Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

RoHS 15 – Substances Evaluation

Substance Dossiers | Version 3

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Stakeholder Meeting | 27 April 2020

Overview

1. Five Cobalt salts
2. Ni sulphate/Ni sulfamate
3. Indium phosphide

Break

4. Beryllium and BeO
5. MCCPs

Break

6. TBBP-A
7. Diantimony trioxide

Per substance:

- Uses and amounts
- Concerns & conclusions
- Summary of the 2nd stakeholder consultation
- Changes in version 3 compared to version 2
- Final recommendation

Summary of restriction recommendations

Substance	Restriction recommended – yes or no?
five Co salts	**No**
two Ni salts	**No,** but evaluation of “Nickel and its compounds”
InP	**No**
Be & BeO	**No** (but selective restriction for contact brushes recommended)
MCCPs	**Yes**
TBBP-A	**Yes**
ATO	**No**, but evaluation of the functional group of ATO + halogenated FR

Five Cobalt salts

Cobalt dichloride, Cobalt sulphate, Cobalt dinitrate, Cobalt carbonate & Cobalt di(acetate)

Five Cobalt salts: Conclusion

- → The substances are used in metal surface treatment processes
- → inclusion of 3 more salts
- → They are process chemicals and do not remain in final EEE.
- → A restriction of the substances is not expected to generate benefits for the environment or human health during the use and recycling / disposal stages of the EEE product life cycle.

Five Cobalt salts: Summary of the 2nd Stakeholder consultation

- 6 contributions were received
- Stakeholders expressed agreement to the recommendation
- No specific information has been received on applications and quantities of the five cobalt salts. Thus, still no differentiation for the cobalt salts with regard to EEE could be done, which was the main reason to propose the scope extension.
- The Cobalt Institute expressed concern about the method of grouping the Co salts for the purpose of the evaluation.

→ No changes have been implemented in Version 3 compared to Version 2

Five Cobalt salts: Final recommendation

Under consideration of the results of the substance assessment, it is **not** reccomended to include cobalt and its salts to the list of restricted substances under RoHS, annex II.

The reason is the absence of cobalt salts in their original form in final EEE products.

14:50 – 15:00

Discussion on five Cobalt salts

- Please ask to be given the floor for a statement using the Webex chat function
- Please keep your statement below two minutes
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Nickel sulphate and Nickel sulfamate

Nickel sulphate and Nickel sulfamate: Conclusion

- The two substances are used in metal surface treatment processes (electro plating)
- They are process chemicals and do not remain in final EEE.
- A restriction of the two substances is not expected to generate benefits for the environment or human health during the use and recycling / disposal stages of the EEE product life cycle.
- A restriction of „Ni and its compounds“ can be expected to be more effective.

Nickel sulphate and Nickel sulfamate: Summary of 2nd Stakeholder consultation

- 7 contributions were received
- Mostly, stakeholders agreed with the recommendation
- Discussions around a grouping and further assessment of „nickel and its compounds“ continues

Nickel sulphate and Nickel sulfamate: Changes in Version 3 compared to Version 2

Based on the input of the Nickel Institute & Lynred, additions and corrections are made in sections:

- 1.3 (legal status)
- 2 (uses)
- 3 (human health hazard profile)
- 5 (waste management)
- 9.7 (total SEA)

For the controversial point on a further assessment of “nickel and its compounds”, considerations are taken up in section 5.

Nickel sulphate and Nickel sulfamate: Final recommendation

The inclusion of Ni and its salts in the list of restricted substances under RoHS, Annex II **is not recommended**.

The reason is that a restriction of these compounds in EEE would not necessarily be effective in preventing their use in the processes; and benefits on health and environment would not be expected to incure as a result of such a restriction.

The assessment would recommend a future assessment under RoHS of nickel and ist compounds […].

