

**Safety Data Sheet dated 27/1/2023, version 9**

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## **SECTION 1: Identification of the substance/mixture and of the company/undertaking**

### **1.1. Product identifier**

Identification of the substance

Trade name: B126 - Silver Pencils 5  
Trade code: B126  
CAS number: 7761-88-8  
EC number: 231-853-9  
Index 67/548/EEC: 047-001-00-2  
REACH number: 01-2119513705-43

### **1.2. Relevant identified uses of the substance or mixture and uses advised against**

Recommended use:

Galvanic, base and lab chemistry  
Manufacture of silver nitrate  
Industrial glass making  
Industrial production of catalysts  
Industrial production of contact materials  
Industrial production of photographic material  
Industrial uses resulting in inclusion into or onto a matrix  
Use of silver nitrate as a dissolution agent on oil platform  
Professional use of silver nitrate in the photographic sector  
Consumer use of unprocessed photo paper containing silver in the emulsion layer

### **1.3. Details of the supplier of the safety data sheet**

Company:  
CABRO SPA - AREZZO  
Road Setteponti 141  
52100 - Italy  
CABRO SPA  
Phone n. +39 0575 984442  
Office hours: 9-13 / 14.30-17.30

Competent person responsible for the safety data sheet:

info@cabro.it

### **1.4. Emergency telephone number**

CABRO SPA  
Phone n. +39 0575 984442  
Office hours: 9-13 / 14.30-17.30  
Poison Information Center - 24/24h Careggi Hospital (Florence) - Phone +39 055 7947819  
Poison Information Center - 24/24h Foggia Hospital - Phone +39 0881-732326  
Poison Information Center - 24/24h Bergamo Hospital - Phone +39 800 883300

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## **SECTION 2: Hazards identification**

### **2.1. Classification of the substance or mixture**

EC regulation criteria 1272/2008 (CLP)

- ⚠ Danger, Ox. Sol. 2, May intensify fire; oxidiser.
- ⚠ Warning, Met. Corr. 1, May be corrosive to metals.
- ⚠ Danger, Skin Corr. 1B, Causes severe skin burns and eye damage.
- ⚠ Warning, Aquatic Acute 1, Very toxic to aquatic life.
- ⚠ Warning, Aquatic Chronic 1, Very toxic to aquatic life with long lasting effects.

Adverse physicochemical, human health and environmental effects:

No other hazards

### **2.2. Label elements**

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## B126 - Silver Pencils 5



Hazard pictograms:



Danger

Hazard statements:

H272 May intensify fire; oxidiser.

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements:

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P220 Keep away from clothing and other combustible materials.

P273 Avoid release to the environment.

P280 Wear protective gloves/clothing and eye/face protection.

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 Immediately call a POISON CENTER/doctor.

P370+P378 In case of fire, use a dry powder fire extinguisher to extinguish.

P391 Collect spillage.

Special Provisions:

None

Contains

silver nitrate

Special provisions according to Annex XVII of REACH and subsequent amendments:

None

### 2.3. Other hazards

No PBT, vPvB or endocrine disruptor substances present in concentration  $\geq 0.1\%$

Other Hazards:

No other hazards

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Identification of the substance

Chemical characterization: B126 - Silver Pencils 5

Trade code: B126

CAS number: 7761-88-8

EC number: 231-853-9

REACH number: 01-2119513705-43

Qty	Name	Ident. Number	Classification
100 %	silver nitrate	Index number: 047-001-00-2 CAS: 7761-88-8 EC: 231-853-9	2.14/2 Ox. Sol. 2 H272 2.16/1 Met. Corr. 1 H290 3.2/1B Skin Corr. 1B H314 4.1/A1 Aquatic Acute 1 H400

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## B126 - Silver Pencils 5



		REACH No.: 01- 2119513705 -43	M=1000. 4.1/C1 Aquatic Chronic 1 H410 M=100.
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3.2. Mixtures  
N.A.

### SECTION 4: First aid measures

#### 4.1. Description of first aid measures

In case of skin contact:

Immediately take off all contaminated clothing.  
OBTAIN IMMEDIATE MEDICAL ATTENTION.  
Remove contaminated clothing immediately and dispose off safely.  
After contact with skin, wash immediately with soap and plenty of water.

In case of eyes contact:

After contact with the eyes, rinse with water with the eyelids open for a sufficient length of time, then consult an ophthalmologist immediately.  
Protect uninjured eye.

In case of Ingestion:

Do not under any circumstances induce vomiting. OBTAIN A MEDICAL EXAMINATION IMMEDIATELY.

In case of Inhalation:

Remove casualty to fresh air and keep warm and at rest.

#### 4.2. Most important symptoms and effects, both acute and delayed

None

#### 4.3. Indication of any immediate medical attention and special treatment needed

In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Treatment:

None

### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

Suitable extinguishing media:  
In case of fire, use a dry powder fire extinguisher to extinguish.  
Extinguishing media which must not be used for safety reasons:  
None in particular.

#### 5.2. Special hazards arising from the substance or mixture

Do not inhale combustion gases  
Burning produces heavy smoke.

#### 5.3. Advice for firefighters

Use suitable breathing apparatus .  
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.  
Move undamaged containers from immediate hazard area if it can be done safely.

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

For non emergency personnel:  
Wear personal protection equipment.  
Remove persons to safety.  
See protective measures under point 7 and 8.  
For emergency responders:  
Wear personal protection equipment.

**6.2. Environmental precautions**

Do not allow to enter into soil/subsoil. Do not allow to enter into surface water or drains.  
Retain contaminated washing water and dispose it.  
In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

Suitable material for taking up: absorbing material, organic, sand

**6.3. Methods and material for containment and cleaning up**

Wash with plenty of water.

**6.4. Reference to other sections**

See also section 8 and 13

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**SECTION 7: Handling and storage**

**7.1. Precautions for safe handling**

Avoid contact with skin and eyes, inhalation of vapours and mists.  
Don't use empty container before they have been cleaned.  
Before making transfer operations, assure that there aren't any incompatible material residuals in the containers.  
See also section 8 for recommended protective equipment.  
Advice on general occupational hygiene:  
Contaminated clothing should be changed before entering eating areas.  
Do not eat or drink while working.

**7.2. Conditions for safe storage, including any incompatibilities**

Store at below 20 °C. Keep away from unguarded flame and heat sources. Avoid direct exposure to sunlight.  
Keep away from unguarded flame, sparks, and heat sources. Avoid direct exposure to sunlight.  
Keep away from food, drink and feed.  
Incompatible materials:  
Keep away from combustible materials.  
Instructions as regards storage premises:  
Cool and adequately ventilated.

**7.3. Specific end use(s)**

None in particular

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**SECTION 8: Exposure controls/personal protection**

**8.1. Control parameters**

silver nitrate - CAS: 7761-88-8

TLV - TWA: 0.01 mg/m<sup>3</sup>

DNEL Exposure Limit Values

B126 - Silver Pencils 5 - CAS: 7761-88-8

Exposure: Human Inhalation

silver nitrate - CAS: 7761-88-8

Worker Industry: 0.016 mg/m<sup>3</sup> - Exposure: Human Inhalation

PNEC Exposure Limit Values

silver nitrate - CAS: 7761-88-8

Target: Fresh Water - Value: 40 ng/L

Target: Marine water - Value: 860 ng/L

Target: Sewage treatment plant - Value: 25 µg/l

Target: Freshwater sediments - Value: 438.13 mg/kg dwt

Target: Marine water sediments - Value: 438.13 mg/kg dwt

**8.2. Exposure controls**

Eye protection:

Use close fitting safety goggles, don't use eye lens.

Protection for skin:

Use clothing that provides comprehensive protection to the skin, e.g. cotton, rubber, PVC or viton.

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### B126 - Silver Pencils 5



Protection for hands:

Use protective gloves that provides comprehensive protection, e.g. P.V.C., neoprene or rubber.

Respiratory protection:

Not needed for normal use.

Thermal Hazards:

None

Environmental exposure controls:

None

Appropriate engineering controls:

None

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Properties	Value	Method:	Notes
Physical state:	Solid	--	--
Colour:	Whitish	--	--
Odour:	odorless	--	--
Melting point/freezing point:	212 °C	--	--
Boiling point or initial boiling point and boiling range:	N.A.	--	--
Flammability:	It's capable of catching fire or being set on fire	--	--
Lower and upper explosion limit:	N.A.	--	--
Flash point:	N.A.	--	--
Auto-ignition temperature:	N.A.	--	--
Decomposition temperature:	N.A.	--	--
pH:	3.8-6.0	--	55 gr/L AgNO <sub>3</sub>
Kinematic viscosity:	N.A.	--	--
Solubility in water:	Soluble	--	--
Solubility in oil:	N.A.	--	--
Partition coefficient n-octanol/water (log value):	N.A.	--	--
Vapour pressure:	N.A.	--	--

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Density and/or relative density:	N.A.	--	--
Relative vapour density:	N.A.	--	--
Particle characteristics:			
Particle size:	N.A.	--	--

#### 9.2. Other information

Properties	Value	Method:	Notes
Miscibility:	N.A.	--	--

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Stable under normal conditions

### 10.2. Chemical stability

Stable under normal conditions

### 10.3. Possibility of hazardous reactions

None

### 10.4. Conditions to avoid

Stable under normal conditions.

### 10.5. Incompatible materials

Avoid contact with combustible materials: the product may explode.

### 10.6. Hazardous decomposition products

None.

## SECTION 11: Toxicological information

### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Toxicological information of the substance:

B126 - Silver Pencils 5 - CAS: 7761-88-8

#### a) acute toxicity

Not classified

Based on available data, the classification criteria are not met

#### b) skin corrosion/irritation

The product is classified: Skin Corr. 1B H314

#### c) serious eye damage/irritation

Not classified

Based on available data, the classification criteria are not met

#### d) respiratory or skin sensitisation

Not classified

Based on available data, the classification criteria are not met

#### e) germ cell mutagenicity

Not classified

Based on available data, the classification criteria are not met

#### f) carcinogenicity

Not classified

Based on available data, the classification criteria are not met

#### g) reproductive toxicity

Not classified

Based on available data, the classification criteria are not met

- h) STOT-single exposure  
Not classified  
Based on available data, the classification criteria are not met
- i) STOT-repeated exposure  
Not classified  
Based on available data, the classification criteria are not met
- j) aspiration hazard  
Not classified  
Based on available data, the classification criteria are not met

**11.2. Information on other hazards**

Endocrine disrupting properties:

No endocrine disruptor substances present in concentration  $\geq 0.1\%$

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**SECTION 12: Ecological information**

**12.1. Toxicity**

Adopt good working practices, so that the product is not released into the environment.

B126 - Silver Pencils 5 - CAS: 7761-88-8

The product is classified: Aquatic Acute 1 - H400; Aquatic Chronic 1 - H410  
silver nitrate - CAS: 7761-88-8

a) Aquatic acute toxicity:

Endpoint: LC50 - Species: Fish = 1.2 µg/l - Duration h: 96

Endpoint: LC50 - Species: Invertebrates = 220 ng/L - Duration h: 48

b) Aquatic chronic toxicity:

Endpoint: EC10 - Species: Fish = 440 ng/L - Duration h: 768

Endpoint: EC10 - Species: Fish = 50-590 ng/L - Duration h: 792

Endpoint: EC10 - Species: Fish = 950-1410 ng/L - Duration h: 816

Endpoint: NOEC - Species: Invertebrates = 310 ng/L - Duration h: 480

e) Plant toxicity:

Endpoint: EC10 - Species: plants = 6.4-16.67 µg/l - Duration h: 168

**12.2. Persistence and degradability**

N.A.

**12.3. Bioaccumulative potential**

N.A.

**12.4. Mobility in soil**

N.A.

**12.5. Results of PBT and vPvB assessment**

vPvB Substances: None - PBT Substances: None

**12.6. Endocrine disrupting properties**

No endocrine disruptor substances present in concentration  $\geq 0.1\%$

**12.7. Other adverse effects**

None

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**SECTION 13: Disposal considerations**

**13.1. Waste treatment methods**

Recover, if possible. Send to authorised disposal plants or for incineration under controlled conditions. In so doing, comply with the local and national regulations currently in force.

