

Cobalt Institute

RESPONSE TO CONSULTATION - "Study to support the review of the list of restricted substances and to assess a new exemption request under RoHS 2 (Pack 15)" including:

- **Questionnaire** 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); and,
- **Accompanying document** with '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)'.

INTRODUCTION

The Cobalt Institute (CI) is an international non-profit trade association composed of the major producers, users, recyclers, and traders of cobalt [<https://www.cobaltinstitute.org/home>]. The Cobalt REACH Consortium Ltd. (CoRC) is a separate wholly-owned subsidiary of the CI formed to support the implementation of REACH and CLP for the cobalt industry [<http://www.cobaltreachconsortium.org/home>].

The Secretariat is pleased to provide comments in response to the Questionnaire, and we also note some brief comments (updates/corrections) to the information presented in the accompanying background document prepared by the Oeko Institute. In summary, the CI considers it is important to emphasise the following points:

- The substances cobalt dichloride and cobalt sulphate are not found in electrical and electronic equipment (EEE). Cobalt dichloride and cobalt sulphate are used as chemical intermediates to produce other cobalt-containing compounds that are present in the surface-treated articles or components used in EEE. It is the cobalt moiety itself that is important for providing the desired physical-chemical properties and technical function, which means the cobalt cannot be substituted (easily replaced) in these specific applications.
- Cobalt dichloride and cobalt sulphate are used in industrial applications by professional workers and the occupational exposures are limited/controlled through existing risk management measures, which are fully described in the REACH registration dossiers for these cobalt substances. The core REACH dossiers and refined exposure scenarios for these substances were recently updated in Jan/Feb 2018. As cobalt dichloride and cobalt sulphate are not present in EEE, there is no risk relating to these compounds to worker and consumer health or to the environment during use or end of life management of EEE.
- Cobalt dichloride and cobalt sulphate are two of the five cobalt salts on the REACH Candidate list. ECHA is currently evaluating cobalt dichloride and cobalt sulphate (and the three other cobalt salts) for a possible Restriction under REACH, the scope of which would cover all uses including the same uses identified for this current RoHS (EEE) consultation. The REACH Restriction proposal (Annex XV dossier) is expected in July 2018, and there will be two public consultations for this process.
- This current RoHS priority list review represents an overlap with an existing on-going regulatory process on these two cobalt compounds, and this RoHS consultation on these two cobalt substances (if continued) would be running in parallel with the wider REACH restriction process.

For these reasons, cobalt dichloride and cobalt sulphate should be removed from the RoHS review priority list.

Contact details:

Ms Carol-lyne PETTIT
Regulatory (EU) & Sustainability Manager
The Secretariat, The Cobalt Institute
e-mail: cpettit@cobaltinstitute.org

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RESPONSE TO QUESTIONNAIRE

1. Applications in which cobalt dichloride and cobalt sulphate are in use

- a. Please provide information concerning products and applications in which the substances are in use.
 - i. In your answer please specify if the applications specified are relevant to EEE products and applications or not.
 - ii. Please elaborate if substitution of the substance is already underway in some of these applications, and where relevant elaborate, which chemical or technological alternatives may be relevant for this purpose. For example, please specify possible alternatives to the use of these compounds in surface treatment (substance level substitution) or possible alternatives to the surface treatment that would eliminate the need to use these compounds (technological level substitution).

RESPONSE COMMENTS TO QUESTION 1A

Cobalt dichloride and cobalt sulphate are used (together with other metal salts) as chemical intermediates to produce other cobalt-containing compounds that will be present on the treated articles or components used in electrical and electronic equipment (EEE). The substances cobalt dichloride and cobalt sulphate are not found in the EEE itself.

Since it is the cobalt moiety itself that is important for providing the desired physical-chemical properties and technical function, the cobalt cannot be substituted (easily replaced) in these specific applications.

Note that cobalt has been formally identified as a critical raw material (CRM) by the EC, and is considered vital to the security and growth of several important sectors of the EU economy, namely rechargeable batteries, magnets, electronics, and super alloys (aerospace and defence).

