



## 9.5. Exposure scenario 5: Use at industrial sites - Use of silver nitrate as intermediate in the production of silver or silver compounds

**Product category used:** PC 7: Base metals and alloys

**Sector of use:** SU 5: Manufacture of textiles, leather, fur; SU 6b: Manufacture of pulp, paper and paper products; SU 9: Manufacture of fine chemicals; SU 13: Manufacture of other non-metallic mineral products, e.g. plasters, cement; SU 16: Manufacture of computer, electronic and optical products, electrical equipment; SU 19: Building and construction work; SU 20: Health services; SU 23: Electricity, steam, gas water supply and sewage treatment

Environment contributing scenario(s):			SPERC
CS 1	Use of silver nitrate as intermediate in the production of silver or silver compounds	ERC 6a	Eurometaux SPERC 6a.1.v3
CS 2	Use of silver nitrate as intermediate in the production of silver or silver compounds - no emissions to water	ERC 6a	
Worker contributing scenario(s):			SWED
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	PROC 1	
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	PROC 2	
CS 5	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	PROC 3	
CS 6	Chemical production where opportunity for exposure arises	PROC 4	
CS 7	Mixing or blending in batch processes	PROC 5	
CS 8	Transfer of substance or mixture (charging/discharging) at dedicated facilities	PROC 8a	
CS 9	Transfer of substance or mixture (charging/discharging) at dedicated facilities	PROC 8b	
CS 10	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC 9	
CS 11	Use as laboratory agent	PROC 15	
CS 12	Manual activities involving hand contact	PROC 19	
CS 13	Handling of solid inorganic substances at ambient temperature	PROC 26	
CS 14	Production of metal powders (wet processes)	PROC 27a	
CS 15	Manual maintenance (cleaning and repair) of machinery	PROC 28	
CS 16	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	PROC 3	
CS 17	Chemical production where opportunity for exposure arises	PROC 4	
CS 18	Mixing or blending in batch processes	PROC 5	
CS 19	Transfer of substance or mixture (charging/discharging) at dedicated facilities	PROC 8a	



CS 20	Transfer of substance or mixture (charging/discharging) at dedicated facilities	PROC 8b
CS 21	Production of metal powders (wet processes)	PROC 27b
CS 22	Manual maintenance (cleaning and repair) of machinery	PROC 28

### 9.5.1. Env CS 1: Use of silver nitrate as intermediate in the production of silver or silver compounds ( ERC 6a )

Assessment entity group used for the assessment of this contributing scenario: ENV RA