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**SECTION 14: Transport information**



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### B126 - Silver Pencils 5



- 14.1. UN number or ID number**  
ADR-UN Number: 1493  
IATA-UN Number: 1493  
IMDG-UN Number: 1493
- 14.2. UN proper shipping name**  
ADR-Shipping Name: SILVER NITRATE  
IATA-Shipping Name: SILVER NITRATE  
IMDG-Shipping Name: SILVER NITRATE
- 14.3. Transport hazard class(es)**  
ADR-Class: 5.1  
ADR - Hazard identification number: 50  
IATA-Class: 5.1  
IATA-Label: 5.1  
IMDG-Class: 5.1
- 14.4. Packing group**  
ADR-Packing Group: II  
IATA-Packing group: II  
IMDG-Packing group: II
- 14.5. Environmental hazards**  
ADR-Environmental Pollutant: Yes  
IMDG-Marine pollutant: Marine Pollutant  
IMDG-EmS: F-A,  
S-Q
- 14.6. Special precautions for user**  
ADR-Subsidiary hazards: -  
ADR-S.P.: -  
ADR-Transport category (Tunnel restriction code): 2 (E)  
IATA-Passenger Aircraft: 558  
IATA-Subsidiary hazards: -  
IATA-Cargo Aircraft: 562  
IATA-S.P.: -  
IATA-ERG: 5L  
IMDG-Subsidiary hazards: -  
IMDG-Stowage and handling: Category A  
IMDG-Segregation: -
- 14.7. Maritime transport in bulk according to IMO instruments**  
N.A.

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## SECTION 15: Regulatory information

- 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**  
Dir. 98/24/EC (Risks related to chemical agents at work)  
Dir. 2000/39/EC (Occupational exposure limit values)  
Regulation (EC) n. 1907/2006 (REACH)  
Regulation (EC) n. 1272/2008 (CLP)  
Regulation (EC) n. 790/2009 (ATP 1 CLP) and (EU) n. 758/2013  
Regulation (EU) n. 2020/878  
Regulation (EU) n. 286/2011 (ATP 2 CLP)  
Regulation (EU) n. 618/2012 (ATP 3 CLP)  
Regulation (EU) n. 487/2013 (ATP 4 CLP)  
Regulation (EU) n. 944/2013 (ATP 5 CLP)  
Regulation (EU) n. 605/2014 (ATP 6 CLP)  
Regulation (EU) n. 2015/1221 (ATP 7 CLP)  
Regulation (EU) n. 2016/918 (ATP 8 CLP)  
Regulation (EU) n. 2016/1179 (ATP 9 CLP)  
Regulation (EU) n. 2017/776 (ATP 10 CLP)



Regulation (EU) n. 2018/669 (ATP 11 CLP)  
Regulation (EU) n. 2018/1480 (ATP 13 CLP)  
Regulation (EU) n. 2019/521 (ATP 12 CLP)  
Regulation (EU) n. 2020/217 (ATP 14 CLP)  
Regulation (EU) n. 2020/1182 (ATP 15 CLP)  
Regulation (EU) n. 2021/643 (ATP 16 CLP)  
Regulation (EU) n. 2021/849 (ATP 17 CLP)

Restrictions related to the product or the substances contained according to Annex XVII Regulation (EC) 1907/2006 (REACH) and subsequent modifications:

Restrictions related to the product:

No restriction.

Restrictions related to the substances contained:

Restriction 75

Where applicable, refer to the following regulatory provisions :

Directive 2012/18/EU (Seveso III)

Regulation (EC) nr 648/2004 (detergents).

Dir. 2004/42/EC (VOC directive)

Provisions related to directive EU 2012/18 (Seveso III):

Seveso III category according to Annex 1, part 1

Product belongs to category: P8, E1

#### 15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for the substance.

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### SECTION 16: Other information

Full text of phrases referred to in Section 3:

H272 May intensify fire; oxidiser.

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Hazard class and hazard category	Code	Description
Ox. Sol. 2	2.14/2	Oxidising solid, Category 2
Met. Corr. 1	2.16/1	Substance or mixture corrosive to metals, Category 1
Skin Corr. 1B	3.2/1B	Skin corrosion, Category 1B
Aquatic Acute 1	4.1/A1	Acute aquatic hazard, category 1
Aquatic Chronic 1	4.1/C1	Chronic (long term) aquatic hazard, category 1

This safety data sheet has been completely updated in compliance to Regulation 2020/878.

This document was prepared by a competent person who has received appropriate training.

Main bibliographic sources:

ECDIN - Environmental Chemicals Data and Information Network - Joint Research Centre,  
Commission of the European Communities

## Safety Data Sheet

### B126 - Silver Pencils 5



SAX's DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS - Eight Edition - Van Nostrand Reinold

The information contained herein is based on our state of knowledge at the above-specified date. It refers solely to the product indicated and constitutes no guarantee of particular quality.

It is the duty of the user to ensure that this information is appropriate and complete with respect to the specific use intended.

This MSDS cancels and replaces any preceding release.

## Exposure Scenario, 08/10/2019

Substance identity	
<b>Chemical name</b>	SILVER NITRATE
<b>CAS No.</b>	7761-88-8
<b>EINECS No.</b>	231-853-9

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1. **ES 1**      Manufacture of silver nitrate
2. **ES 2**      Use at industrial site; Intermediate (PC19); Manufacture of other non-metallic mineral products, e.g. plasters, cement (SU13)
3. **ES 3**      Use at industrial site; Intermediate (PC19); Various sectors (SU8, SU9)
4. **ES 4**      Use at industrial site; Intermediate (PC19)
5. **ES 5**      Use at industrial site; Intermediate (PC19)
6. **ES 6**      Use at industrial site; Various products (PC1, PC8, PC9a, PC14, PC15); Various sectors (SU5, SU6b, SU13, SU16, SU19)
7. **ES 7**      Use at industrial site; Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20); Offshore industries (SU2b)
8. **ES 8**      Widespread use by professional workers; Photo-chemicals (PC30); Manufacture of pulp, paper and paper products (SU6b)
9. **ES 9**      Consumer use

1. ES 1		Manufacture of silver nitrate	
<b>1.1 TITLE SECTION</b>			
Exposure Scenario name	Manufacture of substance		
Date - Version	07/10/2019 - 1.0		
Life Cycle Stage	Manufacture of silver nitrate		
Main user group	Industrial uses		
<b>Environment Contributing Scenario</b>			
CS1 Environmental exposure scenario for the manufacture of silver nitrate		ERC1	
<b>Worker Contributing Scenario</b>			
CS2 Handling of solutions containing silver nitrate during manufacture		PROC1 - PROC2	
CS3 Handling of solutions containing silver nitrate during manufacture		PROC3	
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CS8 Handling of solutions containing silver nitrate during manufacture		PROC18	
CS9 Handling of solutions containing silver nitrate during manufacture		PROC 27b	
CS10 Handling of silver nitrate crystals during manufacture		PROC1 - PROC2	
CS11 Handling of silver nitrate crystals during manufacture		PROC3	
CS12 Handling of silver nitrate crystals during manufacture		PROC4 - PROC5 - PROC21	
CS13 Handling of silver nitrate crystals during manufacture		PROC8a - PROC19	
CS14 Handling of silver nitrate crystals during manufacture		PROC8b - PROC9 - PROC14 - PROC15	
<b>1.2 Conditions of use affecting exposure</b>			
<b>1.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the manufacture of silver nitrate (ERC1)</b>			
Environmental release categories	Manufacture of the substance (ERC1)		
<i>Product (article) characteristics</i>			
<b>Physical form of product:</b> Solid, not biodegradable			
<i>Amount used, frequency and duration of use (or from service life)</i>			
<b>Amounts used:</b> Annual site tonnage = 200 t			
<b>Maximum allowable site tonnage (MSafe):</b> 0.0133 kg Ag/day			
<b>Critical compartment for Msafe:</b> Emission to on site or off site wastewater treatment works			
<b>Release type:</b> Continuous release			
<b>Emission days:</b> 300 days per year			
<i>Technical and organisational conditions and measures</i>			
<b>Control measures to prevent releases</b>			

No measured emission data for water. Emission from SPERC factsheet "Production v2.1"  
 Assumed waste water goes to sewage treatment works in local freshwater assessment  
 Assumed waste water by-passes sewage treatment works in local marine assessment.  
 There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases).  
 No measured emission data for air. Emission from SPERC factsheet "Production v2.1"  
 Modelled release factors to air 0.03%, water 0.002% before sewage treatment plant, soil 0%

#### Conditions and measures related to sewage treatment plant

##### STP type:

Municipal Sewage Treatment Plant

##### Additional information on STP:

Zero degradation assumed. Partitioning: 80.1% to sludge, 19.9% to water calculated based on measured partition coefficients.

##### STP sludge treatment:

Controlled application of sewage sludge to agricultural soil

##### STP effluent (m<sup>3</sup>/day): 2000

#### Conditions and measures related to treatment of waste (including article waste)

##### Waste treatment

Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste.

Fraction of daily/annual use expected in waste: 0%

Appropriate waste codes: 06 05 02\*, 08 01 11, 08 03 12\*, 09 01 01\*, 09 01 03\*, 09 01 04\*, 09 01 05\*, 09 01 06\*, 09 01 13\*, 10 06 06\*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09\*, 15 01 10\*, 15 02 02\*, 16 01 18, 16 03 03\*, 16 08 01, 16 11 04.

Release to the floor, water and soil are to be prevented.

Waste containing silver is recycled for almost a 100%

Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste.

Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.

##### Additional conditions environment

Default data for the municipal sewage treatment plant is 2000 m<sup>3</sup>/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.

#### Other conditions affecting environmental exposure

##### Local freshwater dilution factor: 10

##### Receiving surface water flow: 18000 m<sup>3</sup>/day

#### 1.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC1, PROC2)

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### Product (article) characteristics

##### Physical form of product:

Aqueous solution

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Separation of workers and localised controls (LC) are not required

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure control measures are regularly inspected and maintained.  
 Ensure operatives are trained to minimise exposures.

#### Additional conditions human health

For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes

#### 1.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC3)

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure control measures are regularly inspected and maintained.  
 Ensure operatives are trained to minimise exposures.

#### Additional conditions human health

For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

#### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes

### **1.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC5, PROC4)**

<b>Process Categories</b>	Mixing or blending in batch processes - Chemical production where opportunity for exposure arises (PROC5, PROC4)
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#### *Product (article) characteristics*

#### **Physical form of product:**

Aqueous solution

#### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

#### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

#### **Technical and organisational measures**

Separation of workers is generally not required	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure control measures are regularly inspected and maintained.	
Ensure operatives are trained to minimise exposures.	

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

#### **Personal protection**

Wear suitable gloves tested to EN374.

Use suitable eye protection.

#### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

#### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### **Additional Good Practice Advice:**

Wear suitable face shield. Wear suitable protective clothes Wear safety shoes

### **1.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC7)**

<b>Process Categories</b>	Industrial spraying (PROC7)
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#### *Product (article) characteristics*

#### **Physical form of product:**

Aqueous solution

#### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

#### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

#### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure control measures are regularly inspected and maintained.  
Ensure operatives are trained to minimise exposures.

#### **Additional conditions human health**

Ensure full containment with silver application booth

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

#### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

#### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### **1.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC8a, PROC19)**

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
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#### *Product (article) characteristics*

#### **Physical form of product:**

Aqueous solution

#### **Additional conditions human health**



According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

- Separation of workers and localised controls (LC) are not required
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure control measures are regularly inspected and maintained.
- Ensure operatives are trained to minimise exposures.

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

- Wear a FFP2 mask with APF=10
- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

##### **Additional conditions human health**

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **1.2. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC8b, PROC9, PROC13, PROC15)**

##### **Process Categories**

Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Treatment of articles by dipping and pouring - Use as laboratory reagent (PROC8b, PROC9, PROC13, PROC15)

#### *Product (article) characteristics*

##### **Physical form of product:**

Aqueous solution

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure control measures are regularly inspected and maintained.  
 Ensure operatives are trained to minimise exposures.

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable face shield. Wear suitable protective clothes Wear safety shoes

**1.2. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC18)**

**Process Categories**

General greasing/lubrication at high kinetic energy conditions (PROC18)

*Product (article) characteristics*

**Physical form of product:**

Aqueous solution

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*

**Technical and organisational measures**

Separation of workers is generally not required

Emission reduction because of the paste-like nature of the grease

Inhalation - minimum efficiency of: = 89 %

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure control measures are regularly inspected and maintained.

Ensure operatives are trained to minimise exposures.

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 1.2. CS9: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC 27b)

<b>Process Categories</b>	Production of metal powders (wet processes) (PROC 27b)
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#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Separation of workers is generally not required

Local exhaust ventilation

Inhalation - minimum efficiency of: = 78 %

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure control measures are regularly inspected and maintained.

Ensure operatives are trained to minimise exposures.

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear a FFP2 mask with APF=10

Wear suitable gloves tested to EN374.

Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m3/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes

### 1.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC1, PROC2)

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> Crystals	
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ( <a href="http://www.ebrc.de/mease.html">www.ebrc.de/mease.html</a> ).	
<i>Amount used, frequency and duration of use/exposure</i>	
<b>Duration:</b> Exposure duration = 480 min/day	
<i>Technical and organisational conditions and measures</i>	
<b>Technical and organisational measures</b> Separation of workers and localised controls (LC) are not required Avoid to blow dust (including dust remaining from dried splashes) off with compressed air Ensure control measures are regularly inspected and maintained. Ensure operatives are trained to minimise exposures.	
<b>Additional conditions human health</b> For the closed process no segregation is required	
<i>Conditions and measures related to personal protection, hygiene and health evaluation</i>	
<b>Personal protection</b> Wear suitable gloves tested to EN374. Use suitable eye protection.	
<b>Additional conditions human health</b> Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).	
<i>Other conditions affecting worker exposure</i>	
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m <sup>3</sup> /shift (8 hours)	
<i>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</i>	
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.	
<b>1.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC3)</b>	
<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> Crystals	
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third	

group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure control measures are regularly inspected and maintained.  
 Ensure operatives are trained to minimise exposures.

##### **Additional conditions human health**

For the closed process no segregation is required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **1.2. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC4, PROC5, PROC21)**

##### **Process Categories**

Chemical production where opportunity for exposure arises - Mixing or blending in batch processes - Low energy manipulation and handling of substances bound in/on materials or articles (PROC4, PROC5, PROC21)

#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers is generally not required	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure control measures are regularly inspected and maintained.	
Ensure operatives are trained to minimise exposures.	

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### **1.2. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC8a, PROC19)**

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure control measures are regularly inspected and maintained.  
 Ensure operatives are trained to minimise exposures.

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear a FFP2 mask with APF=10  
 Wear suitable gloves tested to EN374.

Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes

## 1.2. CS14: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC8b, PROC9, PROC14, PROC15)

#### Process Categories

Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Tableting, compression, extrusion, pelletisation, granulation - Use as laboratory reagent (PROC8b, PROC9, PROC14, PROC15)

### Product (article) characteristics

#### Physical form of product:

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure control measures are regularly inspected and maintained.  
Ensure operatives are trained to minimise exposures.  
Separation of workers and localised controls (LC) are not required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable face shield. Wear suitable protective clothes Wear safety shoes

## 1.3 Exposure estimation and reference to its source



### 1.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for the manufacture of silver nitrate (ERC1)

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 0.000458 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 4.05E-05 mg/L	EUSES v2.1	< 1
marine water	= 1.92E-05 mg/L	EUSES v2.1	= 0.0223
freshwater sediment	= 1.68 mg/kg wet weight	EUSES v2.1	= 0.0176
marine sediment	= 0.796 mg/kg wet weight	EUSES v2.1	= 0.00835
soil	= 0.29 mg/kg wet weight	EUSES v2.1	= 0.229
Sewage treatment plant	= 0.00133 mg/L	EUSES v2.1	= 0.0531

### 1.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 1.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 1.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC5, PROC4)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69



#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 1.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC7)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.006 mg/m <sup>3</sup>	Measured data	= 0.39

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 1.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 1.3. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC8b, PROC9, PROC13, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 1.3. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC18)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 1.3. CS9: Worker Contributing Scenario: Handling of solutions containing silver nitrate during manufacture (PROC 27b)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.0022 mg/m <sup>3</sup>	MEASE	= 0.14

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 1.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 1.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 1.3. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC4, PROC5, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission

potential of silver nitrate crystals

### 1.3. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

The combination of "massive effect" and PROC 19 is not possible in MEASE, so exclusively for this process, use "aqueous solution" in order to reflect a very low emission potential of silver nitrate crystals.

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 1.3. CS14: Worker Contributing Scenario: Handling of silver nitrate crystals during manufacture (PROC8b, PROC9, PROC14, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

## 1.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Guidance to check compliance with the exposure scenario:

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.

#### Scaling tool:

MetalEUSES

#### Scaling instructions:

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

#### Scaling web link:

<http://www.arche-consulting.be/Metal-CSA-toolbox/duscaling-tool>

#### Scaling tool:

MEASE

#### Scaling instructions:

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

**Scaling web link:**

<http://www.ebrc.de/mease.html>

2. ES 2 Use at industrial site; Intermediate (PC19); Manufacture of other non-metallic mineral products, e.g. plasters, cement (SU13)

## 2.1 TITLE SECTION

Exposure Scenario name	Industrial glass making
Date - Version	07/10/2019 - 1.0
Life Cycle Stage	Use at industrial site
Main user group	Industrial uses
Sector(s) of use	Manufacture of other non-metallic mineral products, e.g. plasters, cement (SU13)
Product Categories	Intermediate (PC19)

### Environment Contributing Scenario

CS1 Environmental exposure scenario for glass making	ERC6a
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### Worker Contributing Scenario

CS2 Handling of solutions containing silver nitrate during industrial use	PROC1 - PROC2
CS3 Handling of solutions containing silver nitrate during industrial use	PROC3
CS4 Handling of solutions containing silver nitrate during industrial use	PROC4 - PROC5
CS5 Handling of solutions containing silver nitrate during industrial use	PROC7
CS6 Handling of solutions containing silver nitrate during industrial use	PROC8a - PROC19
CS7 Handling of solutions containing silver nitrate during industrial use	PROC8b - PROC9 - PROC13 - PROC15
CS8 Handling of silver nitrate crystals during industrial use	PROC1 - PROC2
CS9 Handling of silver nitrate crystals during industrial use	PROC3
CS10 Handling of silver nitrate crystals during industrial use	PROC4 - PROC5 - PROC21
CS11 Handling of silver nitrate crystals during industrial use	PROC8a - PROC19
CS12 Handling of silver nitrate crystals during industrial use	PROC8b - PROC9 - PROC14 - PROC15

## 2.2 Conditions of use affecting exposure

### 2.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for glass making (ERC6a)

Environmental release categories	Use of intermediate (ERC6a)
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#### Product (article) characteristics

#### Physical form of product:

Liquid, not biodegradable

#### Amount used, frequency and duration of use (or from service life)

#### Amounts used:

Annual site tonnage = 17.78 t

**Maximum allowable site tonnage (MSafe):** 0.0133 kg Ag/day

**Critical compartment for MSafe:** Emission to on site or off site wastewater treatment works

**Release type:** Continuous release

**Emission days:** 300 days per year

#### Technical and organisational conditions and measures

## Control measures to prevent releases

No measured emission data for water. Emission from SPERC factsheet "Production v2.1"  
 Assumed waste water goes to sewage treatment works in local freshwater assessment  
 Assumed waste water by-passes sewage treatment works in local marine assessment.  
 There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases).  
 No measured emission data for air. Emission from SPERC factsheet "Production v2.1"  
 Modelled release factors to air 0.03%, water 0.002% before sewage treatment plant, soil 0%

### Conditions and measures related to sewage treatment plant

#### STP type:

Municipal Sewage Treatment Plant

#### Additional information on STP:

Zero degradation assumed. Partitioning: 80.1% to sludge, 19.9% to water calculated based on measured partition coefficients.

#### STP sludge treatment:

Controlled application of sewage sludge to agricultural soil

#### STP effluent (m<sup>3</sup>/day): 2000

### Conditions and measures related to treatment of waste (including article waste)

#### Waste treatment

Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste.  
 Fraction of daily/annual use expected in waste: 0%  
 Appropriate waste codes: 06 05 02\*, 08 01 11, 08 03 12\*, 09 01 01\*, 09 01 03\*, 09 01 04\*, 09 01 05\*, 09 01 06\*, 09 01 13\*, 10 06 06\*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09\*, 15 01 10\*, 15 02 02\*, 16 01 18, 16 03 03\*, 16 08 01, 16 11 04.  
 Release to the floor, water and soil are to be prevented.  
 Waste containing silver is recycled for almost a 100%  
 Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste.  
 Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.

#### Additional conditions environment

Default data for the municipal sewage treatment plant is 2000 m<sup>3</sup>/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.

### Other conditions affecting environmental exposure

#### Local freshwater dilution factor: 10

#### Receiving surface water flow: 18000 m<sup>3</sup>/day

### 2.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 2.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 2.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Process Categories	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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### Product (article) characteristics

### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Separation of workers is generally not required	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure



**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**2.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)**

<b>Process Categories</b>	Industrial spraying (PROC7)
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*Product (article) characteristics*

**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*

**Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

**Additional conditions human health**

Ensure full containment with silver application booth

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**2.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)**

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
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*Product (article) characteristics*

**Physical form of product:**

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.  
 Wear a FFP2 mask with APF=10

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 2.2. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Treatment of articles by dipping and pouring - Use as laboratory reagent (PROC8b, PROC9, PROC13, PROC15)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 2.2. CS8: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)

##### Process Categories

Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)

#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 2.2. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

### Process Categories

Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

### Product (article) characteristics

### Physical form of product:

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 2.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes - Low energy manipulation and handling of substances bound in/on materials or articles (PROC4, PROC5, PROC21)										
<i>Product (article) characteristics</i>											
<b>Physical form of product:</b> Crystals											
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ( <a href="http://www.ebrc.de/mease.html">www.ebrc.de/mease.html</a> ).											
<i>Amount used, frequency and duration of use/exposure</i>											
<b>Duration:</b> Exposure duration = 480 min/day											
<i>Technical and organisational conditions and measures</i>											
<b>Technical and organisational measures</b>											
<table border="1"> <tr> <td colspan="2">Avoid to blow dust (including dust remaining from dried splashes) off with compressed air</td></tr> <tr> <td colspan="2">Ensure operatives are trained to minimise exposures.</td></tr> <tr> <td colspan="2">Ensure control measures are regularly inspected and maintained.</td></tr> <tr> <td colspan="2">Separation of workers is generally not required</td></tr> <tr> <td>Local exhaust ventilation</td><td>Inhalation - minimum efficiency of: = 78 %</td></tr> </table>		Avoid to blow dust (including dust remaining from dried splashes) off with compressed air		Ensure operatives are trained to minimise exposures.		Ensure control measures are regularly inspected and maintained.		Separation of workers is generally not required		Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air											
Ensure operatives are trained to minimise exposures.											
Ensure control measures are regularly inspected and maintained.											
Separation of workers is generally not required											
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %										
<i>Conditions and measures related to personal protection, hygiene and health evaluation</i>											
<b>Personal protection</b> Wear suitable gloves tested to EN374. Use suitable eye protection.											
<b>Additional conditions human health</b> Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).											
<i>Other conditions affecting worker exposure</i>											
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m3/shift (8 hours)											
<i>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</i>											
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.											
<b>2.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)</b>											
<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)										
<i>Product (article) characteristics</i>											
<b>Physical form of product:</b> Crystals											

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 2.2. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC14, PROC15)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Tableting, compression, extrusion, pelletisation, granulation - Use as laboratory reagent (PROC8b, PROC9, PROC14, PROC15)
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### Product (article) characteristics

#### Physical form of product:

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 2.3 Exposure estimation and reference to its source

#### 2.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for glass making (ERC6a)

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 4.15E-06 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 9.12E-06 mg/L	EUSES v2.1	= 0.228
marine water	= 1.73E-05 mg/kg wet weight	EUSES v2.1	= 0.00401
freshwater sediment	= 0.378 mg/kg wet weight	EUSES v2.1	= 0.00397
marine sediment	= 3.45E-06 mg/kg wet weight	EUSES v2.1	= 0.0015
soil	= 0.0937 mg/kg wet weight	EUSES v2.1	= 0.0756
Sewage treatment plant	= 0.000118 mg/L	EUSES v2.1	= 0.0472

#### 2.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.



### 2.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 2.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 2.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.006 mg/m <sup>3</sup>	Measured data	= 0.39

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 2.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 2.3. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)



Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 2.3. CS8: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 2.3. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 2.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 2.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

The combination of "massive effect" and PROC 19 is not possible in MEASE, so exclusively for this process, use "aqueous solution" in order to reflect a very low emission potential of silver nitrate crystals.

### 2.3. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC14, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 2.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Guidance to check compliance with the exposure scenario:

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.

#### Scaling tool:

MetalEUSES

#### Scaling instructions:

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

#### Scaling web link:

<http://www.arche-consulting.be/tools/duscaling-tool>

#### Scaling tool:

MEASE

#### Scaling instructions:

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy

of the installed RMMs and PPE.

