ANNEX XV REPORT

AN ASSESSMENT OF WHETHER THE USE OF SPECIFIC CHROMIUM(VI) SUBSTANCES IN ARTICLES SHOULD BE RESTRICTED IN ACCORDANCE WITH ARTICLE 69(2) OF REACH

Substance Name	IUPAC Name(s)	EC Number	CAS Number
Acids generated from chromium trioxide and their oligomers. Group containing:			
• **Chromic acid**	Dihydroxy(dioxo) chromium	231-801-5	7738-94-5
• **Dichromic acid**	[(Hydroxydioxochromio) oxy]chromiumoylol; Hydroxy-(hydroxy(dioxo) chromio)oxy-dioxochromium	236-881-5	13530-68-2
• **Oligomers of chromic acid and dichromic acid**	—	not yet assigned	not yet assigned
Chromium trioxide	Trioxochromium	215-607-8	1333-82-0
Sodium chromate	Disodium chromate	231-889-5	7775-11-3
Potassium dichromate	Dipotassium [(oxidodioxochromio)oxy] chromiumoylolate; Dipotassium oxido-(oxido(dioxo)chromio)oxy -dioxochromium	231-906-6	7778-50-9
Potassium chromate	Dipotassium dioxido(dioxo)chromium; Dipotassium dioxochromiumbis(olate)	232-140-5	7789-00-6
Strontium chromate	Strontium dioxido(dioxo) chromium	232-142-6	7789-06-2

Substance Name	IUPAC Name(s)	EC Number	CAS Number
Ammonium dichromate	Diammonium [(oxidodioxochromio)oxy] chromiumoylolate	232-143-1	7789-09-5
Sodium dichromate	Disodium [(oxidodioxochromio)oxy] chromiumoylolate	234-190-3	10588-01-9
Potassium hydroxyloctaoxo-dizincatedichromate(1-)	Potassium dizinc dioxido(dioxo)chromium hydroxide	234-329-8	11103-86-9
Dichromium tris(chromate)	Chromium (3+) dioxido (dioxo) chromium	246-356-2	24613-89-6
Pentazinc chromate octahydroxide	Pentazinc dioxido(dioxo) chromium octahydroxide; Trizinc dioxido (dioxo) chromium dihydroxide	256-418-0	49663-84-5

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About the report

This draft report is prepared according to Article 69(2) of REACH Regulation (EC) No. 1907/2006, which after the sunset date has passed for a substance included on the Authorisation List (Annex XIV), requires ECHA to consider if risks from the use of the substance in articles are adequately controlled and, if this is not the case, prepare an Annex XV restriction dossier.

In general, ECHA gathers information on potential risks to human health and/or the environment for identified uses of the substance in articles from various sources. Information is gathered (if available) from authorisations, applications for authorisations, recommendation for inclusion in Annex XIV and substance of very high concern (SVHC) identification. Uses identified in the REACH registrations and in substances in articles (SiA) notifications are also investigated. In order to gather information on possible uses of the substance in articles that were not identified during the screening phase, a call for evidence is launched via ECHA's website.

Risks stemming from the incorporation of the substance into an article are not in the scope of this investigation as it is assumed they were already addressed by the authorisation process[1]. For imported articles the incorporation process is carried out in third countries and therefore outside the scope of EU legislation, however imported articles are within the scope of this investigation. The incorporation is regarded to cover two type of uses[2]:

a) The substance is incorporated into an article during its production, or

b) The substance, alone or in a mixture is incorporated into/onto an existing article (isolated or incorporated in a complex object) at a later stage (e.g. coatings, primers, adhesives, sealants) and become an integral part of the article (or of the complex object).

It is to be noted that there are several specific exemptions from the authorisation requirements[3], while only few exemptions are envisaged in case of restrictions. These include manufacture and placing on the market or use of a substance in scientific research and development, risks to human health of the use of the substance in cosmetic products and when a substance is used as an on-site isolated intermediate.

Based on the information gathered for chromium(VI) substances, ECHA is of the view that there is no strong driver to prepare and submit an Annex XV restriction dossier at present. This draft screening Annex XV report is prepared to fulfil the requirements in article 69(2). A call for evidence is launched to gather further information and comments on the assumptions made in this draft report.

[1] Q&A ID: 0564: https://echa.europa.eu/support/qas-support/qas Note that ECHA will investigate for this report whether applications for authorisation cover the incorporation of the substance into an article.