For further information about 'Cobalt in Electronics' please visit:

<https://www.cobaltinstitute.org/electronics.html>

- b. Please specify if you are aware, if aside from actual use of the substances, it may be reintroduced into the material cycle through the use of secondary materials.
 - i. Please detail in this case what secondary materials may contain impurities of cobalt dichloride and cobalt sulphate and at what concentrations as well as in the production of what components/products such materials are used.
 - ii. If possible please provide detail as to the changing trends of concentrations of cobalt dichloride and cobalt sulphate in such secondary materials as well as the changing trend of use of the respective secondary material in EEE manufacture.

RESPONSE COMMENTS TO QUESTION 1B

Some secondary materials in the electronics material cycles may contain residual levels of cobalt compounds present as an impurity. If present in these materials, the cobalt compounds would be expected to be in the metallic, alloyed or oxide/hydroxide forms (i.e. not as the metal salt).

Due to cobalt's currently high price and increasing value, it would be expected that cobalt-containing articles or components from EEE will be intentionally separated and recovered where possible.

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- c. Please specify in which applications cobalt dichloride and cobalt sulphate are used as a material constituent, as an additive, as an intermediate or a reactant, etc. and what concentration of cobalt dichloride and cobalt sulphate remains in the final product in each of these cases (on the homogenous material level).

If cobalt dichloride and cobalt sulphate is considered to be an intermediate, please explain the reaction processes and which substance remains in the final component/material.

RESPONSE COMMENTS TO QUESTION 1C

The substances cobalt dichloride and cobalt sulphate are not found in the EEE itself. Cobalt dichloride and cobalt sulphate are used as chemical intermediates (material constituents) in the formulation of metal salts solutions (made-to-order mixtures) that are used in surface treatment baths or passivation processes, for surface finishing or deposition of coatings onto articles or components used in EEE, as well as for various other applications in the surface treatment sector. It is not cobalt dichloride nor cobalt sulphate but another cobalt-containing compound that is present on the surface-treated article or EEE component.

In these reaction processes the cobalt dichloride and/or cobalt sulphate are combined with other metal salts and chemical constituents to prepare the formulation solutions (i.e. proprietary made-to-order mixtures). In solution the metal salts will dissolve and dissociate into their cationic and anionic components. Through the electrochemical deposition process or the passivation process, the cobalt ion is deposited onto the surface layers of the treated article; for example, in the form of metallic cobalt, as an alloyed metal layer, or as a metal oxide/hydroxide complex, or another cobalt-containing compound. The form and composition of the deposited layer will depend on the chemical constituents and technological processes selected by the DU company to achieve the required physical-chemical properties and technical functionality that has been specified by the end-user for the intended application.

2. Quantities and ranges in which cobalt dichloride and cobalt sulphate are in use

- a. Please detail in what applications your company/sector applies cobalt dichloride and cobalt sulphate and give detail as to the annual amounts of use (please specify which data is relevant for which compound). If an exact volume cannot be specified, please provide a range of use (for example – 50-100 tonnes per annum).
- b. Please provide information as to the ranges of quantities in which you estimate that the substance is applied in general and in the EEE sector.
- c. If substitution has begun or is expected to begin shortly, please estimate how the trend of use is expected to change over the coming years.

RESPONSE COMMENTS TO QUESTION 2

It is assumed this question is directed at individual manufacturing companies within the EEE sector, and therefore that the information collected on use-volumes per application will be highly confidential.

The CI should like to note that even though the cobalt salts are only used in very small quantities, the cobalt may be essential to the finished product, by providing desirable properties.

3. Potential emissions in the waste stream

- a. Please provide information on how EEE applications containing cobalt dichloride and cobalt sulphate are managed in the waste phase (with which waste is such EEE collected and what treatment routes are applied)? For example, how are the surface treated components managed in the waste phase?

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- b. Please detail potentials for emissions in the relevant treatment processes.

RESPONSE COMMENTS TO QUESTION 3

Since the substances cobalt dichloride and cobalt sulphate are not found in the EEE itself, these substances would not be expected to be found within the waste EEE streams.

The CI notes that the recovery and recycling activities are conducted by multi-metallic companies. These industrial recycling facilities are covered by the NFM BREF (Best Available Techniques Reference Document for the Non-Ferrous Metals Industries [Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control)], which means that the BAT (best available techniques) are being employed for prevention and control of emissions. The emissions for these facilities would not be expected to contain cobalt dichloride or cobalt sulphate since these substances are not present in the EEE.

4. Substitution

a. For which applications is substitution underway?