**Scaling web link:**

<http://www.ebrc.de/mease.html>

### 3. ES 3 Use at industrial site; Intermediate (PC19); Various sectors (SU8, SU9)

#### 3.1 TITLE SECTION

<b>Exposure Scenario name</b>	Industrial production of catalysts
<b>Date - Version</b>	07/10/2019 - 1.0
<b>Life Cycle Stage</b>	Use at industrial site
<b>Main user group</b>	Industrial uses
<b>Sector(s) of use</b>	Manufacture of bulk, large scale chemicals (including petroleum products) (SU8) - Manufacture of fine chemicals (SU9) - Formulation [mixing] of preparations and/or re-packaging (SU10)
<b>Product Categories</b>	Intermediate (PC19)

#### Environment Contributing Scenario

<b>CS1 Environmental exposure scenario for the industrial production of catalysts</b>	ERC6a
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#### Worker Contributing Scenario

<b>CS2 Handling of solutions containing silver nitrate during industrial use</b>	PROC1 - PROC2
<b>CS3 Handling of solutions containing silver nitrate during industrial use</b>	PROC3
<b>CS4 Handling of solutions containing silver nitrate during industrial use</b>	PROC4 - PROC5
<b>CS5 Handling of solutions containing silver nitrate during industrial use</b>	PROC8a
<b>CS6 Handling of solutions containing silver nitrate during industrial use</b>	PROC8b - PROC9 - PROC15
<b>CS7 Handling of silver nitrate crystals during industrial use</b>	PROC1 - PROC2
<b>CS8 Handling of silver nitrate crystals during industrial use</b>	PROC3
<b>CS9 Handling of silver nitrate crystals during industrial use</b>	PROC4 - PROC5 - PROC21
<b>CS10 Handling of silver nitrate crystals during industrial use</b>	PROC8b - PROC9 - PROC15
<b>CS11 Handling of silver nitrate crystals during industrial use</b>	PROC8a

#### 3.2 Conditions of use affecting exposure

#### 3.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the industrial production of catalysts (ERC6a)

<b>Environmental release categories</b>	Use of intermediate (ERC6a)
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#### Product (article) characteristics

##### Physical form of product:

Solid, not biodegradable

#### Amount used, frequency and duration of use (or from service life)

##### Amounts used:

Annual site tonnage = 2.36 t

**Maximum allowable site tonnage (MSafe):** 0.0133 kg Ag/day

**Critical compartment for Msafe:** Emission to on site or off site wastewater treatment works

**Release type:** Continuous release

**Emission days:** 240 days per year

#### Technical and organisational conditions and measures

##### Control measures to prevent releases

No measured emission data for air. Emission from SPERC factsheet "Production v2.1"

Assumed waste water goes to sewage treatment works in local freshwater assessment  
 Assumed waste water by-passes sewage treatment works in local marine assessment.  
 No measured emission data for water. Emission from SPERC factsheet "Production v2.1"  
 There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases).  
 Modelled release factors to air 0.03%, water 0.0023% before sewage treatment plant, soil 0%

#### *Conditions and measures related to sewage treatment plant*

##### **STP type:**

Municipal Sewage Treatment Plant

##### **Additional information on STP:**

Zero degradation assumed. Partitioning: 80.1% to sludge, 19.9% to water calculated based on measured partition coefficients.

##### **STP sludge treatment:**

Controlled application of sewage sludge to agricultural soil

##### **STP effluent (m<sup>3</sup>/day):** 2000

#### *Conditions and measures related to treatment of waste (including article waste)*

##### **Waste treatment**

Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste.

Fraction of daily/annual use expected in waste: 0%

Appropriate waste codes: 06 05 02\*, 08 01 11, 08 03 12\*, 09 01 01\*, 09 01 03\*, 09 01 04\*, 09 01 05\*, 09 01 06\*, 09 01 13\*, 10 06 06\*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09\*, 15 01 10\*, 15 02 02\*, 16 01 18, 16 03 03\*, 16 08 01, 16 11 04.

Release to the floor, water and soil are to be prevented.

Waste containing silver is recycled for almost a 100%

Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste.

Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.

##### **Additional conditions environment**

Default data for the municipal sewage treatment plant is 2000 m<sup>3</sup>/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.

#### *Other conditions affecting environmental exposure*

##### **Local freshwater dilution factor:** 10

##### **Receiving surface water flow:** 18000 m<sup>3</sup>/day

#### **3.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)**

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Aqueous solution

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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### Product (article) characteristics

### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift);

ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**3.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)**

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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*Product (article) characteristics*

**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*

**Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Separation of workers is generally not required	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.

Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*



#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a)

**Process Categories** Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC15)

**Process Categories** Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Use as laboratory reagent (PROC8b, PROC9, PROC15)

#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The



rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### **3.2. CS7: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)**

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 3.2. CS8: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

### Process Categories

Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

### Product (article) characteristics

### Physical form of product:

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.2. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes - Low energy manipulation and handling of substances bound in/on materials or articles (PROC4, PROC5, PROC21)
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#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Separation of workers is generally not required	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.

Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC15)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Use as laboratory reagent (PROC8b, PROC9, PROC15)
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#### Product (article) characteristics

#### Physical form of product:

Crystals

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)
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#### Product (article) characteristics

#### Physical form of product:

Crystals

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal

operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.
- Separation of workers and localised controls (LC) are not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

- Wear suitable gloves tested to EN374.
- Use suitable eye protection.
- Wear a FFP2 mask with APF=10

##### **Additional conditions human health**

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 3.3 Exposure estimation and reference to its source

#### **3.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for the industrial production of catalysts (ERC6a)**

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 6.25E-07 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 6.57E-06 mg/L	EUSES v2.1	= 0.164
marine water	= 2.16E-06 mg/L	EUSES v2.1	= 0.00252
freshwater sediment	= 0.272 mg/kg wet weight	EUSES v2.1	= 0.00286
marine sediment	= 0.0897 mg/kg wet weight	EUSES v2.1	= 0.000942
soil	= 0.0781 mg/kg wet weight	EUSES v2.1	= 0.063
Sewage treatment plant	= 1.96E-05 mg/L	EUSES v2.1	= 0.000783

#### **3.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)**

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 3.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 3.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 3.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 3.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 3.3. CS7: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 3.3. CS8: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 3.3. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 3.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
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inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63
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#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 3.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 3.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Guidance to check compliance with the exposure scenario:

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.

#### Scaling tool:

MetalEUSES

#### Scaling instructions:

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

#### Scaling web link:

<http://www.arche-consulting.be/tools/duscaling-tool>

#### Scaling tool:

MEASE

#### Scaling instructions:

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

#### Scaling web link:

<http://www.ebrc.de/mease.html>



4. ES 4 Use at industrial site; Intermediate (PC19)	
<b>4.1 TITLE SECTION</b>	
<b>Exposure Scenario name</b>	Industrial production of contact materials
<b>Date - Version</b>	07/10/2019 - 1.0
<b>Life Cycle Stage</b>	Use at industrial site
<b>Main user group</b>	Industrial uses
<b>Product Categories</b>	Intermediate (PC19)
<b>Environment Contributing Scenario</b>	
<b>CS1 Environmental exposure scenario for the industrial production of contact materials</b>	ERC6a
<b>Worker Contributing Scenario</b>	
<b>CS2 Handling of solutions containing silver nitrate during industrial use</b>	PROC1 - PROC2
<b>CS3 Handling of solutions containing silver nitrate during industrial use</b>	PROC3
<b>CS4 Handling of solutions containing silver nitrate during industrial use</b>	PROC4 - PROC5
<b>CS5 Handling of solutions containing silver nitrate during industrial use</b>	PROC7
<b>CS6 Handling of solutions containing silver nitrate during industrial use</b>	PROC8a - PROC19
<b>CS7 Handling of solutions containing silver nitrate during industrial use</b>	PROC8b - PROC9 - PROC13 - PROC15
<b>CS8 Handling of solutions containing silver nitrate during industrial use</b>	PROC 27b
<b>CS9 Handling of silver nitrate crystals during industrial use</b>	PROC1 - PROC2
<b>CS10 Handling of silver nitrate crystals during industrial use</b>	PROC3
<b>CS11 Handling of silver nitrate crystals during industrial use</b>	PROC5 - PROC4 - PROC21
<b>CS12 Handling of silver nitrate crystals during industrial use</b>	PROC8a - PROC19
<b>CS13 Handling of silver nitrate crystals during industrial use</b>	PROC8b - PROC9 - PROC15
<b>4.2 Conditions of use affecting exposure</b>	
<b>4.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the industrial production of contact materials (ERC6a)</b>	
<b>Environmental release categories</b>	Use of intermediate (ERC6a)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> solid, not readily biodegradable	
<i>Amount used, frequency and duration of use (or from service life)</i>	
<b>Amounts used:</b> Annual site tonnage = 44.45 t	
<b>Maximum allowable site tonnage (MSafe):</b> 0.0133 kg Ag/day	
<b>Critical compartment for Msafe:</b> Emission to on site or off site wastewater treatment works	
<b>Release type:</b> Continuous release	
<b>Emission days:</b> 300 days per year	
<i>Technical and organisational conditions and measures</i>	

## Control measures to prevent releases

The highest reported tonnage and highest measured emission were used for modelling. Emission of 0.0023% to water were used for this scenario.

Wastewater emission are based on measured data which are considered representative of downstream user

Assumed waste water goes to sewage treatment works in local freshwater assessment

Assumed waste water by-passes sewage treatment works in local marine assessment.

No measured emission data for air. Emission from SPERC factsheet "Production v2.1"

There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases).

Modelled release factors to air 0.03%, water 0.0023% before sewage treatment plant, soil 0%

### Conditions and measures related to sewage treatment plant

#### STP type:

Municipal Sewage Treatment Plant

#### Additional information on STP:

Zero degradation assumed. Partitioning: 80.1% to sludge, 19.9% to water calculated based on measured partition coefficients.

#### STP sludge treatment:

Controlled application of sewage sludge to agricultural soil

#### STP effluent (m<sup>3</sup>/day): 2000

### Conditions and measures related to treatment of waste (including article waste)

#### Waste treatment

Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste.

Fraction of daily/annual use expected in waste: 0%

Appropriate waste codes: 06 05 02\*, 08 01 11, 08 03 12\*, 09 01 01\*, 09 01 03\*, 09 01 04\*, 09 01 05\*, 09 01 06\*, 09 01 13\*, 10 06 06\*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09\*, 15 01 10\*, 15 02 02\*, 16 01 18, 16 03 03\*, 16 08 01, 16 11 04.

Release to the floor, water and soil are to be prevented.

Waste containing silver is recycled for almost a 100%

Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste.

Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.

#### Additional conditions environment

Default data for the municipal sewage treatment plant is 2000 m<sup>3</sup>/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.

### Other conditions affecting environmental exposure

#### Local freshwater dilution factor: 10

#### Receiving surface water flow: 18000 m<sup>3</sup>/day

### 4.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

- Separation of workers and localised controls (LC) are not required
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

- For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

##### Additional conditions human health

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

- The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

- Wear suitable protective clothes
- Wear safety shoes
- Wear suitable face shield.

#### 4.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Process Categories	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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#### Product (article) characteristics

##### Physical form of product:

- Aqueous solution

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

- Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

- Separation of workers and localised controls (LC) are not required
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

- For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 4.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
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Ensure control measures are regularly inspected and maintained.
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Ensure operatives are trained to minimise exposures.
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Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
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Separation of workers is generally not required
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#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

<b>Other conditions affecting worker exposure</b>	
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m <sup>3</sup> /shift (8 hours)	
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</b>	
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.	
<b>4.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)</b>	
<b>Process Categories</b>	Industrial spraying (PROC7)
<b>Product (article) characteristics</b>	
<b>Physical form of product:</b> Aqueous solution	
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ( <a href="http://www.ebrc.de/mease.html">www.ebrc.de/mease.html</a> ).	
<b>Amount used, frequency and duration of use/exposure</b>	
<b>Duration:</b> Exposure duration = 480 min/day	
<b>Technical and organisational conditions and measures</b>	
<b>Technical and organisational measures</b> Separation of workers and localised controls (LC) are not required Ensure operatives are trained to minimise exposures. Ensure control measures are regularly inspected and maintained. Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
<b>Additional conditions human health</b> Ensure full containment with silver application booth	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
<b>Personal protection</b> Wear suitable gloves tested to EN374. Use suitable eye protection.	
<b>Additional conditions human health</b> Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).	
<b>Other conditions affecting worker exposure</b>	
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m <sup>3</sup> /shift (8 hours)	
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</b>	
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.	
<b>4.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)</b>	
<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
<b>Product (article) characteristics</b>	

**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*
**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*
**Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

*Conditions and measures related to personal protection, hygiene and health evaluation*
**Personal protection**

Wear a FFP2 mask with APF=10  
 Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*
**Body parts exposed:**

 The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*
**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**4.2. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)**
**Process Categories**

Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Treatment of articles by dipping and pouring - Use as laboratory reagent (PROC8b, PROC9, PROC13, PROC15)

*Product (article) characteristics*
**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

**Technical and organisational conditions and measures**
**Technical and organisational measures**

- Separation of workers and localised controls (LC) are not required
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

**Conditions and measures related to personal protection, hygiene and health evaluation**
**Personal protection**

- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

**Additional conditions human health**

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

**Other conditions affecting worker exposure**
**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

**Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.**
**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**4.2. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC 27b)**

<b>Process Categories</b>	Production of metal powders (wet processes) (PROC 27b)
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**Product (article) characteristics**
**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

**Amount used, frequency and duration of use/exposure**
**Duration:**

Exposure duration = 480 min/day

**Technical and organisational conditions and measures**
**Technical and organisational measures**

Ensure operatives are trained to minimise exposures.

