

15 June 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 to this document.*

#### 1. Identity of the substance

Chemical name:	sodium dichromate
EC Number:	234-190-3
CAS Number:	10588-01-9 (anhydrous) and 7789-12-0 (dihydrate)
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<sup>1</sup> (H350: "May cause cancer"), as mutagen category 1B<sup>2</sup> (H340: "May cause genetic defects") and as toxic for reproduction category 1B<sup>3</sup> (H360-FD: "May damage 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.

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<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> 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

## 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  $\text{Na}_2\text{Cr}_2\text{O}_7$  used in the EU was estimated to be 25,000 t (77 % net export).

According to registration information sodium dichromate is almost exclusively imported into the EU in quantities of 10,000 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.

*Registration under Article 10 as a full dossier: YES*

*Registration under Article 18 as a transported isolated intermediate: YES*

### 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 dossier 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.

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) was 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).

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  $\text{Na}_2\text{Cr}_2\text{O}_7$  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 are exposed to significant concentrations of chromium VI compounds.

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. 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).

There were other non-intermediate uses of  $\text{Na}_2\text{Cr}_2\text{O}_7$  identified when industry was consulted by Entec (2008) whilst preparing their report, e.g. as a mordant for wool dye ( $\text{Na}_2\text{Cr}_2\text{O}_7$  added to fix dyes to wool and is 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 be confirmed 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  $\ll 1\%$ ), any potential releases are assumed to be minor as well. The assumption that  $\ll 1\%$  of  $\text{Na}_2\text{Cr}_2\text{O}_7$  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  $\text{Na}_2\text{Cr}_2\text{O}_7$ . 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<sup>4</sup>

### *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 aircraft. 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 chrome-free alternatives (Entec, 2008).

Electrolytic chromium/chromium oxide coated steel (ECCS) has been developed as an alternative to tinplate. In that technique, chromium plating of steel strip (known as blackplate) is performed electrolytically in chromic acid baths. The coating obtained consists of chromium metal and chromium oxides. 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).

## 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.

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<sup>4</sup> Please note that this information was not used for prioritisation.

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

#### *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.
- EC (2005): European Union Risk Assessment Report: chromium trioxide, sodium chromate, sodium dichromate, ammonium dichromate, potassium dichromate. 3<sup>rd</sup> 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.