#### 9.5.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> <li>Annual use amount at site: <math>\leq 25</math> tonnes/year <i>All the amounts are expressed as Ag as this is the driver for the environmental risk assessment.</i></li> <li>Daily use amount at site: <math>\leq 0.137</math> tonnes/day <i>Default number of emission days are derived from a multi-metal background database of measured site-specific release factors collected under the former Directive of New and Existing Substances and REACH 2010 registration dossiers. 182 days/year is the 10th percentile of reported site-specific number of emission days for 168 sites from production of metal compounds.</i></li> </ul>
Technical and organisational conditions and measures
<ul style="list-style-type: none"> <li>On site treatment of off-air: Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter according to the BAT Reference Document in the Non-Ferrous Metals Industry <i>Direct air emissions should be reduced by implementing one or more of the following RMMs (air concentration range for which the RMM is suitable is specified in parenthesis):</i> <ul style="list-style-type: none"> <li>Electrostatic precipitators using wide electrode spacing: <math>5 - 15 \text{ mg/Nm}^3</math></li> <li>Wet electrostatic precipitators: <math>&lt; 5 \text{ mg/Nm}^3</math></li> <li>Cyclones, but as primary collector: <math>&lt; 50 \text{ mg/Nm}^3</math></li> <li>Fabric or bag filters: high efficiency in controlling fine particulate (melting): achieve emission values <math>&lt; 5 \text{ mg/Nm}^3</math>. Membrane filtration techniques can achieve <math>&lt; 1 \text{ mg/Nm}^3</math></li> <li>Ceramic and metal mesh filters. PM10 particles are removed: <math>0.1 \text{ mg/Nm}^3</math></li> <li>Wet scrubbers: <math>&lt; 4 \text{ mg/Nm}^3</math></li> </ul> </li> <li>On site treatment of wastewater: Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange according to the BAT Reference Document in the Non-Ferrous Metals Industry (2017) applying minimum xx% removal efficiency <i>Direct water emissions should be reduced by implementing one or more of the following RMMs:</i> <ul style="list-style-type: none"> <li>Chemical precipitation: used primarily to remove the metal ions (e.g. the use of <math>\text{Ca}(\text{OH})_2</math> to a pH 11: <math>&gt;99\%</math> removal efficiency; the use of <math>\text{Fe}(\text{OH})_3</math> to a pH 11: 96% removal efficiency)</li> <li>Sedimentation (e.g. <math>\text{Na}_2\text{S}</math>, pH 11, <math>&gt;99\%</math> removal efficiency) • Filtration: used as final clarification step (e.g. ultrafiltration, pH 5.1: 93% removal efficiency, nanofiltration: 97% removal efficiency, reverse osmosis, pH 4-11: 99% removal efficiency)</li> <li>Electrolysis: for low metal concentration at about 2 g/L (e.g. electrodialysis: 13% removal efficiency within 2 hours, membrane electrolysis, electrochemical precipitation, pH 4-10, <math>&gt;99\%</math> removal efficiency) • Reverse osmosis: extensively used for the removal of dissolved metals; Ion exchange: final cleaning step in the removal of heavy metal from process wastewater (e.g. 90% removal efficiency for clinoptinolite and 100% removal efficiency for synthetic zeolite)</li> </ul> <i>Following the Integrated Pollution Prevention and Control – BAT Reference note document, the treatment methods are very much dependent on the specific processes and the metals involved. More information can be found in the BAT Reference Document for the Non-Ferrous Metals Industry (2017).</i> </li> </ul>
Conditions and measures related to biological sewage treatment plant
<ul style="list-style-type: none"> <li>Biological STP: None [Effectiveness Water: 0%]</li> </ul>
Conditions and measures related to external treatment of waste (including article waste)
<ul style="list-style-type: none"> <li>Particular considerations on the waste treatment operations: No (low concentration)</li> </ul>



*Waste includes sludge, filter cakes and solid waste. waste shall be handled according to the Waste Framework Directive and disposed of according to national/local legislation. If the metal content of the waste is elevated, internal or external recovery/recycling is considered.*

Other conditions affecting environmental exposure

- Discharge rate of effluent:  $\geq 2E3$  m<sup>3</sup>/day

### 9.5.1.2. Releases

The releases have been estimated on the basis of SPERC Eurometaux SPERC 6a.1.v3: Intermediate use of metal compounds

Modification date: 09/09/2021

#### Description of activities/processes covered by the SPERC

Since this metal SPERC is based on measured data at end-of-pipe on-site, all indicated PROCs are integrated in the release fractions from raw materials handling to cleaning and maintenance.

#### Product/substance domain:

Substance groups or functions:

SPERC valid for metals with solid water partition coefficient for suspended matter between 1,000 L/kg and 400,000 L/kg.

Included in the metal definition (Eurometaux SPERCs): alkali metals, alkaline earth metals, transition metals, post-transition metals, metalloids and their compounds

Excluded from the metal definition: non-metals, halogens, noble gases and metallo-organic compounds.

#### Explanation for the release factor to soil:

ERC default

**Sub-SPERC Eurometaux SPERC 6a.1g.v3** is used for Ag dissolved:

#### Explanation for the release factor to water:

After on-site STP.

Realistic worst-case regression line ( $RF = 10^{(1.59 - 1.14 \times \log(Kd))}$ ) of the metal-specific 90th percentile reported site-specific release factors to wastewater for 201 sites from the production of massive metal and metal powder.

A relationship between solid-water partitioning coefficient for suspended matter  $K_d$  and the release factor to water can be justified because the  $K_d$  expresses the distribution between aqueous phase and suspended matter.  $K_d$  is an important parameter impacting the removal efficiency especially in sedimentation and precipitation RMMs but also in on-site runoff, cleaning operations, wet processes, etc

#### Explanation for the release factor to air:

Release after RMM. The 90th percentile of reported site-specific release factors to air for 145 sites from the production of massive metal and metal powder

The local releases to the environment are reported in the following table.