Ensure control measures are regularly inspected and maintained.

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Local exhaust ventilation

Inhalation - minimum efficiency of: = 78 %



Separation of workers is generally not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear a FFP2 mask with APF=10  
Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **4.2. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)**

##### **Process Categories**

Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)

#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

##### **Additional conditions human health**

For the closed process no segregation is required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift);



ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**4.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)**

**Process Categories**

Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

*Product (article) characteristics*

**Physical form of product:**

Crystals

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*

**Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

**Additional conditions human health**

For the closed process no segregation is required

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**4.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC5, PROC4, PROC21)**

**Process Categories**

Mixing or blending in batch processes - Chemical production where opportunity for exposure arises - Low energy manipulation and handling of substances bound in/on materials or articles (PROC5, PROC4,

PROC21)

#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure control measures are regularly inspected and maintained.

Ensure operatives are trained to minimise exposures.

Separation of workers is generally not required

Local exhaust ventilation

Inhalation - minimum efficiency of: 78 %

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.

Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m3/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 4.2. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)

##### Process Categories

Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)

#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

- Separation of workers and localised controls (LC) are not required
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

- Wear a FFP2 mask with APF=10
- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

##### **Additional conditions human health**

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **4.2. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC15)**

##### **Process Categories**

Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Use as laboratory reagent (PROC8b, PROC9, PROC15)

#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

**Conditions and measures related to personal protection, hygiene and health evaluation**

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

**Other conditions affecting worker exposure**

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**4.3 Exposure estimation and reference to its source**

**4.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for the industrial production of contact materials (ERC6a)**

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 1.02E-05 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 1.48E-05 mg/L	EUSES v2.1	= 0.371
marine water	= 6.33E-06 mg/L	EUSES v2.1	= 0.00736
freshwater sediment	= 0.615 mg/kg wet weight	EUSES v2.1	= 0.00646
marine sediment	= 0.262 mg/kg wet weight	EUSES v2.1	= 0.00275
soil	= 0.128 mg/kg wet weight	EUSES v2.1	= 0.104
Sewage treatment plant	= 0.000339 mg/L	EUSES v2.1	= 0.0136

**4.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)**

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

**Additional information on exposure estimation:**

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

##### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

##### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.006 mg/m <sup>3</sup>	Measured data	= 0.39

##### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

##### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC 27b)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.0022 mg/m <sup>3</sup>	MEASE	= 0.14

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC5, PROC4, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

The combination of "massive effect" and PROC 19 is not possible in MEASE, so exclusively for this process, use "aqueous solution" in order to reflect a very low emission potential of silver nitrate crystals.

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.3. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 4.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

##### Guidance to check compliance with the exposure scenario:

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.



**Scaling tool:**

MetalEUSES

**Scaling instructions:**

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

**Scaling web link:**

<http://www.arche-consulting.be/tools/duscaling-tool>

**Scaling tool:**

MEASE

**Scaling instructions:**

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

**Scaling web link:**

<http://www.ebrc.de/mease.html>

5. ES 5 Use at industrial site; Intermediate (PC19)	
<b>5.1 TITLE SECTION</b>	
<b>Exposure Scenario name</b>	Industrial production of photographic material
<b>Date - Version</b>	07/10/2019 - 1.0
<b>Life Cycle Stage</b>	Use at industrial site
<b>Main user group</b>	Industrial uses
<b>Product Categories</b>	Intermediate (PC19)
<b>Environment Contributing Scenario</b>	
<b>CS1 Environmental exposure scenario for the industrial production of photographic material</b>	ERC6a
<b>Worker Contributing Scenario</b>	
<b>CS2 Handling of solutions containing silver nitrate during industrial use</b>	PROC1 - PROC2
<b>CS3 Handling of solutions containing silver nitrate during industrial use</b>	PROC3
<b>CS4 Handling of solutions containing silver nitrate during industrial use</b>	PROC4 - PROC5
<b>CS5 Handling of solutions containing silver nitrate during industrial use</b>	PROC7
<b>CS6 Handling of solutions containing silver nitrate during industrial use</b>	PROC8a - PROC19
<b>CS7 Handling of solutions containing silver nitrate during industrial use</b>	PROC8b - PROC9 - PROC13 - PROC15
<b>CS8 Handling of solutions containing silver nitrate during industrial use</b>	PROC 27b
<b>CS9 Handling of silver nitrate crystals during industrial use</b>	PROC1 - PROC2
<b>CS10 Handling of silver nitrate crystals during industrial use</b>	PROC3
<b>CS11 Handling of silver nitrate crystals during industrial use</b>	PROC4 - PROC5 - PROC21
<b>CS12 Handling of silver nitrate crystals during industrial use</b>	PROC8a - PROC19
<b>CS13 Handling of silver nitrate crystals during industrial use</b>	PROC8b - PROC9 - PROC15
<b>5.2 Conditions of use affecting exposure</b>	
<b>5.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the industrial production of photographic material (ERC6a)</b>	
<b>Environmental release categories</b>	Use of intermediate (ERC6a)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b>	Liquid, not biodegradable
<i>Amount used, frequency and duration of use (or from service life)</i>	
<b>Amounts used:</b>	Annual site tonnage = 635 t
<b>Maximum allowable site tonnage (MSafe):</b> 0.0133 kg Ag/day	
<b>Critical compartment for Msafe:</b> Emission to on site or off site wastewater treatment works	
<b>Release type:</b> Continuous release	
<b>Emission days:</b> 300 days per year	
<i>Technical and organisational conditions and measures</i>	

## Control measures to prevent releases

The highest reported tonnage and highest measured emission were used for modelling. Emission of 0.0003% to water were used for this scenario.

Wastewater emission are based on measured data which are considered representative of downstream user

Assumed waste water goes to sewage treatment works in local freshwater assessment

Assumed waste water by-passes sewage treatment works in local marine assessment.

No measured emission data for air. Emission from SPERC factsheet "Production v2.1"

There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases).

Modelled release factors to air 0.03%, water 0.0003% before sewage treatment plant, soil 0%

### Conditions and measures related to sewage treatment plant

#### STP type:

Municipal Sewage Treatment Plant

#### Additional information on STP:

Zero degradation assumed.

#### STP sludge treatment:

Controlled application of sewage sludge to agricultural soil

#### STP effluent (m<sup>3</sup>/day): 2000

### Conditions and measures related to treatment of waste (including article waste)

#### Waste treatment

Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste.

Fraction of daily/annual use expected in waste: 0%

Appropriate waste codes: 06 05 02\*, 08 01 11, 08 03 12\*, 09 01 01\*, 09 01 03\*, 09 01 04\*, 09 01 05\*, 09 01 06\*, 09 01 13\*, 10 06 06\*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09\*, 15 01 10\*, 15 02 02\*, 16 01 18, 16 03 03\*, 16 08 01, 16 11 04.

Release to the floor, water and soil are to be prevented.

Waste containing silver is recycled for almost a 100%

Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste.

Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.

#### Additional conditions environment

Default data for the municipal sewage treatment plant is 2000 m<sup>3</sup>/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.

### Other conditions affecting environmental exposure

#### Local freshwater dilution factor: 10

#### Receiving surface water flow: 18000 m<sup>3</sup>/day

### 5.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

- Separation of workers and localised controls (LC) are not required
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

- For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

##### Additional conditions human health

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

- The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

- Wear suitable protective clothes
- Wear safety shoes
- Wear suitable face shield.

#### 5.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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#### Product (article) characteristics

##### Physical form of product:

- Aqueous solution

##### Additional conditions human health

- According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

- Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

- Separation of workers and localised controls (LC) are not required
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

- For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 5.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
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Ensure operatives are trained to minimise exposures.
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Ensure control measures are regularly inspected and maintained.
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Separation of workers is generally not required
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Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
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#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

<b>Other conditions affecting worker exposure</b>	
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m <sup>3</sup> /shift (8 hours)	
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</b>	
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.	
<b>5.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)</b>	
<b>Process Categories</b>	Industrial spraying (PROC7)
<b>Product (article) characteristics</b>	
<b>Physical form of product:</b> Aqueous solution	
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ( <a href="http://www.ebrc.de/mease.html">www.ebrc.de/mease.html</a> ).	
<b>Amount used, frequency and duration of use/exposure</b>	
<b>Duration:</b> Exposure duration = 480 min/day	
<b>Technical and organisational conditions and measures</b>	
<b>Technical and organisational measures</b> Avoid to blow dust (including dust remaining from dried splashes) off with compressed air Ensure operatives are trained to minimise exposures. Ensure control measures are regularly inspected and maintained. Separation of workers and localised controls (LC) are not required	
<b>Additional conditions human health</b> Ensure full containment with silver application booth	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
<b>Personal protection</b> Wear suitable gloves tested to EN374. Use suitable eye protection.	
<b>Additional conditions human health</b> Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).	
<b>Other conditions affecting worker exposure</b>	
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m <sup>3</sup> /shift (8 hours)	
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</b>	
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.	
<b>5.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)</b>	
<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
<b>Product (article) characteristics</b>	

## Physical form of product:

Aqueous solution

## Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

## Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

## Technical and organisational conditions and measures

### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

## Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

## Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

## Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

## Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 5.2. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)

### Process Categories

Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Treatment of articles by dipping and pouring - Use as laboratory reagent (PROC8b, PROC9, PROC13, PROC15)

## Product (article) characteristics

### Physical form of product:

Aqueous solution

## Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

## Amount used, frequency and duration of use/exposure



**Duration:**

Exposure duration = 480 min/day

**Technical and organisational conditions and measures**
**Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

**Conditions and measures related to personal protection, hygiene and health evaluation**
**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

**Other conditions affecting worker exposure**
**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

**Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.**
**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**5.2. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC 27b)**
**Process Categories**

Production of metal powders (wet processes) (PROC 27b)

**Product (article) characteristics**
**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

**Amount used, frequency and duration of use/exposure**
**Duration:**

Exposure duration = 480 min/day

**Technical and organisational conditions and measures**
**Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure operatives are trained to minimise exposures.

Ensure control measures are regularly inspected and maintained.

Separation of workers is generally not required

Local exhaust ventilation	Inhalation - minimum efficiency of: 78 %
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#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **5.2. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)**

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

##### **Additional conditions human health**

For the closed process no segregation is required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift);

ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**5.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)**

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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*Product (article) characteristics*

**Physical form of product:**

Crystals

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*

**Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

**Additional conditions human health**

For the closed process no segregation is required

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**5.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)**

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes - Low energy manipulation and handling of substances bound in/on materials or articles (PROC4, PROC5,
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PROC21)

#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure operatives are trained to minimise exposures.

Ensure control measures are regularly inspected and maintained.

Separation of workers is generally not required

Local exhaust ventilation

Inhalation - minimum efficiency of: 78 %

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.

Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 5.2. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)

##### Process Categories

Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)

#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **5.2. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC15)**

##### **Process Categories**

Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Use as laboratory reagent (PROC8b, PROC9, PROC15)

#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

**Conditions and measures related to personal protection, hygiene and health evaluation**

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

**Other conditions affecting worker exposure**

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**5.3 Exposure estimation and reference to its source**

**5.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for the industrial production of photographic material (ERC6a)**

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 0.000145 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 1.74E-05 mg/L	EUSES v2.1	= 0.434
marine water	= 1.01E-05 mg/L	EUSES v2.1	= 0.0118
freshwater sediment	= 0.719 mg/kg wet weight	EUSES v2.1	= 0.00755
marine sediment	= 0.42 mg/kg wet weight	EUSES v2.1	= 0.00441
soil	= 0.209 mg/kg wet weight	EUSES v2.1	= 0.168
Sewage treatment plant	= 0.000632 mg/L	EUSES v2.1	= 0.0253

**5.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)**

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

**Additional information on exposure estimation:**

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.006 mg/m <sup>3</sup>	Measured data	= 0.39

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)



Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 5.3. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC 27b)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.0022 mg/m <sup>3</sup>	MEASE	= 0.14

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 5.3. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 5.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 5.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

The combination of "massive effect" and PROC 19 is not possible in MEASE, so exclusively for this process, use "aqueous solution" in order to reflect a very low emission potential of silver nitrate crystals.

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 5.3. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

## 5.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

### Guidance to check compliance with the exposure scenario:

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.

