STAKEHOLDER CONSULTATION

Overview

The Nickel Institute (NI)[1] as the association representing leading producers of nickel metal and nickel compounds takes note of the RoHS stakeholder consultation launched on 15th April and open until 15th June 2018.

In the following contribution, NI would like to submit comments and input to the stakeholder consultation. We want to stress four key aspects which should be taken into consideration in the ongoing substance review process for a potential inclusion into Annex II of the RoHS Directive:

- **Nickel sulfate and sulfamate are not found in electrical and electronic equipment (EEE):** neither nickel sulfate nor nickel sulfamate are found in EEE, even as an impurity. Both substances are only used as "intermediate" chemicals in the production process of electrical and electronic equipment. Both nickel compounds are converted into nickel metal during the electrolytic processes in surface treatment.

- **Nickel sulfate and sulfamate should be removed from the priority list:** the aim of the RoHS Directive is to restrict the use (i.e. maximum concentration) of hazardous substances which can be found in EEE. However, neither nickel sulfate nor nickel sulfamate are found in EEE. Therefore, to avoid confusion and future inefficiencies in the RoHS review process, both nickel salts should be removed from the RoHS review priority list. In order to be relevant, effective and consistent with the aim of the legislation, the focus should be on those hazardous substances which are found in EEE and where concerns arise during use or in the end of life management.

- **No harm to health or the environment during use and waste management:** as both nickel sulfate and nickel sulfamate are not present in EEE, there is no risk relating to nickel compounds for consumers, workers or the environment during the use phase or end of life management of electrical and electronic equipment.

- **Nickel sulfate and nickel sulfamate and substitution:** As the two substances are not found in EEE and cannot cause concerns in the end of life stage, the question relating to their substitution does not arise under RoHS.

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[1] Nickel Institute is the global association of the world's leading primary nickel producers. NI is the center of excellence for information on nickel and nickel-containing materials. NiPERA Inc., the separately incorporated science division of NI, undertakes leading edge nickel scientific research relevant to human health and the environment. Nickel Institute's identification number in the EU Transparency Register is 77947983421-21.

Input to stakeholder consultation

The following input (blue) is provided to the stakeholder consultation

1. **Applications in which nickel sulfate and nickel sulfamate 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 nickel plating (substance level substitution) or possible alternatives to nickel plating that would eliminate the need to use these compounds (technological level substitution).

Nickel sulfate is a soluble nickel salt which is used in metal surface treatment processes (i.e. plating) as well as cathode material in batteries. Nickel sulfamate is also a soluble nickel salt which is used in metal surface treatment (i.e. plating) processes only. Further information about the use of these substances can be found in a brochure published by the Nickel Institute. [i]

Both substances are used in the manufacturing processes of electrical and electronic equipment. During the manufacturing process (i.e. surface treatment), both nickel compounds are converted into nickel metal which is deposited on surfaces to achieve certain properties, such as e.g. enhanced corrosion resistance, better adhesion, increased toughness or better connectivity. Neither nickel sulfate nor nickel sulfamate are found in the final electrical and electronic equipment.

This was also acknowledged in the previous 2014 Öko-Institut study on the "Review of the List of Restricted Substances under RoHS 2", where it was stated (section 4.12.4 Summary, page 53) that:

"The EEE specific uses of nickel salts nickel sulfate and nickel bis(sulfamidate)/nickel sulfamate are in metal surface treatment (nickel electroplating, nickel electroforming and nickel electroless technologies). Within these plating processes, as stakeholders explain, nickel salts have intermediate uses, which means that they are converted and not present in the final product as such".

    b. Please specify if you are aware, if aside from actual use of the substances, it may be reintroduced in to the material cycle through the use of secondary materials.
        i. Please detail in this case what secondary materials may contain impurities of nickel sulfate and nickel sulfamate 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 nickel sulfate and nickel sulfamate in such secondary materials as well as the changing trend of use of the respective secondary material in EEE manufacture.