[2] https://echa.europa.eu/documents/10162/23036412/articles_en.pdf/cc2e3f93-8391-4944-88e4-efed5fb5112c

[3] https://echa.europa.eu/documents/10162/13640/generic_exemptions_authorisation_en.pdf/9291ab2a-fe2f-418d-9ce7-4c5abaaa04fc

A. Conclusions

A.1. Conclusions based on the assessment

Table 1 below summarises when the chromium(VI) compounds specified in this document have been included on the candidate list of substances of very high concern (SVHC), and when they have been included in the authorisation list of Annex XIV of the REACH Regulation (with reference to the number of the Commission Regulation (EU)) and their sunset date. According to REACH, ECHA needs to consider whether the use of the substance listed in the Annex XIV in articles poses a risk to human health or to the environment that is not adequately controlled. In such cases, ECHA prepares a restriction dossier which conforms to Annex XV.

Table 1: Conclusions taken with respect to SVHC identification and authorisation of the specified chromium(VI) compounds

Substance name	EC Number	Inclusion to the candidate list (date)	Inclusion into Annex XIV of REACH (date; No of Commission Regulation (EU))	Sunset (date)
Acids generated from chromium trioxide and their oligomers. Group containing:		15/12/2010	17/04/2013; No 348/2013	21/09/2017
• Chromic acid	231-801-5			
• Dichromic acid	236-881-5			
• Oligomers of chromic acid and dichromic acid	not yet assigned			
Chromium trioxide	215-607-8	15/12/2010	17/04/2013; No 348/2013	21/09/2017
Sodium chromate	231-889-5	17/06/2010	17/04/2013; No 348/2013	21/09/2017
Potassium dichromate	231-906-6	17/06/2010	17/04/2013; No 348/2013	21/09/2017
Potassium chromate	232-140-5	17/06/2010	17/04/2013; No 348/2013	21/09/2017
Strontium chromate	232-142-6	20/06/2011	14/08/2014; No 895/2014	22/01/2019
Ammonium dichromate	232-143-1	17/06/2010	17/04/2013; No 348/2013	21/09/2017
Sodium dichromate	234-190-3	28/10/2008	17/04/2013; No 348/2013	21/09/2017
Potassium hydroxyloctaoxo-dizincatedichromate(1-)	234-329-8	19/12/2011	14/08/2014; No 895/2014	22/01/2019
Dichromium tris(chromate)	246-356-2	19/12/2011	14/08/2014; No 895/2014	22/01/2019
Pentazinc chromate octahydroxide	256-418-0	19/12/2011	14/08/2014; No 895/2014	22/01/2019

ECHA has gathered information on the uses of the specified chromium(VI) compounds from various sources. This includes information gathered during the SVHC listing and recommendation for the inclusion of substances in Annex XIV, uses identified in the REACH registrations and

information in the received applications for authorisation, as well as the downstream users' notifications under REACH Article 66, and notification for Substances in Articles (SiA)[4].

Following an assessment of the available evidence, ECHA considers that there is no use of the substances that have the potential to lead to human exposure from chromium(VI) in articles. Furthermore, the potential risk to humans, through workers' exposure or man via the environment, in the production of articles and when a substance (as such or in mixture) is incorporated into/onto an existing article has been evaluated in the applications for authorisations (AfAs) for the corresponding uses, therefore they are outside the scope of this report.[5] Articles with chromium(VI) content above the concentration limit value of 0.1% of chromium might be imported in principle, however, there is no actual indication of this, as ECHA has not received any SiA notifications. Therefore, under Article 69(2), ECHA's view is that there is no strong driver for ECHA to develop and submit an Annex XV dossier for restriction at present.

This conclusion will be tested in a call for evidence to last from 03/02/2021 to 17/03/2021. Following this call, the assessment will be reviewed and the conclusion sent to CARACAL as an information document.

It should be noted that like for other inorganic salts, any hazard would likely come from the chemical species chromium(VI) and if chromium(VI) were used and found in articles, it would be difficult to tell (e.g. following analytical analysis during an enforcement campaign) whether this would be coming from chromium compounds currently investigated or different chromium compounds. These alternative compounds could be, for example, lead chromate pigments, however they are not within the scope of this report as ECHA has a separate Article 69(2) report for these particular compounds under preparation.

A.2. Targeting

This report is targeted on the potential release of the specified chromium(VI) compounds from articles and exposure of chromium (VI) compounds when used in articles and whether or not such use should be restricted.

This targeting is based on the Article 69(2) of the REACH Regulation that requires ECHA to consider if the use of the substance in articles is adequately controlled and to prepare an Annex XV dossier for an appropriate restriction if this is not the case. The incorporation of an Annex XIV substance into an article is a use which is subject to the authorisation requirement (see footnote 1).