**Scaling tool:**

MetalEUSES

**Scaling instructions:**

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

**Scaling web link:**

<http://www.arche-consulting.be/tools/duscaling-tool>

**Scaling tool:**

MEASE

**Scaling instructions:**

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

**Scaling web link:**

<http://www.ebrc.de/mease.html>

6. ES 6		Use at industrial site; Various products (PC1, PC8, PC9a, PC14, PC15); Various sectors (SU5, SU6b, SU13, SU16, SU19)
6.1 TITLE SECTION		
Exposure Scenario name	Industrial uses resulting in inclusion into or onto a matrix	
Date - Version	07/10/2019 - 1.0	
Life Cycle Stage	Use at industrial site	
Main user group	Industrial uses	
Sector(s) of use	Manufacture of textiles, leather, fur (SU5) - Manufacture of pulp, paper and paper products (SU6b) - Manufacture of other non-metallic mineral products, e.g. plasters, cement (SU13) - Manufacture of computer, electronic and optical products, electrical equipment (SU16) - Building and construction work (SU19) - Health services (SU20) - Electricity, steam, gas water supply and sewage treatment (SU23)	
Product Categories	Adhesives, sealants (PC1) - Biocidal products (PC8) - Coatings and paints, thinners, paint removers (PC9a) - Metal surface treatment products (PC14) - Non-metal surface treatment products (PC15) - Heat transfer fluids (PC16) - Ink and toners (PC18) - Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20) - Laboratory chemicals (PC21) - Leather treatment products (PC23) - Metal working fluids (PC25) - Paper and board treatment products (PC26) - Perfumes, fragrances (PC28) - Photo-chemicals (PC30) - Polishes and wax blends (PC31) - Polymer preparations and compounds (PC32) - Textile dyes and impregnating products (PC34) - Washing and cleaning products (PC35) - Water softeners (PC36) - Water treatment chemicals (PC37) - Welding and soldering products, flux products (PC38)	
Environment Contributing Scenario		
CS1 Environmental exposure scenario for industrial uses resulting in inclusion into or onto a matrix		ERC5
Worker Contributing Scenario		
CS2 Handling of solutions containing silver nitrate during industrial use		PROC1 - PROC2
CS3 Handling of solutions containing silver nitrate during industrial use		PROC3
CS4 Handling of solutions containing silver nitrate during industrial use		PROC4 - PROC5
CS5 Handling of solutions containing silver nitrate during industrial use		PROC7
CS6 Handling of solutions containing silver nitrate during industrial use		PROC8a - PROC19
CS7 Handling of solutions containing silver nitrate during industrial use		PROC8b - PROC9 - PROC13 - PROC15
CS8 Handling of solutions containing silver nitrate during industrial use		PROC18
CS9 Handling of solutions containing silver nitrate during industrial use		PROC 27b
CS10 Handling of silver nitrate crystals during industrial use		PROC1 - PROC2
CS11 Handling of silver nitrate crystals during industrial use		PROC3
CS12 Handling of silver nitrate crystals during industrial use		PROC4 - PROC5 - PROC21
CS13 Handling of silver nitrate crystals during industrial use		PROC8a - PROC19
CS14 Handling of silver nitrate crystals during industrial use		PROC8b - PROC9 - PROC14 - PROC15
6.2 Conditions of use affecting exposure		
6.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for industrial uses resulting in inclusion into or onto a matrix (ERC5)		
Environmental release categories	Use at industrial site leading to inclusion into/onto article (ERC5)	
Product (article) characteristics		
Physical form of product:		

Solid, not biodegradable	
<i>Amount used, frequency and duration of use (or from service life)</i>	
<b>Amounts used:</b> Annual site tonnage = 483 t	
<b>Maximum allowable site tonnage (MSafe):</b> 0.0133 kg Ag/day	
<b>Critical compartment for Msafe:</b> Emission to on site or off site wastewater treatment works	
<b>Release type:</b> Continuous release	
<b>Emission days:</b> 215 days per year	
<i>Technical and organisational conditions and measures</i>	
<b>Control measures to prevent releases</b> The highest reported tonnage and measured emissions were used for modelling. An emission of 0.0132% to water was used for this scenario based on measured data. Wastewater emission are based on measured data which are considered representative of downstream user Assumed waste water goes to sewage treatment works in local freshwater assessment Assumed waste water by-passes sewage treatment works in local marine assessment. No measured emission data for air. Emission from SPERC factsheet "Production v2.1" There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases). Modelled release factors to air 0.5%, water 0.0132% before sewage treatment plant, soil 0%	
<i>Conditions and measures related to sewage treatment plant</i>	
<b>STP type:</b> Municipal Sewage Treatment Plant <b>Additional information on STP:</b> Zero degradation assumed. <b>STP sludge treatment:</b> Controlled application of sewage sludge to agricultural soil <b>STP effluent (m<sup>3</sup>/day):</b> 2000	
<i>Conditions and measures related to treatment of waste (including article waste)</i>	
<b>Waste treatment</b> Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste. Fraction of daily/annual use expected in waste: 0% Appropriate waste codes: 06 05 02*, 08 01 11, 08 03 12*, 09 01 01*, 09 01 03*, 09 01 04*, 09 01 05*, 09 01 06*, 09 01 13*, 10 06 06*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09*, 15 01 10*, 15 02 02*, 16 01 18, 16 03 03*, 16 08 01, 16 11 04. Release to the floor, water and soil are to be prevented. Waste containing silver is recycled for almost a 100% Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste. Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.	
<b>Additional conditions environment</b> Default data for the municipal sewage treatment plant is 2000 m3/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.	
<i>Other conditions affecting environmental exposure</i>	
<b>Local freshwater dilution factor:</b> 10 <b>Receiving surface water flow:</b> 18000 m <sup>3</sup> /day	
<b>6.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)</b>	
<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b>	

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

- Separation of workers and localised controls (LC) are not required
- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 6.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

#### Process Categories

Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

### Product (article) characteristics

#### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

**Duration:**

Exposure duration = 480 min/day

**Technical and organisational conditions and measures**
**Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

**Additional conditions human health**

For the closed process no segregation is required

**Conditions and measures related to personal protection, hygiene and health evaluation**
**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

**Other conditions affecting worker exposure**
**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

**Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.**
**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**6.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)**
**Process Categories**

Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)

**Product (article) characteristics**
**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

**Amount used, frequency and duration of use/exposure**
**Duration:**

Exposure duration = 480 min/day

**Technical and organisational conditions and measures**
**Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air

Ensure operatives are trained to minimise exposures.

Ensure control measures are regularly inspected and maintained.



Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
Separation of workers is generally not required	

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 6.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)

Process Categories	Industrial spraying (PROC7)
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#### Product (article) characteristics

##### Physical form of product:

Aqueous solution

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

##### Additional conditions human health

Ensure full containment with silver application booth

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift);

ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

#### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### **6.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)**

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
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#### *Product (article) characteristics*

#### **Physical form of product:**

Aqueous solution

#### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

#### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

#### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

#### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

#### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

#### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### **6.2. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)**

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Treatment of articles by dipping and pouring - Use as laboratory reagent (PROC8b, PROC9, PROC13, PROC15)
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#### *Product (article) characteristics*

**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*
**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*
**Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

*Conditions and measures related to personal protection, hygiene and health evaluation*
**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*
**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*
**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**6.2. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC18)**
**Process Categories**

General greasing/lubrication at high kinetic energy conditions (PROC18)

*Product (article) characteristics*
**Physical form of product:**

Aqueous solution

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*
**Duration:**

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 89 %
Separation of workers is generally not required	

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 6.2. CS9: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC 27b)

Process Categories	Production of metal powders (wet processes) (PROC 27b)
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#### Product (article) characteristics

##### Physical form of product:

Aqueous solution

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
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Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
Separation of workers is generally not required	

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **6.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)**

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Crystals

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

##### **Additional conditions human health**

For the closed process no segregation is required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 6.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

### Process Categories

Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

### Product (article) characteristics

### Physical form of product:

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 6.2. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes - Low energy manipulation and handling of substances bound in/on materials or articles (PROC4, PROC5, PROC21)
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#### Product (article) characteristics

#### Physical form of product:

Crystals

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 78 %
Separation of workers is generally not required	

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 6.2. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)



<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Manual activities involving hand contact (PROC8a, PROC19)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> Crystals	
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ( <a href="http://www.ebrc.de/mease.html">www.ebrc.de/mease.html</a> ).	
<i>Amount used, frequency and duration of use/exposure</i>	
<b>Duration:</b> Exposure duration = 480 min/day	
<i>Technical and organisational conditions and measures</i>	
<b>Technical and organisational measures</b> Avoid to blow dust (including dust remaining from dried splashes) off with compressed air Ensure operatives are trained to minimise exposures. Ensure control measures are regularly inspected and maintained. Separation of workers and localised controls (LC) are not required	
<i>Conditions and measures related to personal protection, hygiene and health evaluation</i>	
<b>Personal protection</b> Wear suitable gloves tested to EN374. Use suitable eye protection. Wear a FFP2 mask with APF=10	
<b>Additional conditions human health</b> Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).	
<i>Other conditions affecting worker exposure</i>	
<b>Body parts exposed:</b> The shift breathing volume covering all process steps is assumed to be 10m <sup>3</sup> /shift (8 hours)	
<i>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</i>	
<b>Additional Good Practice Advice:</b> Wear suitable protective clothes Wear safety shoes Wear suitable face shield.	
<b>6.2. CS14: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC14, PROC15)</b>	
<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Tableting, compression, extrusion, pelletisation, granulation - Use as laboratory reagent (PROC8b, PROC9, PROC14, PROC15)
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> Crystals	
<b>Additional conditions human health</b> According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium	

emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

- Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
- Ensure operatives are trained to minimise exposures.
- Ensure control measures are regularly inspected and maintained.
- Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

- Wear suitable gloves tested to EN374.
- Use suitable eye protection.

##### Additional conditions human health

- Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 6.3 Exposure estimation and reference to its source

##### 6.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for industrial uses resulting in inclusion into or onto a matrix (ERC5)

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 0.00184 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 6.64E-06 mg/L	EUSES v2.1	= 0.166
marine water	= 2.2E-06 mg/L	EUSES v2.1	= 0.00256
freshwater sediment	= 0.275 mg/kg wet weight	EUSES v2.1	= 0.00289
marine sediment	= 0.0912 mg/kg wet weight	EUSES v2.1	= 0.000957
soil	= 0.575 mg/kg wet weight	EUSES v2.1	= 0.463
Sewage treatment plant	= 2.24E-05 mg/L	EUSES v2.1	= 0.000894

##### 6.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
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inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06
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#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 6.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 6.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 6.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC7)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.006 mg/m <sup>3</sup>	Measured data	= 0.39

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 6.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management

measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 6.3. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b, PROC9, PROC13, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 6.3. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC18)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 6.3. CS9: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC 27b)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.022 mg/m <sup>3</sup>	MEASE	= 0.14

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 6.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 6.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 6.3. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC4, PROC5, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

### 6.3. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8a, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

The combination of "massive effect" and PROC 19 is not possible in MEASE, so exclusively for this process, use "aqueous solution" in order to reflect a very low emission potential of silver nitrate crystals.

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 6.3. CS14: Worker Contributing Scenario: Handling of silver nitrate crystals during industrial use (PROC8b, PROC9, PROC14, PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

## 6.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

### Guidance to check compliance with the exposure scenario:

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

### Scaling tool:

MetalEUSES

### Scaling instructions:

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

### Scaling web link:

<http://www.arche-consulting.be/tools/duscaling-tool>

### Scaling tool:

MEASE

### Scaling instructions:

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

### Scaling web link:

<http://www.ebrc.de/mease.html>

7. ES 7	Use at industrial site; Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20); Offshore industries (SU2b)
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## 7.1 TITLE SECTION

Exposure Scenario name	Use of silver nitrate as a dissolution agent on oil platform
Date - Version	07/10/2019 - 1.0
Life Cycle Stage	Use at industrial site
Main user group	Industrial uses
Sector(s) of use	Offshore industries (SU2b)
Product Categories	Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20)

### Environment Contributing Scenario

CS1 Environmental exposure scenario for the use of silver nitrate as a dissolution agent on oil platforms	ERC7
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### Worker Contributing Scenario

CS2 Handling of solutions containing silver nitrate during industrial use	PROC1
CS3 Handling of solutions containing silver nitrate during industrial use	PROC3
CS4 Handling of solutions containing silver nitrate during industrial use	PROC4 - PROC5
CS5 Handling of solutions containing silver nitrate during industrial use	PROC8a
CS6 Handling of solutions containing silver nitrate during industrial use	PROC8b

## 7.2 Conditions of use affecting exposure

### 7.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the use of silver nitrate as a dissolution agent on oil platforms (ERC7)

Environmental release categories	Use of functional fluid at industrial site (ERC7)
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#### Product (article) characteristics

Physical form of product:	Liquid
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#### Amount used, frequency and duration of use (or from service life)

Amounts used:	Annual site tonnage = 0.1 t
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#### Technical and organisational conditions and measures

Control measures to prevent releases	Air: No measured emission data (it is stated that any emissions would be captured by Heating, Ventilation and Air Conditioning, and Carbon filter installed on-site) Waste water: used in a closed system and it is assumed that there are no waste-water emissions to marine environment Soil: not relevant for use in closed system in marine environment
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#### Conditions and measures related to treatment of waste (including article waste)

Waste treatment	Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste. Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.
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### 7.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1)

Process Categories	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)
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#### Product (article) characteristics

Physical form of product:	Aqueous solution
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### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 7.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 7.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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#### Product (article) characteristics

##### Physical form of product:

Aqueous solution

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

Separation of workers is generally not required  
 Local exhaust ventilation

Inhalation - minimum efficiency of: = 78 %

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 7.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a)

##### Process Categories

Transfer of substance or mixture (charging and discharging) at non-dedicated facilities (PROC8a)

#### Product (article) characteristics

##### Physical form of product:

Aqueous solution

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 7.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)
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#### Product (article) characteristics

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 7.3 Exposure estimation and reference to its source

### 7.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for the use of silver nitrate as a dissolution agent on oil platforms (ERC7)

#### Additional information on exposure estimation:

Silver nitrate solution is blended and transported to offshore oil/gas production/exploration sites and used in a closed loop system for a maximum of 24 hours (used as a dissolver in oilfield equipment/piping). Spent dissolver is precipitated and solids/brine are collected onsite and transported to licensed treatment facilities.