15:05 – 15:15

Discussion on Nickel sulphate and Nickel sulfamate

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Indium phosphide (InP)

InP: uses and amounts

CURRENT AMOUNTS IN EUROPE:

- Wafers for optoelectronics and high-speed electronics: **~24 to 33 kg / year**
- Displays and lighting, incl. quantum dots: **~ 60 kg / year**
- Photovoltaik applications: little to no relevance

FORCAST

In light of the expected developments in InP QD technologies, the consumption of InP could increase in the future. Data reported to the consultant within the 2nd Stakeholder Consultation ranges from below 200 kg p.a. to up to 2,000 kg p.a. An average of the range represented by the reported data, would account for **1100 kg p.a. in 2028.**

InP: conclusion

- Local, occupational, residential and environmental concentrations will be very low
- Risks to humans and the environment: very low / negligible
- Alternatives – where applicable – are at least as hazardous as InP
- Significant cost-related consequences on several stakeholder could be expected in case of a restriction
- A restriction is not expected to generage benefits for the environment or for human health

InP: summary of 2nd Stakeholder consultation

- 12 contributions were received
  - Another six stakeholders prvided the same report that already been submitted to the working group of which they are members.
- Generally expressed their agreement to the recommendation
- Contributions provided information on volumes of InP and an outlook on quantum dot technology perspectives,
- The mayority of contributions was taken into account as far as new information could be retreived.

InP: Changes in version 3 compared to version 2

The following sections have been changed:

- Section 2.3 on quantities
- Section 6 concerning exposure data with having implications on section 7
- Section 9 – the socio-economic analysis
- Slight changes in 5.3 on recycling practices and 8.1 on alternatives

→ The Rationale was slightly modified in the sense of neither proposing the substance for restircion nor for a future revision of this assessment under the same scope.

InP: final recommendation

A restriction under RoHS, annex II **is not recommended**, because:

- low quantities < 100 kg / year.
- Current inavailability of substitutes that have a better environmental performance than InP.

However, the consumption of InP is expected to increase significantly - up to 2,000 kg/ year by 2028.

15:20 – 15:30

Discussion on Indium phosphide (InP)

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Beryllium and Beryllium Oxide (BeO)

Be and BeO: uses and amounts

Applications areas:

- pure Be metal: mainly in medical applications (x-ray windows)
- Be-rich alloys containing >30% Be … medical applications
- Copper beryllium alloys containing 0.10 – 2.0% Be
  ubiquitous use in EEE -> e.g. connectors and contact springs,
- Be-oxide: mainly used in form of ceramics and thermal paste

Amounts used:

- 26% of the global Be consumption goes into EEE.
- In the EU, ca. 40% of Be commodities were used in telecommunications, electronics, automotive electronics (16%), aerospace components and general EEE (10%)

Be and BeO: concerns

Beryllium metal and beryllium oxide (BeO):

- Carc. 1B (Carcinogenicity) - May cause cancer by inhalation
- Acute Tox. 2 (Acute toxicity, inhalation) - Fatal if inhaled
- Is assumed that the toxicity of Be is attributable to particulate dust or fumes. However, Be is a non-threshold carcinogen and dose-response mechanism is poorly understood.
- Repeated inhalative low-dose exposure to Be dust can provoke beryllium sensitisation (BeS) and can eventually result in chronic beryllium disease (CBD), which resembles lung cancer
- The toxicity of soluble Be compounds is undisputed, aerosol exposure causes chemical pneumonitis

Be and BeO: conclusion

- The health hazard potential of beryllium and BeO is significant, dermal contact, inhalation and ingestion are acute toxic and carcinogenic in case of repeated respiratory exposure to airborne Be-bearing dust.
- However, uncertainty prevails regarding the dose-response relationship.
- During WEEE recycling and disposal, the exposure to Be-bearing dust is generally assumed to be low because Be is contained in alloys at concentrations below 2% b.w.
- Exposure to airborne Be dust might occur in the use phase of consumer EEE due to wear and tear. Some EEE may contain high power electrical motors with sliding brushes consisting of copper-beryllium alloy, friction may generate Be-bearing debris

