15 June 2011

Draft background document for cobalt(II) dintrate

Document developed in the context of ECHA's third Recommendation for the inclusion of substances in Annex XIV

Information comprising confidential comments submitted during public consultation, or relating to content of Registration dossiers which is of such nature that it may potentially harm the commercial interest of companies if it was disclosed, is provided in a confidential annex to this document.

1. Identity of the substance

Chemical name:	Cobalt(II) dinitrate
EC Number:	233-402-1
CAS Number:	10141-05-6

This background document covers also the hydrated forms of Cobalt(II) dinitrate.

2. Background information

2.1. Intrinsic properties

Cobalt(II) dinitrate was identified as a Substance of Very High Concern (SVHC) according to Articles 57(a) and (c) as it is classified according to Annex VI, part 3, Table 3.1 of Regulation (EC) No 1272/2008 as a carcinogen category 1B[1], H350i (may cause cancer by inhalation), and as toxic for reproduction category 1B[1], H360F (may damage fertility), and was therefore included in the candidate list for authorisation on 15 December 2010, following ECHA's decision ED/95/2010.

2.2. Imports, exports, manufacture and uses

2.2.1. Volume(s), imports/exports

According to registration information the volume manufactured / imported in the EU is in the range of **1,000 – 10,000 t/y**. On the basis of tonnages reported to the Cobalt REACH Consortium (CoRC; RCOM, 2010; personal communication with EUROMETAUX, 2011), the annual production in the EU was estimated in the range **100 – 1,000 t/y**.

[1] Classification in accordance with Regulation (EC) No 1272/2008 Annex VI, part 3, Table 3.1 List of harmonised classification and labelling of hazardous substances as amended and adapted to technical and scientific progress by Commission Regulation (EC) No 790/2009, OJ No L 235, p. 1, 5.9.2009

2.2.2. Manufacture and uses

2.2.2.1. Manufacture and releases from manufacture

Cobalt dinitrate can be prepared by dissolution of the simple oxide or carbonate in nitric acid, but more often it is produced by direct oxidation of the metal with nitric acid (Kirk-Othmer 2010 in Netherlands, 2010). Workers in a factory in the Russian Federation producing cobalt acetate, chloride, nitrate and sulphates were reported to be exposed to cobalt in dust at concentrations of 0.05–50 mg/m^3 (IARC 2006, in the Netherlands, 2010; not mentioned, but assumed that concentration refers to Co^{2+}). At a different study, measured cobalt concentrations at workplaces with exposure to cobalt salts in a refinery were 68 – 89 µg/m^3 (range 1 – 7700 µg/m^3) (Lison 1994 in the Netherlands, 2010).

The Cobalt REACH Consortium reported that manufacture and/or import facilities of the Cobalt REACH Consortia members for Cobalt(II) dintrate are located in Belgium, France, Germany, and the UK (the Netherlands, 2010).

2.2.2.2. Uses and releases from uses

Uses

According to Registration data (additional info from other sources as mentioned below), cobalt(II) dintrate is used in the EU in:

- ***Manufacture of other chemicals*** *(e.g. cobalt(II) carbonate or carboxylates);*

This includes also use in ***other wet chemical processes***. Furthermore, cobalt(II) dinitrate is mentioned to be used in the manufacture of active substances for the production of batteries (it seems that production of batteries requires prior manufacture of another cobalt compound from cobalt(II) dinitrate). This use concerns for example Li-ion and alkaline rechargeable (such as NiCd) batteries, which are used e.g. in the automotive market (HEV Vehicle and Electric Vehicle) and storage applications (for intermittent renewable energy generation; photovoltaic and wind) (industrial / portable batteries; RCOM, 2010; The Netherlands, 2010). According to the Cobalt Development Institute, Cobalt(II) dintrate is also used in the manufacture of ***catalysts*** (hydrotreating; oxidation catalyst; hydrodesulphurisation; Fischer Tropsch (GTL); RCOM, 2010; personal communication with EUROMETAUX, 2011).

- ***Surface treatment processes****:*

    - *Electrodeposition* (the Netherlands, 2010; RCOM, 2010): cobalt salts (not necessarily all the described applications below are relevant for cobalt(II) dinitrate) are electroplated as Co metal or alloys with nickel, tungsten, iron, molybdenum, chromium, zinc, and precious metals. Applications include aerospace-, automotive-, telecommunication-, electronics-, storage media-, military-, etc.- industries. The function of

the substance is to affect physical properties of surfaces, e.g. smoothness, hardness, brightness, ductility, resistance, porosity, or the production of record and compact discs.
- *Colour anodizing*
- *Non-electrodeposition*
- *Welding and soldering processes*

- *Formulation and industrial use **as water treatment chemical / oxygen scavenger / corrosion inhibitor**;*

The formulated mixtures may be added e.g. to process water for protection of the pipes from corrosion by oxygen, or as micro-nutrient solution.

- ***As a catalyst:***

Although this use has been registered as identified use, information provided by the industry suggests that only other catalysts are manufactured from cobalt(II) dinitrate, and that this is in fact a use as intermediate (RCOM, 2010; personal communication with EUROMETAUX, 2011).

Information on further (to the above listed) uses was not possible to confirm on the basis of the available data. It is noted that cobalt has been detected in cosmetic kohl products (concentrations between 0.11 and 51 mg/kg) and in cosmetic henna products (concentrations between 0.59 and 1.1 mg/kg) (Danish Environmental Agency, 2005: Survey of chemical substances in consumer products No. 65; In RCOM, 2010).

