

1st Stakeholder Consultation – Compilation of initial substance information for cobalt dichloride (CAS 7646-79-9, 7791-13-1; EC 231-589-4) and cobalt sulphate (CAS 10026-24-1, 10124-43-3; EC 233-334-2)

Abbreviations

CLP	Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging
CRM	Critical Raw Materials
EEE	Electrical and Electronic Equipment
ECHA	European Chemicals Agency
IED	Industrial Emission Directive
REACH	Regulation (EU) No 1907/2006 on the Registration, Evaluation, Authorisation and restriction of Chemical substances.
RMOA	Risk Management Option Analysis
SPIN	Substances in Preparations in Nordic Countries

1. Legal status and other restrictions

Cobalt dichloride and cobalt sulphate are both recognized as substances of very high concern and were both included in the REACH Candidate list in 2008 because of their being carcinogenic and toxic for reproduction (articles 57a and 57c). On 20 December 2011, ECHA recommended including cobalt dichloride and cobalt sulphate in Annex XIV.¹ However, the inclusion in Annex XIV has not been realized to date (16.04.2018).

Cobalt dichloride and cobalt sulphate are classified under the CLP regulation (Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging) with the following entries:²

- Acute Tox. 4 (Acute toxicity) - H302 (Harmful if swallowed);
- Skin Sens. 1 (Sensitisation of the respiratory tract or the skin) - H317 (May cause an allergic skin reaction);
- Resp. Sens. 1 (Sensitisation of the respiratory tract or the skin) - H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled);
- Muta. 2 (Germ cell mutagenicity) - H341 (Suspected of causing genetic defects);
- Carc. 1B (Carcinogenicity) - H350i (May cause cancer by inhalation);
- Repr. 1B (Reproductive Toxicity) - H360F (May damage fertility);
- Aquatic Acute 1 (Hazardous to the aquatic environment) - H400 (Very toxic to aquatic life); and

¹ ECHA (2011): Third Annex XIV recommendation - 20 December 2011; http://www.echa.europa.eu/documents/10162/13640/3rd_a_xiv_recommendation_20dec2011_en.pdf, last viewed 19.04.2018

² <https://echa.europa.eu/de/information-on-chemicals/annex-vi-to-clp>, last viewed 19.04.2018

- Aquatic Chronic 1 (Hazardous to the aquatic environment) - H410 (Very toxic to aquatic life with long lasting effects).

The restrictions for substances under entry 28 and entry 30 of REACH Annex XVII apply for cobalt dichloride and cobalt sulphate, where the use as a substance, mixture or constituent of other mixtures for supply to the general public is not allowed.

For soluble cobalt salts, among them cobalt dichloride and cobalt sulphate, the European Chemicals Agency ECHA conducted a risk management option analysis (RMOA) and concluded that there is a need for a proposal for restriction of the substance and committed to submit a REACH Annex XV dossier for a restriction in 07/2018.³

Cobalt and its compounds are subject to the following legal restrictions:

- The IED Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control) sets emission limit values for cobalt and its compounds at industrial sites.⁴
- In the Water Framework Directive 2006/11/EC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community, cobalt is listed as a substance for which water pollution has to be reduced; therefore Member States are required to establish environmental quality standards for this purpose.
- Maximum air emission limit values for the incineration of waste are established in Directive 2000/76/EEC on the incineration of waste.⁵

Cobalt is listed on the 2017 list of Critical Raw Materials for the EU (COM(2017) 490 final)⁶. Materials appearing on this list have been identified as critical for the EU because possible risks of supply shortage (scarcity) and their impacts on the economy are higher than those of most of the other raw materials. Additional aspects (e.g. environmental, social) are not mentioned in the communication in this regard.

2. Uses and quantities

Cobalt dichloride and cobalt sulphate are both registered under REACH, however with different tonnage bands:

- Cobalt dichloride is registered for 1,000- 10,000 tonnes per year⁷.
- Cobalt sulphate is registered for 10,000 – 100,000 tonnes per year⁸.

³ <https://echa.europa.eu/documents/10162/c362c44b-9470-a290-5ed7-c6c7a84989ae>, last viewed 19.04.2018

⁴ Average emission limit values (mg/Nm³) for the following heavy metals over a sampling period of a minimum of 30 minutes and a maximum of 8 hours for Cobalt and its compounds, expressed as cobalt (Co): 0,5 mg/Nm³

⁵ All average values over the sample period of a minimum of 30 minutes and a maximum of 8 hours: total 0,5 mg/m³ and total 1 mg/m³ for Cobalt and its compounds, expressed as cobalt (Co)

⁶ EU COM (2017), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the 2017 list of Critical Raw Materials for the EU, Brussels, 13.9.2017, COM(2017) 490 final, available under: <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2017:0490:FIN>, last viewed 19.04.2018

⁷ <https://echa.europa.eu/de/registration-dossier/-/registered-dossier/14346>, last viewed 19.04.2018

⁸ <https://echa.europa.eu/de/registration-dossier/-/registered-dossier/1428>, last viewed 19.04.2018

The tonnage band in the registration for cobalt sulphate has increased from a range of 1,000 - 10,000 to a range of 10,000 – 100,000 tonnes per annum, in comparison to the tonnage band at the time of the Oeko-Institut 2014 study⁹.