- i. For which applications is substitution scientifically or technically not practicable or reliable and why?
- ii. Please provide detail of substitutes for specific applications (for example the cobalt compounds used in surface treatment).
- iii. Please refer in your answers to available substitutes on the substance level (for cobalt in the specific surface treatment processes) and on the technological level (for example alternatives to surface treatment).
- iv. Do certain constraints exist for the application of substitutes (provide details on costs, reliability, availability, roadmap for substitution, etc.)?

RESPONSE COMMENTS TO QUESTION 4

The CI notes that it is not necessary to consider substitution in this EEE case, since cobalt dichloride and cobalt sulphate are not present in the EEE.

5. Socio economic impact of a possible restriction

Please provide information as to the socio-economic impacts of a scenario in which cobalt dichloride and/or cobalt sulphate are restricted under RoHS. Please specify your answers in relation to specific applications in which the substances are used and/or in relation to the phase-in of specific alternatives in related application areas. Please refer in your answer where possible to possible costs and benefits of various sectors, users, the environment, etc. Please support statements with quantified estimations.

RESPONSE COMMENTS TO QUESTION 5

A possible restriction under RoHS on the use of cobalt dichloride or cobalt sulphate as chemical intermediates in the surface treatments of EEE articles or components would present an unnecessary cost barrier to EU industry, in terms of imposing additional administrative burdens and requirements for workplace monitoring and chemical analyses for substances which are not present in the EEE.

The possible restriction under RoHS is also not necessary for exposure or environmental purposes. The cobalt salts are used in industrial applications by professional workers and the occupational exposures are limited/controlled through existing risk management measures, which are described in the exposure assessment and scenarios prepared for the REACH registration dossiers for these cobalt substances.

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The CI notes that ECHA is currently evaluating cobalt dichloride and cobalt sulphate (and the three other cobalt salts) for a possible Restriction under REACH, and the scope of this Restriction would cover all uses including the same uses that have been identified for this current RoHS (EEE) consultation. The REACH Restriction proposal (Annex XV dossier) is expected in July 2018, and there will then be two public consultations.

Therefore, this current RoHS priority list review represents an overlap with an existing on-going EU regulatory process on these two cobalt compounds, and this RoHS consultation on cobalt dichloride and cobalt sulphate (if continued) would be running in parallel with the wider REACH restriction process.

For these reasons, cobalt dichloride and cobalt sulphate should be removed from the RoHS review priority list.

6. Further information and comments

The information compiled on these substances for the stakeholder consultation has been prepared as a summary of the publicly available information reviewed so far. If relevant, please provide further information in this regard, that you believe to have additional relevance for this review, as well as references where relevant to support your statements.

ADDITIONAL COMMENTS

Firstly, the CI notes that the 2014 study by Umweltbundesamt GmbH for the Review of the List of Restricted Substances under RoHS2 [Reference: ENV.C.2/ETU/2012/0021] concluded that cobalt dichloride and cobalt sulphate were identified as the fifth highest priority, meaning there were four sets of substances identified with higher priority than these two cobalt compounds. Therefore, we question why these two cobalt substances are being reconsidered at this time, particularly since these are not present in the EEE. The CI understands there will be a separate consultation on the methodology for the RoHS proposal.

Secondly, the CI notes that the accompanying document prepared by Oeko Institute with the compilation of initial substance information for these two cobalt substances, does not present the most up-to-date information available for these two cobalt compounds, and some of the estimates are also misleading.

In terms of uses and quantities (page 2), the accompanying document notes 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 year.*
- *Cobalt sulphate is registered for 10,000 – 100,000 tonnes per year.”*

It is then noted (on page 3) that *“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-Institute 2014 study.”*

These ranges (above) would seem to infer rather significant increase in total volumes being produced, however these ranges are being presented out of context. It is important to clarify these ranges refer to an estimate of total EU tonnage volumes based on summing together the individual REACH tonnage bands registered by each company, and this results in a significant overestimate of the actual total EU tonnage manufactured in the EU.

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The following excerpts are taken from the CoRC-CI Joint Response Comments submitted into the ECHA Call for Evidence (CfE) on the Five Cobalt Salts conducted last year (July to Sept 2017) and provide some necessary clarifications regarding the actual volumes and use information for the five cobalt salts.

