20 December 2011

Background document for sodium dichromate

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. This confidential annex is not included in the public version of this background document.

1. Identity of the substance

Chemical name:	sodium dichromate
EC Number:	234-190-3
CAS Number: (dihydrate)	10588-01-9 (anhydrous) and 7789-12-0
IUPAC Name:	sodium dichromate

2. Background information

2.1. Intrinsic properties

Sodium dichromate was identified as a Substance of Very High Concern (SVHC) according to Article 57(a), (b) and (c) as it is classified according to Annex VI, part 3, Table 3.1 (the list of harmonised classification and labelling of hazardous substances) of Regulation (EC) No 1272/2008 as carcinogen category 1B[1] (H350: "May cause cancer"), as mutagen category 1B[2] (H340: "May cause genetic defects") and as toxic for reproduction category 1B[3] (H360-FD: "May damage

[1] This corresponds to a classification as carcinogen category 2, R45 (May cause cancer) in Annex VI, part 3, Table 3.2 (the list of harmonised classification and labelling of hazardous substances from Annex I to Directive 67/548/EEC) of Regulation (EC) N° 1272/2008.

[2] This corresponds to a classification as mutagen category 2 ; R46 (May cause heritable genetic damage) in Annex VI, part 3, Table 3.2 (the list of harmonised classification and labelling of hazardous substances from Annex I to Directive 67/548/EEC) of Regulation (EC) N° 1272/2008.

[3] This corresponds to a classification as toxic for reproduction category 2 ; R60-61 (May impair fertility. May cause harm to the unborn child) in Annex VI, part 3, Table 3.2 (the list of harmonised classification and labelling of hazardous substances from Annex I to Directive 67/548/EEC) of Regulation (EC) N° 1272/2008

fertility. May damage the unborn child") and was therefore included in the candidate list for authorisation on 28 October 2008, following ECHA's decision ED/67/2008.

2.2. Imports, exports, manufacture and uses

2.2.1. Volume(s), imports/exports

According to the Risk Assessment Report (RAR), sodium dichromate was manufactured in quantities of 110,000 t by 3 companies in the EU in 1997 (EC, 2005). Taking into account export and import, the amount of $Na_2Cr_2O_7$ used in the EU was estimated to be 25,000 t at that time (77 % net export).

According to registration information sodium dichromate is almost exclusively imported into the EU in quantities of 50,000 to 100,000 t/y. There is no information on export available.

The tonnage allocated to uses within the scope of authorisation is between 1,000 – 10,000 t/y.

2.2.2. Manufacture and uses

2.2.2.1. Manufacture and releases from manufacture

Manufacturing takes place solely as a solution (no dermal or inhalation exposure during production) (Entec, 2008).

Although no details on releases from manufacture are available the descriptors given in registration dossier indicate the possibility of (significant) occupational exposure, for example by PROC4. According to ERC1 given in the registration dossiers the default environmental release rates are 5 % to air, 6 % to water and 0.01 % to soil.

2.2.2.2. Uses and releases from uses

According to registration information the majority of sodium dichromate is used as intermediate in the manufacture of fine and bulk large scale chemicals, but also for manufacture of tanning salts, pigments and chromium metal. Further uses given are in metal surface treatment and as laboratory chemical.

During public consultation comments were received confirming, or further detailing the above mentioned uses. For example, registration dossiers only generally referred to intermediate use of sodium dichromate in the manufacture of other chromium containing compounds. That was further specified mentioning e.g. the manufacture of sodium chlorate ($NaClO_3$) which is used as a bleaching

agent for chemical wood pulp in the manufacture of pulp and paper (RCOM, 2011).

According to Entec (2008) the manufacture of Cr (III) oxide makes up the majority of the intermediate use (~ 90 %). The main non-intermediate use identified by Entec (2008) is in metal finishing (~ 3 % of quantity used).

The latter still seems to be the main relevant use within the scope of authorisation according to registration information. Metal surface treatment (e.g. passivation, electroplating) aims to achieve a certain finish or to prevent corrosion, especially in the aeronautics and metal packaging (canning) industry (Entec, 2008; RCOM, 2008; RCOM, 2011).

Metal finishing covers a wide range of varied and complex processes carried out by industry and involves both chemical and physical processes. There is no measured data on releases from the use of $Na_2Cr_2O_7$ in metal finishing (Entec, 2008), however, model calculations presented in the registrations indicate the possibility of occupational exposure to some extent. Recent exposure information reported by Germany (Annex XV, 2010) shows that workers might be exposed to significant concentrations of chromium (VI) compounds at some installations.

The two identified metal surface treatment processes further described in the registration dossiers are tin-plated steel product passivation and industrial surface treatment of metals. As mentioned above the main sectors of use of metal finished products are the aeronautics industry and metal packaging.

Aeronautics industry
Consultation with the industry revealed that many of the parts that are used to make aircrafts are made by SMEs and are supplied to the large engine and airframe manufacturers. Therefore processes using sodium dichromate are to a large extent used by small to medium sized specialist engineering companies. Large parts of the airframe will be made by the aircraft manufacturers so the substance is also used by these large companies. No information on the amounts used in different processes by the aerospace industry is available (Entec, 2008).

Metal packaging
The main process involved in steel packaging is tinplate passivation (also called "ETP" – Electrolytic Tin Plating). It occurs only in a few large plants in the EU. The process of passivation is used to make a stable steel-tin-lacquer system thereby preventing migration of metal components into the canned product (Entec, 2008). It serves also the reduction of the thickness of tin oxides formed during re-melting. The electrolytic treatment produces a layer containing chromium (chromium metal and chromium (III) oxide/hydroxide) which prevents subsequent oxidation in air and also improves adhesion of the lacquer layer (RCOM, 2011).