From the information given on the ECHA registered substances database, uses as intermediate cannot be unambiguously assigned to certain industrial uses, e.g. the industrial use of cobalt dichloride and cobalt sulphate in surface treatment processes is listed as intermediate use. Though the use of cobalt salts in surface treatment was identified by registrants as an intermediate use in the registration dossiers, ECHA (2017) concluded that the identification of the use in surface treatment as intermediate is not considered justified.¹⁰ Based on a published “Guidance on Intermediates”, ECHA states that surface treating agents are not regarded as intermediates.¹¹

The industrial uses of cobalt dichloride and cobalt sulphate are summarized in the table below (Table 1).

Table 1: Amounts and uses of cobalt dichloride and cobalt sulphate according to ECHA registered substance database

	Cobalt dichloride	Cobalt sulphate
Tonnage Band	1,000 - 10,000 t/y	10,000 - 100,000 t/y
Intermediate uses	<ul style="list-style-type: none"> · Surface treatment processes · Manufacture of chemicals and in other wet-chemical processes · Manufacture of inorganic pigments & frits, glass and ceramic ware · Manufacture of textile dyes · Manufacture of cobalt carboxylates and resins 	<ul style="list-style-type: none"> · Surface treatment processes · Manufacture of chemicals and in other wet-chemical processes · Manufacture of inorganic pigments, frits, ceramic ware, glass · Production of dyes for the textile, leather, wood and paper industry · Battery production and use
Others	<ul style="list-style-type: none"> · Surface treatment processes / Passivation processes in surface treatment / Plating processes in surface treatment · Manufacture of inorganic pigments & frits, glass, ceramic ware, varistors and magnets (calcination/sintering processes) · Water treatment chemicals, oxygen scavengers, corrosion inhibitors 	<ul style="list-style-type: none"> · Surface treatment processes / Passivation processes in surface treatment / Plating processes in surface treatment · Manufacture of inorganic pigments & frits, glass, ceramic ware, varistors and magnets (calcination/sintering processes) · Water treatment chemicals, oxygen scavengers, corrosion inhibitors

⁹ Oeko-Institut (2014): Study for the Review of the List of Restricted Substances under RoHS 2. Analysis of Impacts from a Possible Restriction of Several New Substances under RoHS 2 by Gensch, C.-O., Baron, Y. Blepp, M., Bunke, D., Moch, K.; Revised Final Version 06.08.2014; http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Substance_Review/20140806_Substance_Review_revised_version_final_plus_Dossier.pdf, last viewed 19.04.2018

¹⁰ ECHA (2013): A preliminary investigation into the conditions of use of five cobalt salts, Final report, July 2013; https://echa.europa.eu/documents/10162/13641/cobalts_salts_study_report_en.pdf/42f0947f-e7fe-7b14-fc97-cfda0c068e9d - from page 40 on, last viewed 19.04.2018

¹¹ ECHA (2010): Guidance on Intermediates, version 2, December 2010; https://echa.europa.eu/documents/10162/13632/intermediates_en.pdf/0386199a-bdc5-4bbc-9548-0d27ac222641, last viewed 19.04.2018

	Cobalt dichloride	Cobalt sulphate
	<ul style="list-style-type: none"> • Manufacture of textile dyes • Biogas production • Fermentation processes, in biotech and scientific research and standard analysis • Manufacture of cobalt carboxylates and resinates • Humidity indicator cards, plugs and/or bags with printed spots 	<ul style="list-style-type: none"> • Manufacture of textile dyes • Biogas production • Use in fermentation processes, in biotech and scientific research and standard analysis • Catalyst in synthesis processes • Manufacture and industrial use of batteries using cobalt sulfate • Chemical pharmaceutical production • Cobalt deposition in electronic materials

Source: ECHA registered substance database for cobalt dichloride and cobalt sulphate, retrieved in April 2018

The EEE specific uses of both cobalt compounds are:^{12,13}

- Plating processes in surface treatment (used in telecommunication, electronics, storage media, household articles),
- Manufacture of inorganic pigments, frits, glass, ceramic ware, varistors and magnets; and incalination/sintering processes (for semiconductors used in the manufacture of computer, electronic and optical products, electrical equipment).