- “The total volume of the five cobalt salts manufactured within the EU or imported into the EU before subsequently being sold, has been steadily increasing over the last decade: from approximately 10,100 to 11,900 tonnes per year between 2008 to 2010, to approximately 21,000 tonnes per year between 2014 and 2016” (CoRC-CI Joint Response ECHA CfE Sept 2017).
- “These five cobalt salts have six broad uses, ... and the estimated volumes (as percentage of the total), are as follows: Chemicals (89%); Catalysts (8%); Surface treatment (1.5%); Biotechnology (1%); Pigment (<<1%); and Bespoke uses (<<1%)” [CoRC-CI Joint Response ECHA CfE Sept 2017].
- The previous category for Intermediates is now referred to as the Chemicals sector in the latest survey (CoRC-CI Sept 2017).

Thirdly, in the accompanying document (page 4), the EEE-specific uses are indicated as follows:

- *“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 CI notes the uses and Exposure Scenarios (ES) for the cobalt salts have been refined as follows:

- Formulation of metal surface treatment pre-formulations,
- Passivation processes in surface treatment,
- Passivation processes in surface treatment at large industrial sites with continuous processes,
- Plating processes in surface treatment,
- Industrial handling of surface treated articles (passivated/plated),
- Professional handling of surface treated articles (passivated/plated),

Furthermore, the ES for ‘Manufacture of inorganic pigments, frits, ceramic ware, glass (intermediate use)’ no longer includes magnets and varistors in the title.

The core REACH dossiers and refined Exposure Scenarios for these substances were updated in Jan/Feb 2018. The full Exposure Scenarios developed for the REACH dossiers of the cobalt salts are readily available and can be viewed on the CoRC website: <http://www.cobaltreachconsortium.org/RED>

Fourthly, the estimates of volumes of relevance for EEE in the accompanying document (shown on page 5) are again being overinflated as these are obtained by multiplying the very small percentages being used in surface treatment applications by the grossly overestimated total volumes based on the summed REACH tonnage bands (volume extrapolation noted above). Therefore, some further clarification is provided from the recent CfE surveys, as follows,

- “Based on the survey results, less than 500 tonnes of cobalt salts were estimated to be used per year in the EU28 in the surface treatment sector, and survey responses indicated that this was primarily used for plating applications” [CoRC-CI Joint Response to ECHA CfE Sept 2017].

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The Secretariat notes that this volume (<500 tpa) is being used in the surface treatment sector, and the EEE-related applications represent a portion of this total volume. This is an important sector to the EU economy, as shown by the following excerpts from the CoRC-CI Joint Response to the ECHA CfE [Sept 2017]:

- “The EU electroplating market is valued at approximately €27.5 billion in 2017 (pers. comms.). This includes metal plating as well as passivation and anti-corrosion coatings. Across the EU28, it is estimated that more than 2,500 sites for plating and galvanisation use cobalt salts [CDI, 2012]. Cobalt salts are used for hard plating applications (e.g. cobalt-gold alloys) for the coating of electronics products, jewellery, instruments and in the manufacture of semiconductors and microchips.
- Indirectly, it is estimated that there are over 1,000,000 jobs in all industries which are dependent on parts that have been surface-treated with cobalt salts, mostly used for security components (electronic circuits, and fixings) [CDI, 2012]. The largest sector to use metal plating is the electricals and electronics plating industry, which is globally estimated to be worth ~€4.6 billion [Future Market Insights, 2017].” [CoRC-CI Sept 2017]

Finally, we note that the most up-to-date information available on the cobalt salts was submitted by industry into the ECHA Call for Evidence conducted last year (July to Sept 2017). Also, ECHA has recently conducted an on-line survey with industry to collect further details on the technical and economic feasibility of restricting the manufacturing and use of the five cobalt salts unless the specified minimum set of technical measures are implemented. This recent survey covers the technical measures for electroplating using cobalt salts in aqueous solutions in the surface treatment sector. Therefore, the surface treatment processes for EEE are already being addressed through this REACH restriction process.

In closing, the Secretariat trusts our comments provided above are helpful to provide a better understanding, and to illustrate why these two cobalt substances should not be considered for the RoHS review priority list. We would be pleased to discuss any questions.

Thank you

The Secretariat

The Cobalt Institute (CI) / Cobalt REACH Consortium Ltd. (CoRC)

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