Nickel sulfate and nickel sulfamate are not found in final EEE but converted in an electrolytic process into nickel metal. Therefore, neither nickel sulfate nor nickel sulfamate can be found in electrical and electronic equipment – even as an impurity.

The second part of the question (i.e. changing trends of concentration) is not relevant to nickel sulfate and nickel sulfamate in EEE. They are not present in secondary materials.

c. Please specify in which applications nickel sulfate and nickel sulfamate are used as a material constituent, as an additive or as an intermediate and what concentration of nickel sulfate and nickel sulfamate remains in the final product in each of these cases (on the homogenous material level).

As stated before, nickel sulfate and nickel sulfamate are used as intermediates in the EEE production process (i.e. surface treatment) and completely converted into nickel metal. The application can be described as only an intermediate use in the EEE production process. There are no remaining concentrations of nickel sulfate and nickel sulfamate in the final products due to the characteristics of the electrolytic process.

d. If nickel sulfate and nickel sulfamate are considered to be intermediates, please explain the reaction processes and which substances remain in the final product/material?

Nickel sulfate and nickel sulfamate are soluble nickel salts. During the electrolytic process in metal surface treatment, these nickel salts are dissolved in the electrolytic bath into nickel $^{2+}$ ions and a salt complex (e.g. $SO4^{2-}$). The nickel ions migrate to the cathode where the nickel ions are deposited as nickel metal on the surface of relevant parts that have to be plated. Electroless nickel plating is an auto-catalytic reaction. Similar to electrolytic plating, nickel salts are dissolved and form nickel $^{2+}$ ions and a salt complex (e.g. $SO4^{2-}$). Unlike the electrolytic process, it is not necessary to pass an electric current through the solution to form a deposit of nickel on the substrate. Electroless nickel plating provides an even deposit regardless of the shape and form of the workpiece. It is used as alternative process especially for non-conductive surfaces. There are various publications describing the nickel plating processes in detail, such as the Nickel Institute "Nickel Plating Handbook". [ii]

2. Quantities and ranges in which nickel sulfate and nickel sulfamate are in use

a. Please detail in what applications your company/sector applies nickel sulfate and nickel sulfamate 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 tons 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.

For Europe, the total amount of nickel salts used in plating during electrical and electronic equipment manufacturing processes are estimated to be less than 5.000t.[iii] 'Nickel salts' include nickel sulfate and nickel sulfamate, as well as other nickel compounds used for plating. No further information is available with regard to the specific use of nickel sulfate and nickel sulfamate.

In its 2018 report "1st Stakeholder Consultation – Compilation of initial substance information for nickel sulfate and nickel sulfamate", Öko-Institut provided some information regarding the production and volumes of nickel sulfate in Europe. The main source of information was the Risk Management Option Analysis (RMOA) carried out under REACH on nickel sulfate. The RMOA was published in August 2016 on the ECHA website[iv]. The Öko-Institut quotes a statement from the draft RMOA (2014) which

mentions that there is a significant tonnage of nickel sulfate for which no explanation about the "remaining non-used volume" was provided. It has to be noted that the tonnages reported in the RMOA as well as the REACH registration dossiers cover different qualities of nickel sulfate. For the above-mentioned metal surface treatment processes, a purified nickel sulfate is required. However, a major portion of the nickel sulfate registered under REACH is crude nickel sulfate which occurs as a by-product from copper refining. This form of crude nickel sulfate cannot be used for surface treatment. It is usually sold to the nickel industry and converted into pure nickel metal.

3. **Potential emissions in the waste stream**
    a. Please provide information on how EEE applications containing nickel sulfate and nickel sulfamate are managed in the waste phase (with which waste is such EEE collected and what treatment routes are applied)? For example, how are nickel plated components managed in the waste phase?
    b. Please detail potentials for emissions in the relevant treatment processes.

