

9. Exposure scenario 9: Service life (worker at industrial site) - Industrial handling of surface treated articles (passivated/plated)

Market sector: Use in surface treatment

Article categories:

AC 2: Machinery, mechanical appliances, electrical/electronic articles

AC 7: Metal articles

Environment contributing scenario(s):		
CS 1	Handling of surface treated articles (passivated/plated)	ERC 12a
Worker contributing scenario(s):		
CS 2	Handling of articles	PROC 21

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES6: Use at industrial sites - Passivation processes in surface treatment

ES7: Use at industrial sites - Passivation processes in surface treatment at large industrial sites with continuous processes

ES8: Use at industrial sites - Plating processes in surface treatment

Explanation on the approach taken for the ES

Please refer to IUCLID Section 13 for a detailed description of the specific methodology applied for the occupational exposure assessment.

It is noted that the substance is chemically transformed into another substance. Consequently, exposure can no longer occur to the registered substance. Please refer to information on safe use for the handling of the individual manufactured substances for process steps commencing the chemical transformation step.

9.1. Env CS 1: Handling of surface treated articles (passivated/plated) (ERC 12a)

9.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
<ul style="list-style-type: none"> Daily use at site: ≤ 0.006 tonnes/day <p><i>The tonnage and further exposure is always expressed in cobalt.</i></p>
<ul style="list-style-type: none"> Annual use at a site: ≤ 2.007 tonnes/year
Conditions and measures related to sewage treatment plant
<ul style="list-style-type: none"> Municipal STP: Yes
<ul style="list-style-type: none"> Discharge rate of STP: $\geq 2E3$ m³/d
<ul style="list-style-type: none"> Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
<ul style="list-style-type: none"> Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.) <p><i>Fraction of daily/annual use expected in waste: 60% of all articles, 40% is recycled. (EC, 2010)</i></p> <p><i>Appropriate waste codes: 20 01 34, 20 01 40, 20 03 01, 20 03 07, ... Suitable Disposal: Waste from end-of-life articles can be disposed of as municipal waste, except when they are separately regulated, like electronic devices, batteries, vehicles, etc. Disposal of wastes is possible via incineration (operated according to Directive 2000/76/EC on the incineration of waste) or landfilling (operated according to Reference Document on the Best available Techniques for Waste Industries of August 2006 and Council Directive 1999/31/EC and Council Decision 19 December 2002). A detailed assessment has been performed and is reported in the Waste report (ARCHE, 2011)</i></p>

Other conditions affecting environmental exposure
• Discharge rate of effluent: $\geq 2E3$ m ³ /d
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d <i>Flow rate of receiving surface should be sufficiently high to dilute the effluent concentration of the STP below the PNEC for water and sediment.</i>

9.1.2. Releases

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

Table 9.96. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	Release factor	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day Explanation / Justification: There are no intended cobalt releases due to service life of surface treated articles, the non-intended releases are negligible and pose no threat to the environment.
Air	Release factor	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day Explanation / Justification: Not relevant
Soil	Release factor	Final release factor: 0% Explanation / Justification: Not relevant

Releases to waste

Release factor to external waste: 60 %

Release factor to waste from the process: 60%

Fraction of daily/annual use expected in waste: 60% of all articles, 40% is recycled. (EC, 2010).

Note that the 60% does not specifically apply to this use but applies to all professional, consumer or service life uses from cobalt.

A detailed assessment has been performed and is reported in the Waste report (ARCHE, 2011)

9.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) for the service life are negligible and pose no threat to the environment.

Emission data from municipal STPs have been collected for Belgium (via VMM) and The Netherlands (WATSON database). For Belgium 6 data points are available between 2011 and 2013. Only one data point is above the DL, the effluent concentration of the STP above the DL is 3 µg Co/L. For the Netherlands 272 data points are available between 2005 and 2012. Only 69 data points are above the DL, the median effluent concentration is below the DL and the 90th percentile is 2.69 µg Co/L. These concentrations are a factor 100 below the PNEC for STP of 370 µg Co/L.

Table 9.97. Exposure concentrations and risks for the environment and man via the environment

Not applicable.

9.2. Worker CS 2: Handling of articles (PROC 21)

It is noted that the substance is used as raw material in the treatment of article surfaces. During treatment, the substance is completely transformed into cobalt and deposited as such on the respective article surface.

9.2.1. Conditions of use

	Method
Product (Article) characteristics	
<ul style="list-style-type: none"> Maximum emission potential of the substance: Very low <i>Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.</i> 	
<ul style="list-style-type: none"> Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%] 	
<ul style="list-style-type: none"> Physical form of substance: Massive object 	
Amount used (or contained in articles), frequency and duration of use/exposure	
<ul style="list-style-type: none"> Duration per shift: = 480.0 min 	
<ul style="list-style-type: none"> Shifts per year: = 240.0 Shifts/year <i>Typical number of shifts per year during which this task is conducted considering a single worker. This value has been taken into account in the calculation of excess cancer risk.</i> 	
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> Process temperature: Ambient 	
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> General good occupational hygiene practices <i>Required good occupational hygiene practices to ensure a safe handling of the substance involve measures (e.g. shower and change clothes at end of work shift) to avoid any contamination of private households via the work-home-interface and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking in the workplace. In general, inhalation and ingestion should be avoided. Unless otherwise stated below, certified working clothing and shoes should be worn during work. Any contaminated clothing should not be taken home. Good general ventilation in the workplace should be ensured. Dust should not be blown off (e.g. from dried splashes) with compressed air. Regular training in workplace hygiene practice and proper use of personal protective equipment (if relevant) is required.</i> 	
<ul style="list-style-type: none"> Gloves: Gloves protecting from sensitizing properties to skin, continuous supervision of workers required <i>Due to the skin sensitizing effect of the substance, protective gloves according to EN 374 have to be worn at all workplaces unless any exposure to the substance can be excluded when taking into account the nature of the conducted process, applied exposure prevention measures and physical appearance of the substance of concern in the specific type of application (e.g. protecting from splashes by containment of emission source). Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. Additionally, face protection is required to be worn as appropriate. This level of protection is to be achieved by continuous supervision and training of workers wearing gloves.</i> 	
<ul style="list-style-type: none"> Certified safety clothing and shoes <i>Certified safety clothing including coveralls and safety shoes are to be worn as appropriate. Face protection may be worn if the type of process is associated with the risk of face injuries due to thermal or mechanical stress.</i> 	

9.2.2. Exposure and risks for workers

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

Table 9.98. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, long term	9 µg/m ³ (Measured data: Analogous data)	RCR = 0.112

Remarks on measured exposure:

Analogous data

Identity of the substance used: Exposure reported as substance

Inhalation exposure, long term concentration: Number of measured data points: 10

Risk characterisation

Qualitative risk characterisation:

The risk characterisation for local dermal effects is given in Section 9.0.4.2.