Be and BeO: summary of 2nd Stakeholder consultation

- 10 new stakeholder contributions were received.
- General agreement to not proposing beryllium and BeO for a general restriction under RoHS, except a selective restriction proposal for Cu-Be alloys in sliding brushes for e-motors.
- One stakeholder questioned the carcinogenicity of non- soluble Be-dust and the applicable CLP hazard class Carc.1B
  + asserted that beryllium sensitisation was no adverse health impact.
- Scrutiny regarding Cu-Be debris generation by sliding brushes in e-motors but no evidence provided to refute the concern.
- Following the consultation, several sections of the dossier have been amended based on new information provided.

Be and BeO: Changes in Version 3 compared to Version 2

The following sections have been changed:

- table 1 split to distinguish non-soluable and soluable Be componds
- Sections 1 / 2: editorial changes on the regulatory process / uses
- Section 3: further clearification regarding BeS, CBD and Acute Beryllium Disease included and international context of OELs further differenciated
- Slight changes in 6.2 on occupational exposure during WEEE recycling

→ The Rationale and restriction recommendations were not altered, only editorial changes (recommendation for voluntary measures was cut because out of scope)

Be and BeO: final recommendation

A general restriction under RoHS, annex II **is not recommended**, because:

- High technical importance of the substances
- Unavailability of substitute materials that provide comparable technical performance
- The risk of decreasing technical performance of EEE may entail increasing defect rates and thus shorter service life of EEE-products, which may lead to higher amounts of WEEE

-> An **applications-selective restriction** of Be-bearing EEE-parts that are prone to wear-and-tear and may release beryllium containing dust (such as sliding brushes in high power electrical motors) **should be considered**.

15:35 – 15:50

Discussion on Beryllium and Beryllium Oxide (BeO)

- Please ask to be given the floor for a statement using the Webex chat function
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15:50 – 16:00

Short break

Medium-chain chlorinated parafins (MCCPs)

MCCPs: uses and amounts

- The main function of MCCPs is that of a **secondary plasticiser** (extender) in PVC -> it lowers the use of more expensive primary plasticisers.
- Moreover, MCCPs provide flame retardant properties and are added to PVC, rubber and other polymers.
- Noteworthy that MCCPs represent a substitute for short-chain chlorinated paraffins (SCCPs)
- The main EEE application area of MCCPs in the EU are PVC insulations and sheathing for electric cables and wires
- Typical concentration of MCCP in PVC insulation is 8-15 % of weighth. Total EU consumption for cable applications estimated in the range of 1,000 to 10,000 t per year

MCCPs: concerns

- MCCPs are **not acutely toxic** for humans. MCCPs are generally unreactive and not mutagenic although no carcinogenicity studies have been conducted.
- But they fulfil PBT and vPvB (very persistent and very bioaccumulative) criteria of REACH Annex XIII and are thus suggested as a candidate for a Substance of Very High Concern (SVHC).
- The MCCPs do not impede PVC cable recycling but the uncontolled combustion of PVC and MCCP bears the risk of a formation of dibenzo-p-dioxins and furans. This is not considered a problem in the EU. However, open burning of cable scrap is common practice in developing countries where occupational exposure is very likely.

MCCPs: summary of 2nd Stakeholder consultation

- 10 new stakeholder contributions were received.
- There was generally discontent regarding the allocation of chlorinated paraffins with chain lengths of C13 and below as SCCP, that form part of the mixture in commercial MCCP.
- Several stakeholders warned about long phase-out periods due to the need for new material development, testing and certification, in particular in the sector of medical appliances.
- Meanwhile, the UK Environment Agency has finished the CoRAP evaluation of MCCPs and concluded that the substances fulfil PBT and vPvB criteria of REACH Annex XIII and are thus suggested as a candidate for a Substance of Very High Concern (SVHC).