**Table 9.56. Local releases to the environment**

Release	Assessment entity	Release factor	Local release rate
Water	Ag dissolved	2E-3%	2.74E-3 kg/day
Air	Ag dissolved	0.03%	0.041 kg/day
Non agricultural soil	Ag dissolved	0.01%	- kg/day

#### Releases to waste

**Release factor to external waste: 2.3 %**

The 90th percentile of reported site-specific release factors to solid waste for 62 manufacturing sites covering zinc, nickel, lead, cobalt, cadmium, antimony

### 9.5.1.3. Exposure and risks for the environment and man via the environment



The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table. The exposure estimates have been obtained with EUSES 2.1.2 unless stated otherwise.

**Table 9.57. Exposure concentrations and risks for the environment and man via the environment**

Protection target	Assessment entity	Exposure concentration	Risk quantification
Fresh water	Ag dissolved	<b>Local PEC:</b> 4.16E-5 mg/L RCR = 0.904	Final RCR = 0.904
Sediment (freshwater)	Ag dissolved	<b>Local PEC:</b> 7.921 mg/kg dw RCR = 0.018	Final RCR = 0.018
Marine water	Ag dissolved	<b>Local PEC:</b> 5.46E-6 mg/L RCR = 6.35E-3	Final RCR < 0.01
Sediment (marine water)	Ag dissolved	<b>Local PEC:</b> 1.041 mg/kg dw RCR = 2.38E-3	Final RCR < 0.01
Sewage Treatment Plant	Ag dissolved	<b>Local PEC:</b> 0 mg/L RCR = 0	Final RCR < 0.01
Agricultural soil	Ag dissolved	<b>Local PEC:</b> 0.098 mg/kg dw RCR = 0.093	Final RCR = 0.093
Man via environment - Inhalation (systemic effects)	Ag dissolved	<b>Concentration in air:</b> 5.8E-6 mg/m <sup>3</sup> RCR = 3.87E-5	Final RCR < 0.01
Man via environment - Oral	Ag dissolved	<b>Exposure via food consumption:</b> 3.84 µg/kg bw/day (Measured data: See section 9.0.3.6) RCR = 0.035	Final RCR = 0.035
Man via environment - combined routes			Final RCR = 0.035

**Remarks on measured exposure:**

See section 9.0.3.6 for Ag dissolved:

Identity of the substance used: Ag

Explanation: Worst case exposure of 3.84 µg Ag/kg bw/day from food (section 9.0.3.6) was taken forward to the risk characterisation.

The intake via drinking water calculated with CHESAR was 3-4 orders of magnitudes lower compared to the intake via food and has thus not been taken into account.

## 9.5.2. Env CS 2: Use of silver nitrate as intermediate in the production of silver or silver compounds - no emissions to water ( ERC 6a )

Assessment entity group used for the assessment of this contributing scenario: ENV RA

### 9.5.2.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> <li>Annual use amount at site: &lt;= 1E3 tonnes/year <i>All the amounts are expressed as Ag as this is the driver for the environmental risk assessment.</i></li> <li>Daily use amount at site: &lt;= 5.5 tonnes/day <i>Default number of emission days are derived from a multi-metal background database of measured site-specific release factors collected under the former Directive of New and Existing Substances and REACH 2010 registration dossiers.</i> <i>182 days/year is the 10th percentile of reported site-specific number of emission days for 168 sites from production of metal compounds.</i></li> </ul>
Technical and organisational conditions and measures
<ul style="list-style-type: none"> <li>On site treatment of off-air: Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter according to the BAT Reference Document in the Non-Ferrous</li> </ul>