The Cobalt Development Institute (CDI) stated in 2014¹⁴ that *“in general Co is used in semiconductors, component lead frames, contacts and connectors, printed circuit boards, processors and chipsets, and hard-disk drives. However it is not known to the CDI yet which, and how much of each of the three cobalt substances are used in each of these applications.”*

In the context of ECHA’s third Recommendation for inclusion of substances in Annex XIV, the Cobalt REACH Consortium provided information on the volumes per sector / use:

Volumes of relevance for uses of cobalt dichloride:¹²

- Production of other chemicals: 97%
- Surface treatment: <2%
- Oxygen scavenger/corrosion prevention in industrial water systems: <1%
- Medicinal products and as trace element in industrial cell culture, <1%
- Animal feed and as component of fertilizer formulation: <<1%
- Humidity indicator: <<<1% (according to a company that provided further information during the consultation, maximum 100 kg/y)

¹² ECHA (2011): Background document for cobalt dichloride; 20 December 2011; <http://www.echa.europa.eu/documents/10162/a002b713-7e1a-46ba-ba54-13763c18fd82>, last viewed 19.04.2018

¹³ ECHA (2011): Background document for cobalt(II) sulphate, 20 December 2011; <http://www.echa.europa.eu/documents/10162/ef958831-f28c-47f1-b159-ab4a32b53b2f>, last viewed 19.04.2018

¹⁴ Cobalt Development Institute (2014): Contribution submitted on 04.04.2014; <http://rohs.exemptions.oeko.info/index.php?id=213>, last viewed 19.04.2018

- In the manufacture of inorganic pigments for ceramic products (including glazes) & porcelain manufacture (decolourizing application), no specific tonnage information, assumed low

For the EEE sector, mainly the use in surface treatment is assumed relevant. Assuming the information indicated above (i.e., <2% of the total of 10,000 t per year) surface treatment accounts for < 200 tonnes of cobalt dichloride per year; this amount however also covers non-EEE uses.

Volumes of relevance for uses of cobalt sulphate:¹³

- Manufacture of other chemicals: ~ 90%
- Use in surface treatment: < 5%
- Manufacture of inorganic pigments: <3%
- Manufacture of batteries: <1%
- Manufacture of catalysts: <<1%
- Use as an animal feed supplement: <1%
- Use as an oxygen scavenger/corrosion prevention in industrial water systems: <<1%
- Manufacture of textile dyes: <<1%
- Manufacture of drier and/or pigment in paints/inks: <<1%

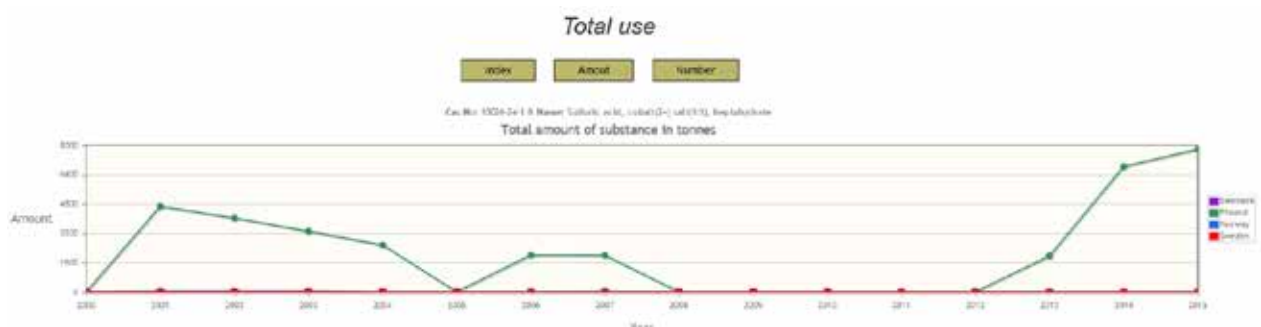
Here too, for the EEE sector, mainly the uses in surface treatment are assumed relevant. The above indicated <5% of 100,000 tonnes per year (as the registered tonnage band has changed since 2014) in surface treatment thus accounts for < 5,000 tonnes per year. This amount however also covers non-EEE uses. According to estimates from ECHA on volumes of cobalt salts, 250 tonnes cobalt sulphate were used in surface treatment in 2012.¹⁵

Data is available as to current uses of the cobalt compounds in the SPIN database¹⁶. SPIN is a database on the use of Substances in Products in the Nordic countries. It includes information on the quantities of chemicals that are used in the Scandinavian countries, the industries in which such chemicals are used and the function which they are used for. For cobalt dichloride, there are no amounts registered, whereas for cobalt sulphate, varying amounts are registered. In 2015 for Finland 7,773 tonnes of cobalt sulphate were registered.

¹⁵ ECHA (2013): A preliminary investigation into the conditions of use of five cobalt salts, Final report, July 2013; https://echa.europa.eu/documents/10162/13641/cobalts_salts_study_report_en.pdf/42f0947f-e7fe-7b14-fc97-cfda0c068e9d, page 46, last viewed 19.04.2018

¹⁶ <http://spin2000.net/>, last viewed 19.04.2018

Figure 1: Total use of cobalt sulphate in tonnes in the Nordic countries in the years 2000 to 2015



Source: SPIN database