### 7.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC1)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
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inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06
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#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 7.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 7.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.011 mg/m <sup>3</sup>	MEASE	= 0.69

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 7.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8a)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 7.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during industrial use (PROC8b)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management

measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

## 7.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

### Guidance to check compliance with the exposure scenario:

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005.

### Scaling tool:

MetalEUSES

### Scaling instructions:

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

### Scaling web link:

<http://www.arche-consulting.be/tools/duscaling-tool>

### Scaling tool:

MEASE

### Scaling instructions:

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

### Scaling web link:

<http://www.ebrc.de/mease.html>

8. ES 8		Widespread use by professional workers; Photo-chemicals (PC30); Manufacture of pulp, paper and paper products (SU6b)
8.1 TITLE SECTION		
Exposure Scenario name	Professional use of silver nitrate in the photographic sector	
Date - Version	07/10/2019 - 1.0	
Life Cycle Stage	Widespread use by professional workers	
Main user group	Professional uses	
Sector(s) of use	Manufacture of pulp, paper and paper products (SU6b)	
Product Categories	Photo-chemicals (PC30)	
Environment Contributing Scenario		
CS1 Environmental exposure scenario for the professional use of silver nitrate in the photographic sector		ERC8c
Worker Contributing Scenario		
CS2 Handling of solutions containing silver nitrate during professional use		PROC1 - PROC2
CS3 Handling of solutions containing silver nitrate during professional use		PROC3
CS4 Handling of solutions containing silver nitrate during professional use		PROC4 - PROC5
CS5 Handling of solutions containing silver nitrate during professional use		PROC8a - PROC9 - PROC10 - PROC13 - PROC19
CS6 Handling of solutions containing silver nitrate during professional use		PROC8b
CS7 Handling of solutions containing silver nitrate during professional use		PROC15
CS8 Handling of solutions containing silver nitrate during professional use		PROC20
CS9 Handling of silver nitrate crystals during professional use		PROC1 - PROC2
CS10 Handling of silver nitrate crystals during professional use		PROC3
CS11 Handling of silver nitrate crystals during professional use		PROC4 - PROC5
CS12 Handling of silver nitrate crystals during professional use		PROC8a - PROC9 - PROC19 - PROC21
CS13 Handling of silver nitrate crystals during professional use		PROC8b
CS14 Handling of silver nitrate crystals during professional use		PROC14
CS15 Handling of silver nitrate crystals during professional use		PROC15
CS16 Handling of silver nitrate crystals during professional use		PROC20
8.2 Conditions of use affecting exposure		
8.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the professional use of silver nitrate in the photographic sector (ERC8c)		
Environmental release categories	Widespread use leading to inclusion into/onto article (indoor) (ERC8c)	
Product (article) characteristics		
Physical form of product: Liquid, not biodegradable		
Amount used, frequency and duration of use (or from service life)		
Amounts used: Annual site tonnage = 0.000635 t		
Maximum allowable site tonnage (MSafe): 0.0133 kg Ag/day		



**Critical compartment for Msafe:** Emission to on site or off site wastewater treatment works

**Release type:** Continuous release

**Emission days:** 200 days per year

#### *Technical and organisational conditions and measures*

##### **Control measures to prevent releases**

Air: No measured emission data. Emissions from SPERC factsheet 'Use of intermediates v2.1'  
Wastewater emission are based on measured data which are considered representative of downstream user  
Assumed waste water goes to sewage treatment works in local freshwater assessment  
Assumed waste water by-passes sewage treatment works in local marine assessment.  
There are no direct emission to soil but it is assumed that sewage sludge is applied to land (which may not be applicable in many cases).  
Modelled release factors to air 0%, water 40% before sewage treatment plant, soil 0%

#### *Conditions and measures related to sewage treatment plant*

##### **STP type:**

Municipal Sewage Treatment Plant

##### **Additional information on STP:**

Zero degradation assumed. Partitioning: 80.1% to sludge, 19.9% to water calculated based on measured partition coefficients.

##### **STP sludge treatment:**

Controlled application of sewage sludge to agricultural soil

##### **STP effluent (m<sup>3</sup>/day):** 2000

#### *Conditions and measures related to treatment of waste (including article waste)*

##### **Waste treatment**

Hazardous waste from onsite risk management and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste.  
Fraction of daily/annual use expected in waste: 0%  
Appropriate waste codes: 06 05 02\*, 08 01 11, 08 03 12\*, 09 01 01\*, 09 01 03\*, 09 01 04\*, 09 01 05\*, 09 01 06\*, 09 01 13\*, 10 06 06\*, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 05, 11 01 09\*, 15 01 10\*, 15 02 02\*, 16 01 18, 16 03 03\*, 16 08 01, 16 11 04.  
Release to the floor, water and soil are to be prevented.  
Waste containing silver is recycled for almost a 100%  
Silver is completely recyclable, so the silver content in the end-of-life material determines the value of the waste.  
Waste generated under the form of sweeps, emission cleaning dust and off spec material should be recycled into the manufacturing system.

##### **Additional conditions environment**

Default data for the municipal sewage treatment plant is 2000 m<sup>3</sup>/d (resulting dilution factor for the receiving water:10). For marine assessments a default additional tenfold dilution is assumed.

#### *Other conditions affecting environmental exposure*

##### **Local freshwater dilution factor:** 10

##### **Receiving surface water flow:** 18000 m<sup>3</sup>/day

#### **8.2. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC1, PROC2)**

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Aqueous solution

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium

emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

##### **Additional conditions human health**

For the closed process no segregation is required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### **8.2. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC3)**

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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#### *Product (article) characteristics*

##### **Physical form of product:**

Aqueous solution

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

### Additional conditions human health

For the closed process no segregation is required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

## 8.2. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC4, PROC5)

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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### Product (article) characteristics

### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

### Conditions and measures related to personal protection, hygiene and health evaluation

### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 8.2. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC8a, PROC9, PROC10, PROC13, PROC19)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Roller application or brushing - Treatment of articles by dipping and pouring - Manual activities involving hand contact (PROC8a, PROC9, PROC10, PROC13, PROC19)
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#### *Product (article) characteristics*

#### Physical form of product:

Aqueous solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

#### Duration:

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 8.2. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC8b)

<b>Process Categories</b>	Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)
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#### *Product (article) characteristics*

#### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air	
Ensure operatives are trained to minimise exposures.	
Ensure control measures are regularly inspected and maintained.	
Separation of workers is generally not required	
Local exhaust ventilation	Inhalation - minimum efficiency of: = 77 %

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 8.2. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC15)

Process Categories	Use as laboratory reagent (PROC15)
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### Product (article) characteristics

#### Physical form of product:

Aqueous solution

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous

solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **8.2. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC20)**

##### **Process Categories**

Use of functional fluids in small devices (PROC20)

#### *Product (article) characteristics*

##### **Physical form of product:**

Aqueous solution

##### **Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

##### **Additional conditions human health**

For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 8.2. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC1, PROC2)

<b>Process Categories</b>	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC1, PROC2)
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#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Separation of workers and localised controls (LC) are not required  
Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.

##### Additional conditions human health

For the closed process no segregation is required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure



**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**8.2. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC3)**

<b>Process Categories</b>	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)
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*Product (article) characteristics*

**Physical form of product:**

Crystals

**Additional conditions human health**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 480 min/day

*Technical and organisational conditions and measures*

**Technical and organisational measures**

Separation of workers and localised controls (LC) are not required  
 Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.

**Additional conditions human health**

For the closed process no segregation is required

*Conditions and measures related to personal protection, hygiene and health evaluation*

**Personal protection**

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.

**Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

*Other conditions affecting worker exposure*

**Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

**Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

**8.2. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC4, PROC5)**

<b>Process Categories</b>	Chemical production where opportunity for exposure arises - Mixing or blending in batch processes (PROC4, PROC5)
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*Product (article) characteristics*

**Physical form of product:**

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 8.2. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC8a, PROC9, PROC19, PROC21)

Process Categories	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) - Manual activities involving hand contact - Low energy manipulation and handling of substances bound in/on materials or articles (PROC8a, PROC9, PROC19, PROC21)
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### Product (article) characteristics

#### Physical form of product:

Crystals

### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
 Ensure operatives are trained to minimise exposures.  
 Ensure control measures are regularly inspected and maintained.  
 Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
 Use suitable eye protection.  
 Wear a FFP2 mask with APF=10

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### 8.2. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC8b)

Process Categories	Transfer of substance or mixture (charging and discharging) at dedicated facilities (PROC8b)
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#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air
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Ensure operatives are trained to minimise exposures.
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Ensure control measures are regularly inspected and maintained.
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Separation of workers is generally not required
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Local exhaust ventilation	Inhalation - minimum efficiency of: = 77 %
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#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 8.2. CS14: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC14)

#### Process Categories

Tabletting, compression, extrusion, pelletisation, granulation (PROC14)

#### Product (article) characteristics

##### Physical form of product:

Crystals

##### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

##### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

##### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

##### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.  
Wear a FFP2 mask with APF=10

##### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

##### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

*Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 8.2. CS15: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC15)

**Process Categories** Use as laboratory reagent (PROC15)

#### Product (article) characteristics

#### Physical form of product:

Crystals

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### Amount used, frequency and duration of use/exposure

#### Duration:

Exposure duration = 480 min/day

#### Technical and organisational conditions and measures

#### Technical and organisational measures

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

#### Conditions and measures related to personal protection, hygiene and health evaluation

#### Personal protection

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

#### Additional conditions human health

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### Other conditions affecting worker exposure

#### Body parts exposed:

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.

#### Additional Good Practice Advice:

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

### 8.2. CS16: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC20)

**Process Categories** Use of functional fluids in small devices (PROC20)

#### Product (article) characteristics

#### Physical form of product:

Solid in solution

#### Additional conditions human health

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. To determine the dustiness of a substance, a dustiness test may be performed. The rotating drum (modified Heubach) method can be used, to reflect potential dustiness during handling of a substance. In hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third

group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. Although handling of aqueous solutions is usually associated with a very low emission potential, the spraying of aqueous solutions is assumed to be involved with medium emission. Further information can be found in the glossary of the MEASE tool ([www.ebrc.de/mease.html](http://www.ebrc.de/mease.html)).

#### *Amount used, frequency and duration of use/exposure*

##### **Duration:**

Exposure duration = 480 min/day

#### *Technical and organisational conditions and measures*

##### **Technical and organisational measures**

Avoid to blow dust (including dust remaining from dried splashes) off with compressed air  
Ensure operatives are trained to minimise exposures.  
Ensure control measures are regularly inspected and maintained.  
Separation of workers and localised controls (LC) are not required

##### **Additional conditions human health**

For the closed process no segregation is required

#### *Conditions and measures related to personal protection, hygiene and health evaluation*

##### **Personal protection**

Wear suitable gloves tested to EN374.  
Use suitable eye protection.

##### **Additional conditions human health**

Avoid any contamination of private households via the work-home-interface (do shower and change cloths at the end of work shift); ensure a good housekeeping practices in the workplace (e.g. regular cleaning devices and immediate cleaning in case of splashes and overspill); ensure to minimise inadvertent ingestion (e.g. no eating or smoking in the workplace).

#### *Other conditions affecting worker exposure*

##### **Body parts exposed:**

The shift breathing volume covering all process steps is assumed to be 10m<sup>3</sup>/shift (8 hours)

#### *Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.*

##### **Additional Good Practice Advice:**

Wear suitable protective clothes Wear safety shoes Wear suitable face shield.