[4] By 18.12.2019 ECHA did not receive any notification in articles: https://echa.europa.eu/documents/10162/13642/data_candidate_list_substances_in_articles_en.pdf/d48a58e4-0d67-4c54-86a5-0b15877a8c93

[5] Q&A ID No 564: https://echa.europa.eu/support/qas-support/qas?p_p_id=journalqasearch_WAR_journalqaportlet&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_pos=2&p_p_col_count=3

A.3. Summary of the justification

A.3.1. Identified uses, hazard, exposure / emissions and risk

Information on uses

The uses of the specified chromium(VI) compounds are summarised in Table 2 below. They are based on the information gathered during the SVHC listing and recommendation for the inclusion of substances in Annex XIV, the uses identified in the REACH registrations and information in the received applications for authorisation[6].

In 2010 (the year when the REACH registrations were made), the main uses of the chromium(VI) compounds were in industrial sites. There are no current notifications for Substances in Articles (SiA) made under Article 7(2) for any of the chromium(VI) compounds addressed in this report.

From the information received in the applications for authorisation, the concentrations of chromium(VI) remaining in the finished article are typically below detection levels (and certainly below 0.1%). However, occasionally, chromium(VI) may be present intentionally, for example during the use of coating of an article, to form a self-healing layer to avoid corrosion (it forms a stable chrome oxide layer in contact with the oxygen of the air on the surface of the metal, protecting it from further corrosion –rusting-), or during the use of chromium(III) in leather and textile articles. Machining operations, like fettling, drilling, riveting, edging or turning might be necessary during industrial post-treatment of coated parts. Therefore, exposure to chromium(VI) coarse particles during these activities is possible. These activities were considered, including their resulting exposure and risk assessment, and covered in the relevant applications for authorisation. Furthermore, the authorisation decisions impose a specific condition on 'articles for supply to the general public'. The specific condition states that: "*…the authorisation shall be subject to the condition that the authorisation holder and its downstream users ensure that there is no chromium(VI) above the detectable level present in articles for supply to the general public*."[7]

In principle, articles with chromium(VI) content above the concentration limit value of 0.1% chromium might be imported. However, there is no actual indication of this as ECHA has not received any SiA notifications (whereby producers and importers of articles are required to prepare a SiA notification when an SVHC -in this case the specified chromium(VI) substances- is present above a concentration of 0.1% w/w in articles produced and/or imported).

Specific processes like welding of metals where there is no presence of chromium(VI), although they are made partly of chromium metal, such as stainless steel, might generate fumes where chromium(VI) is formed, together with the less toxic trivalent chromium (chromium(III)). Management of chromium(VI) formed during the welding process is achieved by compliance with the adopted occupational exposure limit values (OELs). The recent binding occupational limit value (BOELV) set under EU Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (EU, 2004) is 0.010 mg Cr(VI)/m^3 for a period of 5 years after the date of transposition of the directive; after that period a limit of 0.005 mg Cr(VI)/m^3 will apply. For welding or plasma-cutting processes or similar work processes that generate fumes, there is a derogation, with an OEL value of 0.025 mg Cr(VI)/m^3

[6] https://echa.europa.eu/applications-for-authorisation-previous-consultations

[7] https://ec.europa.eu/docsroom/documents/44426

until 5 years after the transposition date and after that period the limit will be 0.005 mg Cr(VI)/m^3. In France and the Netherlands, an OEL of 1 µg/m^3 has been set for Cr(VI) (MinSZW, 2016; ANSES, 2017). These are the most stringent OELs currently set for workplaces in the EU[8]. Therefore, the risk to these workers is covered by the BOELV set under directive 2004/37/EC.

Table 2: Uses of the specified chromium(VI) compounds

Substance name	EC number	General description of Scope of authorised use
Acids generated from chromium trioxide and their oligomers. Group containing:	not assigned	1. Hard chrome plating for gasoline and diesel injection applications
• Chromic acid	231-801-5	
• Dichromic acid	236-881-5	
• Oligomers of chromic acid and dichromic acid	not yet assigned	
Chromium trioxide	215-607-8	1. Functional chrome plating in various industry sectors e.g. automotive, construction, oil and gas marine applications, power generation, railway, mining, military applications 2. Functional chrome plating with decorative character in various industry sections e.g. automotive, sanitary applications 3. Surface treatment for applications in various industry sectors e.g. aerospace, architectural, automotive, metal manufacturing and finishing, and general engineering 4. Passivation of ETP (tin plated steel) 5. Pre-treatment step, e.g. etching 6. Manufacture of electrolytic chromium coated steel 7. Conversion coating and passivation of circuits 8. Component in an industrial catalyst 9. Formulation of mixtures
Sodium chromate	231-889-5	1. Anticorrosion agent in cooling systems 2. Use in alkali metal dispensers for photocathodes production 3. Surface treatment for aerospace applications 4. Formulation of mixtures
Potassium dichromate	231-906-6	1. Conversion coating and passivation of circuits 2. Surface treatment for aerospace applications 3. Surface treatment for anodic films 4. Formulation of mixtures
Potassium chromate	232-140-5	1. Use in alkali metal dispensers for photocathodes production
Strontium chromate	232-142-6	1. Use in primers for surface treatment for aerospace applications 2. Formulation of mixtures
Ammonium dichromate	232-143-1	1. Photosensitiser for production of e.g. micro components, mandrels, holographic combiners