Electrolytic Chromium Coated Steel (ECCS), or Tin-free Steel (TFS), has been developed as an alternative to tinplate. In that technique, chromium plating of steel strip (known as blackplate) is performed electrolytically in a chromium (VI) solution resulting in a layer of chromium (chromium metal and chromium (III) oxide/hydroxide). However, ECCS can only be used with an additional organic coating. It is less weldable than tinplate and, therefore, the use of

ECCS is limited to about 20% of the total amount of steel for packaging (Entec, 2008).

Other applications requiring a finished metallic surface include for example opto-mechanical products which are used for high precision applications e.g. in the military sector or for outdoor measurement instruments (RCOM, 2011).

There were other non-intermediate uses of $Na_2Cr_2O_7$ identified when industry was consulted by Entec (2008) whilst preparing their report, e.g. as a mordant for wool dye ($Na_2Cr_2O_7$ added to fix dyes to wool and thereby reduced to Cr (III)), use in industrial cleaning ("de-smut"), and cleaning of laboratory glassware. Some of these uses were confirmed within public consultation (RCOM, 2008) but cannot by registration data. No further information on tonnages involved and respective releases could be obtained. As in addition Entec (2008) concluded these uses were all minor (in total << 1 %), any potential releases are assumed to be minor as well. The assumption that << 1 % of $Na_2Cr_2O_7$ is used in the textile sector was confirmed by the Italian REACH CA (2011).

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

There is no specific information available regarding the geographical distribution for the non-intermediate uses of $Na_2Cr_2O_7$. Metal finishing as the main non-intermediate use takes place mainly at SMEs and some larger industrial settings. Although the number and geographical distribution are unknown, it can be assumed that they are numerous and widely distributed within the EU.

2.3. Availability of information on alternatives[4]

Aeronautics industry
The aeronautics industry has funded a number of research projects on the replacement of hexavalent chromium (rather than sodium dichromate per se; Entec 2008). There are possible alternatives for a number of different uses, but none are presently known to fulfil the technical and airworthiness safety that is required for aircrafts. In addition, in many cases where possible alternatives could be identified, these could only be used for the production of new aircraft as maintenance of existing aircraft requires the use of the substances that are currently used because of compatibility with existing materials.

Metal packaging
There are signs that the industry may be moving away from chromium (VI) to either chromium (III) or chromium-free alternatives (Entec, 2008; RCOM, 2011). Possible alternatives for the passivation of ETP which are currently tested include siloxanes and Zr/Ti fluorides (RCOM, 2011).

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

2.4. Existing specific Community legislation relevant for possible exemption

There seems to be no specific Community legislation in force that would allow to consider exemption of (categories of) uses from the authorisation requirement on the basis of Article 58(2) of the REACH Regulation (see sections 'D' and in particular 'E' of RCOM, 2011).

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

Not available.

3. Conclusions and justification

3.1. Prioritisation

The volume of sodium dichromate supplied to uses in the scope of authorisation is high. Some of the uses in metal finishing are considered to be widespread with a potential for significant worker exposure.

Verbal-argumentative approach

On the basis of the criteria, sodium dichromate has a high priority for inclusion in Annex XIV.

Scoring approach

Score			Total Score
Inherent properties (IP)	Volume (V)	Uses - wide dispersiveness (WDU)	(= IP + V + WDU)
1 Art. 57 (a), (b) & (c); Carc 1B, Muta 1B, Repro 1B	7 (High annual volume in the scope of authorisation.)	Overall score: 3 * 3 = 9 Site-#: 3 (Substance used at a high number of sites) Release: 3 (potentially significant worker exposure)	17

Conclusion, taking regulatory effectiveness considerations into account

On the basis of the prioritisation criteria sodium dichromate gets high priority for inclusion in Annex XIV.

There are other chromium (VI) compounds on the Candidate List with (partially) the same uses, or which could be used to replace sodium dichromate in (some of) its uses (and vice versa). Therefore, these substances should as well be considered for inclusion in Annex XIV.

Therefore, it is proposed to recommend sodium dichromate for inclusion in Annex XIV.

4. References

Annex XV (2010): Chromium trioxide. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB or a substance of an equivalent level of concern. Submitted by Germany, August 2010.

http://echa.europa.eu/documents/10162/20ee121d-0db9-4c97-ae32-d18d1f4b3ff4

EC (2005): European Union Risk Assessment Report: chromium trioxide, sodium chromate, sodium dichromate, ammonium dichromate, potassium dichromate. 3rd Priority List, Volume 53. European Commission, Joint Research Centre.

Entec (2008): Data on manufacture, import, export, uses and releases of sodium dichromate as well as information on potential alternatives to its use. Report prepared for ECHA.

Italian REACH CA (2011): Comment by Italian REACH CA to MSC Secretariat and Members, April 2011.

RCOM (2008): "Responses to comments" document. Document compiled from commenting period 30/06/2008 – 14/08/2008 on the identification of sodium dichromate as SVHC.

http://echa.europa.eu/documents/10162/ef60f637-5522-4c8f-a356-0313eb5766bd

RCOM (2011): "Responses to comments" document. Document compiling comments and respective answers from commenting period 15/06/2011 – 14/09/2011 on ECHA's 3rd draft recommendation of priority substances for inclusion in the list of substances subject to authorisation (Annex XIV).

http://echa.europa.eu/documents/10162/17232/rcom_chromium_compounds_en.pdf