Volumes per sector or use

According to information collected by the Cobalt REACH Consortium (the Netherlands, 2010; RCOM, 2010; personal communication with EUROMETAUX, 2011[2]):

- more than 35% of the cobalt(II) dinitrate in the EU is used in the manufacture of catalysts,
- up to 35% is used in the manufacture of chemicals (feed materials for other chemicals),
- up to 20% is used in surface treatment,
- up to 15% is used for the production of batteries

Releases from uses

The main route of occupational exposure of cobalt compounds is via the respiratory tract by inhalation of dusts, fumes and mists containing cobalt (IARC 1991 in RCOM, 2010). According to its classification, cobalt(II) dinitrate may cause cancer by inhalation, with a low specific concentration limit of 0.01% for this hazard (it is noted that cobalt(II) dinitrate is also classified as toxic for reproduction).

[2] Some use categories have been combined for reasons of commercial confidentiality.

Some measured concentrations have been reported in the literature for the dust in facilities producing cobalt salts (0.05–50 mg cobalt /m^3), and in a refinery (relating to cobalt salts use - 68 – 89 μg/m^3; range 1 – 7700 μg/m^3) (the Netherlands, 2010; RCOM, 2010).

All the above uses have been listed in the registration dossiers as industrial. Some of the produced mixtures can be assumed to be handled as well by professionals and consumers.

2.2.2.3. Geographical distribution and conclusions in terms of (organisation and communication in) supply chains

No information is available on the number of downstream users of cobalt(II) dinitrate in the EU.

2.3. Availability of information on alternatives[3]

As for cobalt(II) dinitrate and other cobalt salts a number of common uses have been registered, it can be reasonably assumed that such salts could in general replace cobalt(II) dintrate in some of its applications.

According to the Cobalt REACH Consortium, the vast majority of the applications do actually not allow for mutual substitution of the cobalt salts for technical and/or economical reasons; even where it is chemically feasible to substitute the cobalt salts, it would not be practical on an industrial scale without involving excessive cost (further information is currently collected for the current applications; personal communication with EUROMETAUX, 2011).

According to some comments submitted by the industry (RCOM, 2010), cobalt(II) dintrate cannot be replaced in its applications without loss of performance or excessive increased cost.

2.4. Existing specific Community legislation relevant for possible exemption

No data available.

2.5. Any other relevant information (e.g. for priority setting)

No data available.

[3] Please note that this information was not used for the prioritisation.

3. Conclusions and justification

3.1. Prioritisation

Verbal-argumentative approach

Relatively low volume used in the scope of authorisation. Widespread uses, as it appears that the substance is used at a presumably medium number of industrial settings and that use by professionals cannot be excluded for some applications (e.g. water treatment, welding/soldering materials).

Releases at workplaces in industrial settings seem to be controlled in most cases but some processes, involving handling of powder forms of the substance have a potentially significant exposure potential for industrial and - where relevant - professional workers.

Therefore, based on the criteria, the substance has a moderate priority.

Scoring approach

Score			Total Score
Inherent properties (IP)	Volume (V)	Uses - wide dispersiveness (WDU)	(= IP + V + WDU)
Score: 0 -1 [4] (carcinogen 1B; toxic for reproduction 1B)	3 (Relatively low volume in the scope of authorisation)	Overall score: 2 * 3 = 6 Site-#: 2 (Used at a presumably medium number of sites) Release: 3 (for some uses risk of significant and potentially uncontrolled exposure)	9 - 10

Conclusion, taking regulatory effectiveness considerations into account

On the basis of the prioritisation criteria, cobalt(II) dinitrate gets moderate priority for inclusion in Annex XIV.

As there are other cobalt(II) compounds on the Candidate List that could replace the substance in at least some of its uses, these other cobalt(II) compounds should be grouped with the substance and included in Annex XIV as well.

Therefore, **it is proposed to recommend cobalt(II) dinitrate for inclusion in Annex XIV**.

[4] Some information has been provided by the Cobalt REACH Consortium regarding a potential concentration threshold of cobalt (II) salts for eliciting cancer effects. For the sole purpose of this prioritisation step a score in the range 0 (carcinogenic with threshold) - 1 (carcinogenic without threshold) is assigned. This scoring does not pre-empt any conclusion by the Risk Assessment Committee when preparing its opinions on the future applications.

4. References

The Netherlands (2010): Annex XV dossier for the proposal for identification of Cobalt(II) dinitrate as a CMR CAT 1 or 2, PBT, vPvB or a substance of an equivalent level of concern. Submitted by the Netherlands. http://echa.europa.eu/doc/consultations/svhc/svhc_axvrep_netherlands_cmr_co-dinitrate.pdf

Personal communication with EUROMETAUX (2011): Comments provided by the Cobalt REACH Consortium on clarification of information regarding the prioritisation of the cobalt salts.

RCOM (2010): "Responses to comments" document compiled from the commenting period on the identification of Cobalt(II) dinitrate as SVHC (08.03.-22.04.2010). http://echa.europa.eu/doc/about/organisation/msc/msc_rcoms2010/rcom_cobaltdinitrate/rcom_cobaltdinitrate_20101112.rtf