#### **8.3 Exposure estimation and reference to its source**

#### **8.3. CS1: Environment Contributing Scenario: Environmental exposure scenario for the professional use of silver nitrate in the photographic sector (ERC8c)**

protection target	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
Freshwater sewage treatment plant	< 6.67 µg Ag/L (soluble silver)	N/A	< 1
marine water	< 86 µg Ag/L (soluble silver)	N/A	< 1
air	= 8.53E-08 mg/m <sup>3</sup>	EUSES v2.1	N/A
freshwater	= 6.39E-06 mg/L	EUSES v2.1	= 0.16
marine water	= 2.07E-06 mg/L	EUSES v2.1	= 0.00241
freshwater sediment	= 0.265 mg/kg wet weight	EUSES v2.1	= 0.00278
marine sediment	= 0.0859 mg/kg wet weight	EUSES v2.1	= 0.000902
soil	= 0.0769 mg/kg wet weight	EUSES v2.1	= 0.062
Sewage treatment plant	= 1.26E-05 mg/L	EUSES v2.1	= 0.000505

### 8.3. CS2: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS3: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS4: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS5: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC8a, PROC9, PROC10, PROC13, PROC19)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS6: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC8b)



Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.012 mg/m <sup>3</sup>	MEASE	= 0.72

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 8.3. CS7: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 8.3. CS8: Worker Contributing Scenario: Handling of solutions containing silver nitrate during professional use (PROC20)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 8.3. CS9: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC1, PROC2)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

#### 8.3. CS10: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC3)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
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inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63
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#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS11: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC4, PROC5)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS12: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC8a, PROC9, PROC19, PROC21)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.005 mg/m <sup>3</sup>	MEASE	= 0.31

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

The combination of "massive effect" and PROC 19 is not possible in MEASE, so exclusively for this process, use "aqueous solution" in order to reflect a very low emission potential of silver nitrate crystals.

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS13: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC8b)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.012 mg/m <sup>3</sup>	MEASE	= 0.72

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals

Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS14: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC14)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals. Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS15: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC15)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.01 mg/m <sup>3</sup>	MEASE	= 0.63

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals. Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

### 8.3. CS16: Worker Contributing Scenario: Handling of silver nitrate crystals during professional use (PROC20)

Exposure route, Health effect, Exposure indicator	Exposure level	Calculation method	Risk Characterization Ratio (RCR)
inhalative, systemic, long-term	= 0.001 mg/m <sup>3</sup>	MEASE	= 0.06

#### Additional information on exposure estimation:

For the exposure assessment in MEASE, the physical form "massive object" is used as a surrogate in order to reflect very low emission potential of silver nitrate crystals. Although the quantitative risk characterisation, already demonstrated that the prescribed operational conditions and risk management measures effectively control exposure well below the respective DNELs, it cannot be excluded that residual exposure concentrations may lead to local effects. As a precautionary measure, it is therefore prescribed to use personal protective equipment in situations in which such residual exposure concentrations cannot be excluded. The risk of local effects is therefore adequately controlled.

## 8.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

### Guidance to check compliance with the exposure scenario:

Use of measured data as basis for assessment: 6 measurements per workplace are required for an emission assessment as a minimum. Depending on the variability of the data sets (expressed as the geometric standard deviation) and the level of the resulting risk characterisation ratio (RCR), additional measurements may be required. Only measurements of personal exposure of the inhalable fraction of airborne dust (according to EN 481) should be used. The exposure data shall either be applicable to the length of a specific task to be assessed or to a full-shift (i.e. sampled over a duration of at least 120 min) if the task to be assessed is conducted for a significant portion of the work shift. From the exposure data set the 90th percentile is to be used as a reasonable worst case (RWC) estimate for comparison with the relevant DNEL. RPE may be taken into account by applying the assigned protection factor applicable to the equipment used as given in EN 529:2005. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**Scaling tool:**

MetalEUSES

**Scaling instructions:**

In case the manufacturer does not have emission or ambient measured info he can use the Metal EUSES scaling tool to estimate the associated exposure for other parameters than those included here to demonstrate safe user under this specific scenario or situation

**Scaling web link:**

<http://www.arche-consulting.be/tools/duscaling-tool>

**Scaling tool:**

MEASE

**Scaling instructions:**

Use of exposure models: If the emission assessment in the ES is based on modelled data, the same model can be used to justify specific slight deviations from the conditions as described. All parameters needed to run the exposure estimation tool MEASE can be found in the ES. It is noted that the installation of the described RMMs is mandatory and that exclusively the modification of the used PPE is allowed as deviation. The only parameters which may therefore be modified in the MEASE-calculation are consequently exposure duration, efficacy of the installed RMMs and PPE.

**Scaling web link:**

<http://www.ebrc.de/mease.html>

9. ES 9 Consumer use	
<b>9.1 TITLE SECTION</b>	
<b>Exposure Scenario name</b>	Consumer use of unprocessed photo paper containing silver in the emulsion layer
<b>Date - Version</b>	07/10/2019 - 1.0
<b>Life Cycle Stage</b>	Consumer use
<b>Main user group</b>	Consumer uses
<b>Sector(s) of use</b>	Consumer uses (SU21)
<b>Article Category(ies)</b>	Paper articles (AC8)
<b>Environment Contributing Scenario</b>	
<b>CS1 Environmental exposure scenario for the consumer use of unprocessed photo paper containing silver in the emulsion layer</b>	
<b>Consumer Contributing Scenario</b>	
<b>CS2 Tank processing</b>	
<b>CS3 Tray processing of films</b>	
9.2 Conditions of use affecting exposure	
<b>9.2. CS1: Environment Contributing Scenario: Environmental exposure scenario for the consumer use of unprocessed photo paper containing silver in the emulsion layer</b>	
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> Solid, not biodegradable	
<i>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</i>	
<b>Additional Good Practice Advice:</b> Local and regional environmental exposure assessments have been conducted for both the manufacture and industrial use of silver substances, and the risks to different environmental compartments characterised. A safe level of emission has been presented in these generic exposure scenarios. Monitored data was used to determine the territorial background concentration of silver in both freshwater and soil. This background concentration is considered to incorporate all sources of silver and silver salts in the environment, and incorporates all emissions from industrial and consumer uses. Based on the information provided of the end products of the industrial processes, silver has been shown to be bound within the product itself. There is a very limited potential for emissions of silver nitrate to the environment from the limited consumer uses of silver nitrate, due to the fact that the silver nitrate is consumed into the article. The only exception to this is the use of silver nitrate in photographic processing, for which a separate exposure scenario is applied, although this use of silver has been in decline for several years due to the fast replacement by digital photography, and recycling of silver (salts) containing photographic processing fluids is now relatively common and in some EU countries even obligatory. The remaining environmental emissions of silver nitrate from the remaining consumer uses are therefore considered to be negligible, and will be encompassed by far by the industrial emissions. The used photographic solution containing silver ions should be properly collected in closed containers and recycled either by the user or by professional recyclers. Appropriate containment measures should be taken to avoid spilling of used developers' fluid into the sewer system, when filling the recycling receptors.	
<b>9.2. CS2: Consumer Contributing Scenario: Tank processing</b>	
<i>Product (article) characteristics</i>	
<b>Physical form of product:</b> Solid, not biodegradable Liquid	
<b>Additional conditions human health</b> Concentration of the substance in the preparation: emulsion layer Black and white film: 5-6 g/m <sup>2</sup> ; Black and white paper: 1.5-1.8 g/m <sup>2</sup> ; Colour negative film: ca 8g/m <sup>2</sup> ; Colour reverse film: 4-5 g/m <sup>2</sup> ; Colour negative paper: 0.8-0.9 g/m <sup>2</sup> ; Colour reverse paper: 1.1-1.3 g/m <sup>2</sup> ; (Fotochemikalien: Daten und Fakten zum Umweltschutz 2.Auflage" W. Baumann, ISBN 3-540-57243-0) Concentration of the substance in the preparation: fixing solution (used) Tentative 4.44g Ag ion/L fixing solution. The following assumptions were made: 1) a film containing 4 g of Ag per m <sup>2</sup> ; 2) a processing where 1/3 of the silver halide is developed into the silver picture = 2/3 of the silver halide is dissolved in the fixer solution; 3) a replenishment rate	

of 600 ml/m<sup>2</sup>

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration < 15 min

**Frequency:**

Number of applications = 2 events per day

**Frequency:**

Avoid using product more than .... = 4 events per day

**Additional conditions human health**

Covers skin contact area up to = 840 cm<sup>2</sup>

*Information and behavioural advice for consumers*

**Information and behavioural advice for consumers:**

Avoid using without gloves.

Ensure that direct skin contact is avoided.

*Other conditions affecting consumers exposure*

**Body parts exposed:**

Assumes that potential dermal contact is limited to hands.

**9.2. CS3: Consumer Contributing Scenario: Tray processing of films**

*Product (article) characteristics*

**Physical form of product:**

Solid, not biodegradable

Liquid

**Additional conditions human health**

Concentration of the substance in the preparation: emulsion layer

Black and white film: 5-6 g/m<sup>2</sup>; Black and white paper: 1.5-1.8 g/m<sup>2</sup>; Colour negative film: ca 8g/m<sup>2</sup>; Colour reverse film: 4-5 g/m<sup>2</sup>; Colour negative paper: 0.8-0.9 g/m<sup>2</sup>; Colour reverse paper: 1.1-1.3 g/m<sup>2</sup>; (Fotochemikalien: Daten und Fakten zum Umweltschutz 2.Auflage" W. Baumann, ISBN 3-540-57243-0)

Concentration of the substance in the preparation: fixing solution (used)

Tentative 4.44g Ag ion/L fixing solution. The following assumptions were made: 1) a film containing 4 g of Ag per m<sup>2</sup>; 2) a processing where 1/3 of the silver halide is developed into the silver picture = 2/3 of the silver halide is dissolved in the fixer solution; 3) a replenishment rate of 600 ml/m<sup>2</sup>

*Amount used, frequency and duration of use/exposure*

**Duration:**

Exposure duration = 10 min

**Frequency:**

Number of applications = 2 events per day

**Frequency:**

Avoid using product more than .... = 4 events per day

**Additional conditions human health**

Covers skin contact area up to = 35.7 cm<sup>2</sup>

*Information and behavioural advice for consumers*

**Information and behavioural advice for consumers:**

Avoid using without gloves.

Ensure that direct skin contact is avoided.

*Other conditions affecting consumers exposure*

**Body parts exposed:**

Assumes that potential dermal contact is limited to fingertips.

**9.3 Exposure estimation and reference to its source**

## 9.2. CS2: Consumer Contributing Scenario: Tank processing

### Additional information on exposure estimation:

The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level). As no dermal DNEL for aqueous solutions of soluble silver ions is available no quantitative assessment has been provided. However, dermal contact to soluble silver ions leads to a black staining of the upper epidermis, which will outgrow and abrade if no constant renewal of silver on the skin persists. Thus a qualitative assessment has been performed for dermal exposure.

Inhalation exposure is considered to be not relevant.

Oral exposure is considered to be not relevant.

Potential dermal exposure to silver ions from the fixing solution is only possible during disposal. If appropriate gloves are worn no exposure to the skin needs to be expected. However, splashes on the skin cannot be excluded if no protective gloves are worn during disposal. Due to the black staining of silver ions on the upper epidermis it can be assumed that consumers would wear gloves to avoid this. Furthermore, there is also the aspect of maximising the quality of the photographic images being produced and therefore users will normally not allow chemicals to remain on the skin or in the workspace. Chemical contamination has serious adverse effects on unprocessed materials, leading to spots, stains, fingerprints etc, on negatives or prints.

## 9.2. CS3: Consumer Contributing Scenario: Tray processing of films

### Additional information on exposure estimation:

The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level). As no dermal DNEL for aqueous solutions of soluble silver ions is available no quantitative assessment has been provided. However, dermal contact to soluble silver ions leads to a black staining of the upper epidermis, which will outgrow and abrade if no constant renewal of silver on the skin persists. Thus a qualitative assessment has been performed for dermal exposure.

Inhalation exposure is considered to be not relevant.

Oral exposure is considered to be not relevant.

If appropriate gloves are worn no exposure to the skin needs to be expected. However, contact of the fingers with the fixing solution cannot be excluded if no protective gloves are worn or a pair of tweezers are used when putting or removing paper into/from the fixer solution. Due to the black staining of silver ions on the upper epidermis it can be assumed that consumers would wear gloves to avoid this. Furthermore, there is also the aspect of maximising the quality of the photographic images being produced and therefore users will normally not allow uncontrolled chemical contact with the material. Chemical contamination has serious adverse effects on unprocessed materials, leading to spots, stains, fingerprints etc, on negatives or prints. The same goes for greasy fingertips on unprocessed material, allowing the assumption that most of the task will be done using auxiliary tools like tweezers.

## 9.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES

### Guidance to check compliance with the exposure scenario:

Not relevant for consumer exposure

Environmental emissions: the used photographic solution containing silver ions should be properly collected in closed containers and recycled either by the user or by professional recyclers. Appropriate containment measures should be taken to avoid spilling of used developers' fluid into the sewer system, when filling the recycling receptors.