<p><b>Metals Industry</b>  <i>Direct air emissions should be reduced by implementing one or more of the following RMMs (air concentration range for which the RMM is suitable is specified in parenthesis):</i></p> <ul style="list-style-type: none"> <li>• <i>Electrostatic precipitators using wide electrode spacing: 5 – 15 mg/Nm<sup>3</sup></i></li> <li>• <i>Wet electrostatic precipitators: &lt; 5 mg/Nm<sup>3</sup></i></li> <li>• <i>Cyclones, but as primary collector: &lt; 50 mg/Nm<sup>3</sup></i></li> <li>• <i>Fabric or bag filters: high efficiency in controlling fine particulate (melting): achieve emission values &lt; 5mg/Nm<sup>3</sup>. Membrane filtration techniques can achieve &lt; 1 mg/Nm<sup>3</sup></i></li> <li>• <i>Ceramic and metal mesh filters. PM10 particles are removed: 0.1 mg/Nm<sup>3</sup></i></li> </ul> <p><i>Wet scrubbers: &lt; 4 mg/Nm<sup>3</sup></i></p>
<ul style="list-style-type: none"> <li>• The substance should not be released to water  <i>Emissions to surface water or to the sewage system are not allowed in this scenario</i></li> </ul>
<p><b>Conditions and measures related to biological sewage treatment plant</b></p>
<ul style="list-style-type: none"> <li>• Biological STP: None [Effectiveness Water: 0%]</li> </ul>
<p><b>Conditions and measures related to external treatment of waste (including article waste)</b></p>
<ul style="list-style-type: none"> <li>• Particular considerations on the waste treatment operations: No (low concentration)  <i>Hazardous wastes from onsite risk management measures 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. Releases to the floor, water and soil are to be prevented. If the silver content of the waste is elevated enough, internal or external recovery/recycling might be considered.</i>  <i>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</i>  <i>Suitable disposal: Hazardous waste produced during the manufacture and downstream use is sent to a recycler only marginal amounts are sent to a landfill or an incinerator. Waste containing silver is recycled for almost a 100%</i>  <i>A detailed assessment has been performed on modelled and measured data and is reported in the Waste report (ARCHE, 2013)</i></li> </ul>
<p><b>Other conditions affecting environmental exposure</b></p>
<ul style="list-style-type: none"> <li>• Receiving surface water flow rate: <math>\geq 1.8E4</math> m<sup>3</sup>/day</li> <li>• Discharge rate of effluent: <math>\geq 2E3</math> m<sup>3</sup>/day</li> </ul>

### 9.5.2.2. Releases

The local releases to the environment are reported in the following table. Note that the releases reported do not account for the removal in the modelled biological STP.

**Table 9.58. Local releases to the environment**

Release	Assessment entity	Release estimation method	Explanations
Water	Ag dissolved	Estimated release factor	<p><b>Release factor before on site RMM: 0%</b>  <b>Release factor after on site RMM: 0%</b>  <b>Local release rate: 0 kg/day</b>  <b>Explanation:</b>            Several companies have reported that they do not have emissions to water.</p>
Air	Ag dissolved	Estimated release factor (based on SPERC Eurometaux SPERC 6a.1.v3)	<p><b>Release factor before on site RMM: 0.026%</b>  <b>Release factor after on site RMM: 0.026%</b>  <b>Local release rate: 1.441 kg/day</b>  <b>Explanation:</b>            Release after RMM. The 90th percentile of reported site-specific release factors to air for 145 sites from the production of massive metal and metal powder</p>
Non agricultural	Ag dissolved	Estimated release	<p><b>Release factor after on site RMM: 0%</b></p>



Release	Assessment entity	Release estimation method	Explanations
soil		factor	<b>Explanation:</b> No direct release to soil.

### 9.5.2.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table. The exposure estimates have been obtained with EUSES 2.1.2 unless stated otherwise.

**Table 9.59. Exposure concentrations and risks for the environment and man via the environment**

Protection target	Assessment entity	Exposure concentration	Risk quantification
Fresh water	Ag dissolved	<b>Local PEC:</b> 6.06E-6 mg/L RCR = 0.132	Final RCR = 0.132
Sediment (freshwater)	Ag dissolved	<b>Local PEC:</b> 1.155 mg/kg dw RCR = 2.64E-3	Final RCR < 0.01
Marine water	Ag dissolved	<b>Local PEC:</b> 1.91E-6 mg/L RCR = 2.22E-3	Final RCR < 0.01
Sediment (marine water)	Ag dissolved	<b>Local PEC:</b> 0.364 mg/kg dw RCR = 8.31E-4	Final RCR < 0.01
Sewage Treatment Plant	Ag dissolved	<b>Local PEC:</b> 0 mg/L RCR = 0	Final RCR < 0.01
Agricultural soil	Ag dissolved	<b>Local PEC:</b> 0.15 mg/kg dw RCR = 0.143	Final RCR = 0.143
Man via environment - Inhalation (systemic effects)	Ag dissolved	<b>Concentration in air:</b> 2E-4 mg/m <sup>3</sup> RCR = 1.33E-3	Final RCR < 0.01
Man via environment - Oral	Ag dissolved	<b>Exposure via food consumption:</b> 3.84 µg/kg bw/day (Measured data: See section 9.0.3.6) RCR = 0.035	Final RCR = 0.035
Man via environment - combined routes			Final RCR = 0.036