The question is not relevant to nickel sulfate and nickel sulfamate and can be misleading, as it seems to imply that these two nickel compounds are contained in EEE. As explained above, both substances are not found in the electrical and electronic equipment and therefore also do not occur in the waste stage.

In general, it is worth noting that waste electrical and electronic equipment is collected and recycled in multi-metallic recycling installations. Together with other nonferrous metals, nickel is recovered. The processes are described in the Nonferrous Metals BREF Notes (NFM BREF Notes) of the European IPPC Bureau (EIPPCB). The best available technology for emission prevention and control is applied by these installations. [v]

It is important to stress that there are no emissions of nickel sulfate and nickel sulfamate during the waste treatment / recycling processes as these substances are not present in electrical and electronic equipment.

4. **Substitution**
    a. For which applications is substitution underway?
        i. Please provide information in relation to specific applications on the substance level (for example substitutes for the nickel compounds in the nickel plating process) as well as for alternatives on the technological level (for example alternatives to the nickel plating process).
        ii. For which applications is substitution scientifically or technically not practicable or reliable and why.
        iii. Do certain constraints exist (provide details on costs, reliability, availability, roadmap for substitution, etc.) for the application of substitutes?
        iv. Please specify in this respect which alternatives are available on the substance level (substitution) and which are understood to be available on the technological level (elimination).

Question not relevant under RoHS as nickel sulfate & nickel sulfamate cannot be found as such in EEE.

5. **Socio economic impact of a possible restriction**
   Please provide information as to the socio-economic impacts of a scenario in which nickel sulfate and sulfamate 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 to possible costs and benefits of various sectors, users, the environment, etc. where possible; please support statements with quantified estimations.

Although nickel sulfate and nickel sulfamate are not present in EEE, the current discussion around a potential restriction of nickel sulfate and nickel sulfamate in electrical and electronic equipment under RoHS can lead to unnecessary nickel stigmatization, concern on the market and could impact in particular the European surface treatment industry which converts nickel salts into nickel metal in electrolytic processes. This industry sector is mainly composed of small and medium sized enterprises (SMEs). It therefore important to consider that any potential measure could impact the value chain and especially SME companies, which are considered the backbone of the EU´s economy.

We also observe that on page 3 of the "Compilation of initial substance information" for the two nickel compounds, Öko-Institut mentions that the EU Binding Occupational Exposure Limit Values (BOELV) recommended by the French authorities as the most appropriate risk management option, have not yet been set. We would like to draw attention to the fact that the Commission's preparations for setting such an OEL under the upcoming 4th revision of Directive 2004/37 are progressing.

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.

To ensure the efficiency of the review process, the RoHS substance methodology should first be finalized, prior to the assessment of substances in view of their possible restriction under RoHS. Substances which are not present in the EEE should not be assessed under RoHS.

Furthermore, from a "better regulation" perspective, it is important to avoid unnecessary regulatory measures and duplication. For instance, nickel sulfate has been already subject to an extensive Risk Management Option Analysis (RMOA) under REACH. The RMOA concluded that binding occupational exposure limit values under EU workplace legislation is the most effective and efficient risk management measure to address any potential residual risk from the use of the substance. The process is ongoing. In 2019, the European Commission is expected to present a legislative proposal setting EU binding OEL values for nickel compounds and other substances under the upcoming 4th revision of Directive 2004/37, including nickel sulfate and nickel sulfamate. NI fully supports the process.

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[i] https://www.nickelinstitute.org/~/media/Files/MediaCenter/NiCompounds/NI%20Compounds%202015%20v12%20FINAL.ashx?la=en

[ii] https://www.nickelinstitute.org/~/media/Files/TechnicalLiterature/NPH_141015.ashx Nickel Plating Handbook

[iii] Confidential market data from "Roskill Pariser Nickel End Use Report" (2017). www.roskillpariser.com

[iv] https://echa.europa.eu/documents/10162/026d40c4-7b36-4b8d-910c-bd036af685bf

[v] http://eippcb.jrc.ec.europa.eu/reference/nfm.html