MCCPs: Changes in Version 3 compared to Version 2

- The dossier at hand has been updated according to the CORAP assessment i.e. MCCPs fulfil PBT and vPvB criteria.
- Further, the text was revised to better distinguish the composition of commoditised Chlorinated Paraffins (CP52) formulations, which contain MCCPs and varying amounts of <13 chain length paraffins in contrast to SCCPs
- Moreover, several chapters of the dossier have been revised based on new information provided by stakeholders. e.g. regarding applications and estimated amounts of use .
- The version 3 of the dossier represents the final version of the RoHS Annex II dossier for MCCP.

MCCPs: final recommendation and rationales

It is recommended to **restrict MCCPs** and add an explanation that this entry covers chlorinated paraffins containing paraffins **with a chain length of C14-17** – linear or branched.

- MCCP fulfil PBT and vPvB criteria of REACH Annex XIII
- Possible occupational exposure in form of vapours and dust at during WEEE recycling and disposal (shredding PVC cables)
- Risks to the environment: The possible release of MCCPs from WEEE waste management is of concern given the vPvB properties of MCCPs. To this end, current PNECs are possibly an underestimation.
- Alternatives for MCCPs for the plasticising as well as the flame retarding effects are commercially available (e.g. metal hydroxide ATH, MTH). However, a one-fits-all substitution is not available. Some substitutes, such as ATO are considered to be regrettable.

16:05 – 16:25

Discussion on MCCPs

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TBBP-A

TBBP-A: uses and amounts

USES

1) precursor in the production of brominated epoxy resins that function as **reactively flame-retarded substrate** in printed wiring boards (PWB), ~90%

2) **additive flame retardant** in thermoplastic EEE components, for example housings that consist of ABS plastic, ~ 10%

TOTAL AMOUNTS

- 1,000 to 10,000 t/a (ECHA Registered Substance Database, 2019)
- 1,000 – 2,500 t/a (EU sales volume of TPPBA according to a stakeholder contribution of the European Flame Retardants Association EFRA in 2014)

TBBP-A: concerns

- Relevant exposure route of TBBP-A by dust in shredding processes of plastic housing. No monitoring data is available. TBBP-A was found in serum samples of workers of EEE waste processing plants
- Current DNELs do not take into account the potential endocrine disrupting properties
- The Norwegian EPA has proposed a classification as „carc 1b“. PBT criteria are under assessment.
- TBBP-A has been found a ubiquitous environmental pollutant, it is present in samples from the arctic.

TBBP-A: summary of 2nd Stakeholder consultation

- 9 stakeholder contributions were received
- One contribution explicitly stated ist general agreement
- Stakeholders commented on the following aspects:
  - Global volumes and concentrations of TBBP-A in ABS & HIPS plastic
  - Conclusions drawn from the structural comparison of BPA and TBBP-A
  - DEPA conclusions on PBT and endocrine disrupting properties are used as a basis
  - Presentation of waste management, sorting techniques, and export of waste
  - References on exposure data
  - Analysis of hazards of alternatives proposed
  - Data regarding socio-economic analysis

TBBP-A: Changes in version 3 compared to version 2

Points of critique	Reaction and changes
structural comparison of BPA and TBBP-A; PBT and ED properties	Slight explanatory changes in sections 3,6, 10
Waste management - sorting	Summarised in chapter 5 together with an explanation why we did not take up the critique
Waste management – export of waste	Noted. No action proposed. See the explanation under context & scope
Exposure data	No more contemporary data were provided
Hazards of alternatives	No major changes
Socio-economic analysis	No more contemporary data were provided
Editorial comments	Mainly processed

TBBP-A: final recommendation

Ihe ammendment of RoHS Annex II with **a restriction is proposed** for:

> *2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol or tetrabromobis-phenol A (TBBP-A) (0,1 % per weight)*

Reasons: **under REACH, assessment of TBBP-A as endocrine disruptive and/or as PBT are underway.** ECHA requested additional information to be provided until January 2021. The validation of the read-across approach and/or results of the identification of TBBP-A as endocrine disruptive and/or as PBT (the first process to conclude), should be considered in the final decision on a RoHS restriction. In all cases, classification would render current guidance (no effect) as irrelevant and would be in favour of the restriction.