#### **Remarks on measured exposure:**

See section 9.0.3.6 for Ag dissolved:

Identity of the substance used: Ag

Explanation: Worst case exposure of 3.84 µg Ag/kg bw/day from food (section 9.0.3.6) was taken forward to the risk characterisation.

The intake via drinking water calculated with CHESAR was 3-4 orders of magnitudes lower compared to the intake via food and has thus not been taken into account.

### 9.5.3. Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions ( PROC 1 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.3.1. Conditions of use

	Method
Product (article) characteristics	



	Method
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Closed system without breaches	MEASE 1.02.01
• Pattern of exposure control: Non-direct handling	MEASE 1.02.01
• Contact level: None	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.60. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.01	Final RCR = 0.01
Inhalation, local, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	1.71E-3 mg/kg bw/day (MEASE 1.02.01) RCR = 5.03E-3	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.015

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.4. Worker CS 4: Chemical production or refinery in closed continuous



## process with occasional controlled exposure or processes with equivalent containment conditions ( PROC 2 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

### 9.5.4.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Incidental	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.61. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.01	Final RCR = 0.01
Inhalation, local, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.111



**Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.5. Worker CS 5: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition ( PROC 3 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.5.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Incidental	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

#### 9.5.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.62. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.104	Final RCR = 0.104



Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, local, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.017 mg/kg bw/day (MEASE 1.02.01) RCR = 0.05	Final RCR = 0.05
Combined routes, systemic, long-term			Final RCR = 0.154

**Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.6. Worker CS 6: Chemical production where opportunity for exposure arises ( PROC 4 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.6.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	



### 9.5.6.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.63. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.521	Final RCR = 0.521
Inhalation, local, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.622

#### Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.7. Worker CS 7: Mixing or blending in batch processes ( PROC 5 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.7.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes	



	Method
<i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.7.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.64. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.521	Final RCR = 0.521
Inhalation, local, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.622

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.8. Worker CS 8: Transfer of substance or mixture (charging/discharging) at dedicated facilities ( PROC 8a )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.8.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation	



	Method
<i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
<ul style="list-style-type: none"> <li>Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i></li> </ul>	
<ul style="list-style-type: none"> <li>Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i></li> </ul>	
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> <li>Place of use: Indoor</li> </ul>	

### 9.5.8.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.65. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.521	Final RCR = 0.521
Inhalation, local, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.069 mg/kg bw/day (MEASE 1.02.01) RCR = 0.202	Final RCR = 0.202
Combined routes, systemic, long-term			Final RCR = 0.723

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):  
See section 9.0.4.2

### 9.5.9. Worker CS 9: Transfer of substance or mixture (charging/discharging) at dedicated facilities ( PROC 8b )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.9.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> <li>Percentage (w/w) of substance in mixture/article: ≤ 100 %</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>Physical form of the used product: Solid (material with low dustiness)</li> </ul>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
<ul style="list-style-type: none"> <li>Duration of activity: ≤ 8 h/day</li> </ul>	MEASE 1.02.01
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> <li>Occupational Health and Safety Management System: Advanced</li> </ul>	MEASE 1.02.01



	Method
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness $\geq 90\%$ )	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.9.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.66. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.104	Final RCR = 0.104
Inhalation, local, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.205

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.10. Worker CS 10: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) ( PROC 9 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.10.1. Conditions of use



	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)	MEASE 1.02.01
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.10.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.67. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.104	Final RCR = 0.104
Inhalation, local, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.205

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):



See section 9.0.4.2

## 9.5.11. Worker CS 11: Use as laboratory agent ( PROC 15 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

### 9.5.11.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.11.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.68. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.104	Final RCR = 0.104
Inhalation, local, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic,	Silver nitrate	0.017 mg/kg bw/day (MEASE 1.02.01)	Final RCR = 0.05





Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
long term		RCR = 0.05	
Combined routes, systemic, long-term			Final RCR = 0.154

**Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

## 9.5.12. Worker CS 12: Manual activities involving hand contact ( PROC 19 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

### 9.5.12.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: $\leq 8$ h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness $\geq 90\%$ )	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.12.2. Exposure and risks for workers



The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.69. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.521	Final RCR = 0.521
Inhalation, local, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.141 mg/kg bw/day (MEASE 1.02.01) RCR = 0.415	Final RCR = 0.415
Combined routes, systemic, long-term			Final RCR = 0.936

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### **9.5.13. Worker CS 13: Handling of solid inorganic substances at ambient temperature ( PROC 26 )**

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### **9.5.13.1. Conditions of use**

	Method
<b>Product (article) characteristics</b>	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
<b>Technical and organisational conditions and measures</b>	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
• Generic local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 78%] <i>Standard efficiency</i> Inhalation explanation: <i>Efficiency for industrial use</i>	MEASE 1.02.01
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to</i>	



	Method
<i>the substance can be excluded.</i>	
<ul style="list-style-type: none"> <li>• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i></li> </ul>	
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> <li>• Place of use: Indoor</li> </ul>	

### 9.5.13.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.70. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.33 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.344	Final RCR = 0.344
Inhalation, local, long term	Silver nitrate	0.33 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.141 mg/kg bw/day (MEASE 1.02.01) RCR = 0.415	Final RCR = 0.415
Combined routes, systemic, long-term			Final RCR = 0.758

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.14. Worker CS 14: Production of metal powders (wet processes) ( PROC 27a )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.14.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> <li>• Percentage (w/w) of substance in mixture/article: &lt;= 100 %</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>• Physical form of the used product: Solid (material with low dustiness)</li> </ul>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
<ul style="list-style-type: none"> <li>• Duration of activity: &lt;= 8 h/day</li> </ul>	MEASE 1.02.01
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> <li>• Occupational Health and Safety Management System: Advanced</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>• Pattern of use: Non-dispersive use</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>• Pattern of exposure control: Direct handling</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>• Contact level: Extensive</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>• Generic local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 78%] <i>Standard efficiency</i></li> </ul>	MEASE 1.02.01



	Method
Inhalation explanation: <i>Efficiency for industrial use</i>	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Respiratory protection: Yes (APF >= 10)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.14.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.71. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.11 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.115	Final RCR = 0.115
Inhalation, local, long term	Silver nitrate	0.11 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.141 mg/kg bw/day (MEASE 1.02.01) RCR = 0.415	Final RCR = 0.415
Combined routes, systemic, long-term			Final RCR = 0.529

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.15. Worker CS 15: Manual maintenance (cleaning and repair) of machinery ( PROC 28 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.15.1. Conditions of use

	Method
Product (article) characteristics	



	Method
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	MEASE 1.02.01
• Physical form of the used product: Solid (material with low dustiness)	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.15.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.72. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.521	Final RCR = 0.521
Inhalation, local, long term	Silver nitrate	0.5 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.069 mg/kg bw/day (MEASE 1.02.01) RCR = 0.202	Final RCR = 0.202
Combined routes, systemic, long-term			Final RCR = 0.723

#### **Remarks on exposure data from external estimation tools:**

**MEASE 1.02.01** for Silver nitrate:

Explanation:

As the MEASE 1.02.01 exposure estimation tool for workers does not provide exposure estimates for PROC 28, PROC 8a has been used instead as the input parameter assuming that there are similarities in the exposure.

**Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.16. Worker CS 16: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition ( PROC 3 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.16.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Incidental	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

#### 9.5.16.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.73. Exposure concentrations and risks for workers**



Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.01	Final RCR = 0.01
Inhalation, local, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.017 mg/kg bw/day (MEASE 1.02.01) RCR = 0.05	Final RCR = 0.05
Combined routes, systemic, long-term			Final RCR = 0.061

**Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.17. Worker CS 17: Chemical production where opportunity for exposure arises ( PROC 4 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

**9.5.17.1. Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must</i>	



	Method
<i>be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.17.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.74. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.052	Final RCR = 0.052
Inhalation, local, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.153

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.18. Worker CS 18: Mixing or blending in batch processes ( PROC 5 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.18.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	MEASE 1.02.01
• Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to</i>	





	Method
<i>the substance can be excluded.</i>	
<ul style="list-style-type: none"> <li>Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i></li> </ul>	
<ul style="list-style-type: none"> <li>Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i></li> </ul>	
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> <li>Place of use: Indoor</li> </ul>	

### 9.5.18.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.75. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.052	Final RCR = 0.052
Inhalation, local, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.153

#### Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.19. Worker CS 19: Transfer of substance or mixture (charging/discharging) at dedicated facilities ( PROC 8a )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.19.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> <li>Percentage (w/w) of substance in mixture/article: &lt;= 100 %</li> </ul>	MEASE 1.02.01
<ul style="list-style-type: none"> <li>Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i></li> </ul>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
<ul style="list-style-type: none"> <li>Duration of activity: &lt;= 8 h/day</li> </ul>	MEASE 1.02.01
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> <li>Occupational Health and Safety Management System: Advanced</li> </ul>	MEASE 1.02.01



	Method
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness $\geq 90\%$ )	MEASE 1.02.01
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.19.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.76. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.052	Final RCR = 0.052
Inhalation, local, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.153

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

### 9.5.20. Worker CS 20: Transfer of substance or mixture (charging/discharging) at dedicated facilities ( PROC 8b )

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.20.1. Conditions of use



	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	MEASE 1.02.01
• Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)	MEASE 1.02.01
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.20.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.77. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.01	Final RCR = 0.01
Inhalation, local, long term	Silver nitrate	0.01 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.111

#### Risk characterisation



Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):  
See section 9.0.4.2

### 9.5.21. Worker CS 21: Production of metal powders (wet processes) (PROC 27b)

Assessment entity group used for the assessment of this contributing scenario: HH RA

#### 9.5.21.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	MEASE 1.02.01
• Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	

#### 9.5.21.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.78. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic,	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01)	Final RCR = 0.104



Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
long term		RCR = 0.104	
Inhalation, local, long term	Silver nitrate	0.1 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.205

**Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2

## 9.5.22. Worker CS 22: Manual maintenance (cleaning and repair) of machinery ( PROC 28 )

Assessment entity group used for the assessment of this contributing scenario: HH RA

### 9.5.22.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	MEASE 1.02.01
• Physical form of the used product: Liquid, including paste/slurry/suspension <i>Note that 'aqueous solution' was selected in MEASE to reflect the very low emission potential of the substance.</i>	MEASE 1.02.01
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	MEASE 1.02.01
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	MEASE 1.02.01
• Pattern of use: Non-dispersive use	MEASE 1.02.01
• Pattern of exposure control: Direct handling	MEASE 1.02.01
• Contact level: Extensive	MEASE 1.02.01
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness ≥ 90%)	MEASE 1.02.01
• Respiratory protective equipment (RPE) as precautionary measure: RPE protecting from local effects via inhalation <i>Due to potential adverse effects of the substance to the respiratory tract, RPE is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.</i>	
• Gloves as precautionary measure: Gloves protecting from local effects to the skin (high hazard) <i>Due to the potential adverse effects of the substance to skin, protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate.</i>	
• Eye protection: Eye protection to be worn to protect from adverse effects to the eyes <i>Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.</i>	



	Method
Other conditions affecting workers exposure	
• Place of use: Indoor	

### 9.5.22.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

**Table 9.79. Exposure concentrations and risks for workers**

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01) RCR = 0.052	Final RCR = 0.052
Inhalation, local, long term	Silver nitrate	0.05 mg/m <sup>3</sup> (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	Silver nitrate	0.034 mg/kg bw/day (MEASE 1.02.01) RCR = 0.101	Final RCR = 0.101
Combined routes, systemic, long-term			Final RCR = 0.153

#### **Remarks on exposure data from external estimation tools:**

**MEASE 1.02.01** for Silver nitrate:

Explanation:

As the MEASE 1.02.01 exposure estimation tool for workers does not provide exposure estimates for PROC 28, PROC 8a has been used instead as the input parameter assuming that there are similarities in the exposure.

#### **Risk characterisation**

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):

See section 9.0.4.2