This timing allows for a further assessment of possible substitutes for TBBP-A, and for decisions on whether certain substitutes should be considered for restriction jointly with the restriction of TBBP-A.

A restriction **would not affect** the use as a reactive component in the production of **FR4 PWB,** assuming good and controlled manufacturing conditions.

16:30 – 16:50

Discussion on TBBP-A

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Diantimony trioxide (ATO)

ATO: Uses and amounts

Uses:
Synergist for halogenated FR in

- Plastics used for enclosures and components, c(ATO)=2-25%
- Cables and wires, c(ATO)=5-8%
- Semiconductor packaging, printed wiring boards (PWBs), c(ATO)=?

Amounts:

Global production of ATO for the use in flame retardants:
85,000 t; thereof: 25,000 t in EEE (2018)

EU: consumption of 10,000 - 20,000 t (2015),
no EEE-specific estimations

ATO: conclusions

- ATO is used in combination with halogenated flame retardants to make them more effective. Therefore, ATO should not be assessed alone but together with the halogenated flame retardants.
- However, as such a combined/cumulative assessment is not in scope of this dossier, these considerations cannot be further explored.
- Mono-substitution (substituting only ATO as synergist) in products on the market does not seem to be applied.
- Regrettable substitution should be avoided.
- The occupational exposure to ATO in recycling plants should be more closely monitored to establish better exposure data
- Post-shredder WEEE-sorting techniques take advantage of the presence of ATO to separate plastic that contains BFR due to its density

ATO: summary of 2nd stakeholder consultation

- 18 stakeholder contributions were received
- Additional five confidential contributions were submitted. They refer mostly to socio-economic information and cost estimates. However, as restriction of ATO is not proposed, it was decided not to process these data any further.
- Areas on which stakeholder gave their input and opinion:
  - Uses and quantities;
  - Waste management and sorting techniques,
  - The references on exposure data and the estimation of risks for workers,
  - The analysis of alternatives,
  - The data basis of the socio-economic analysis,
  - The recommendation to assess the group of ATO+halogenated FR

ATO: Changes in version 3 compared to version 2

Points of critique	Reaction and changes
Uses and quantities	A confidential report providing mass flow analysis for the whole ATO market was provided but not taken up in the dossier
Waste management and sorting techniques	Partly updated. We however continue referring to the status quo
The references on exposure data and the estimation of risks for workers	Further information was included in the dossier. Changes in chapters 6 and 7.
The analysis of alternatives	Additions have been made in chapter 8.
The data basis of the socio-economic analysis	Based on article 6, this part is also to be based on available information. Where such information was available from earlier studies on this substance or through the cooperation of stakeholders it has been included in this section.
The recommendation to assess the group of ATO+halogenated	No changes.

ATO: final recommendation

A restriction ATO independently from its function as synergist to halogenated FR might lead to regrettable substitutions (i.e.. increasing use of halogenated FR)

It is **not recommended to add ATO to Annex II** of the RoHS Directive.

Instead, **a group assessment is recommended** comprising the system of halogenated flame retardants and ATO synergist.

The group approach is supported by the RoHS methodology, "*potential restriction in EEE should be composed of substances sharing one or a combination of the following similarities:* […] *similar or same purpose/use/function in specific applications."* The proposal for the grouping is based on the same function which is providing flame retardancy.

16:55 – 17:15

Discussion on Diantimony trioxide (ATO)

- Please ask to be given the floor for a statement using the Webex chat function
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17:15 – 17:25

Short break