[8] https://www.sciencedirect.com/science/article/pii/S0013935119303809#bib23

Substance name	EC number	General description of Scope of authorised use
Sodium dichromate	234-190-3	1. Anticorrosion agent in cooling systems 2. Additive to supress parasitic reactions 3. Passivation of ETP (tin plated steel) 4. Surface treatment for anodic films 5. Conversion coating and passivation of circuits 6. Surface treatment for aerospace applications 7. Use in textile applications to facilitate the dyeing process 8. Formulation of mixtures
Potassium hydroxyl-octaoxodizincate-dichromate(1-)	234-329-8	1. Surface treatment for aerospace applications 2. Formulation of mixtures
Dichromium tris(chromate)	246-356-2	1. Surface treatment for anodic films 2. Surface treatment for aerospace applications 3. Formulation of mixtures
Pentazinc chromate octahydroxide	256-418-0	1. Surface treatment for aerospace applications 2. Formulation of mixtures

Sources: links to the ECHA pages listing the individual applications for authorisation see “References”

Information on hazards

The specified chromium(VI) compounds are included in REACH Annex XIV based on their properties as specified in Table 3. Other endpoints are not relevant for this dossier.

Table 3: Hazardous properties based on which the specific chromium(VI) compounds have been included in REACH Annex XIV

Substance name	EC number	Properties, based on which the substance has been included in Annex XIV
Acids generated from chromium trioxide and their oligomers. Group containing:	not assigned	Carcinogenic (Article 57a)
• Chromic acid	231-801-5	
• Dichromic acid	236-881-5	
• Oligomers of chromic acid and dichromic acid	not yet assigned	
Chromium trioxide	215-607-8	Carcinogenic (Article 57a) Mutagenic (Article 57b)
Sodium chromate	231-889-5	Carcinogenic (Article 57a) Mutagenic (Article 57b) Toxic for reproduction (Article 57c)
Potassium dichromate	231-906-6	Carcinogenic (Article 57a) Mutagenic (Article 57b) Toxic for reproduction (Article 57c)
Potassium chromate	232-140-5	Carcinogenic (Article 57a) Mutagenic (Article 57b)
Strontium chromate	232-142-6	Carcinogenic (Article 57a)
Ammonium dichromate	232-143-1	Carcinogenic (Article 57a) Mutagenic (Article 57b) Toxic for reproduction (Article 57c)
Sodium dichromate	234-190-3	Carcinogenic (Article 57a) Mutagenic (Article 57b) Toxic for reproduction (Article 57c)
Potassium hydroxyl-octaoxodizincate-dichromate(1-)	234-329-8	Carcinogenic (Article 57a)
Dichromium tris(chromate)	246-356-2	Carcinogenic (Article 57a)
Pentazinc chromate octahydroxide	256-418-0	Carcinogenic (Article 57a)

In 2013, ECHA's Committee for Risk Assessment (RAC) agreed that there is insufficient evidence to exclude a genotoxic mode of action and therefore a threshold cannot be assumed for carcinogenicity[9]. The RAC document from 2013 was amended in 2015 to include the intrinsic property "Toxic to reproduction" of the chromium(VI) compounds[10]. RAC considered that it is possible to determine DNELs for the fertility effects (category 1B) and the developmental toxicity (category 1B) of four soluble chromium(VI) compounds (ammonium dichromate, sodium dichromate, sodium chromate and potassium dichromate). However, RAC noted that when

[9] https://echa.europa.eu/documents/10162/13579/rac_carcinogenicity_dose_response_crvi_en.pdf/facc881f-cf3e-40ac-8339-c9d9c1832c32

[10] https://echa.europa.eu/documents/10162/21961120/rac_35_09_1_c_dnel_cr-vi-en.pdf/8964d39c-d94e-4abc-8c8e-4e2866041fc6

comparing the reproductive toxicity DNELs with the carcinogenic dose-response of chromium(VI), it is clear that the carcinogenic effects of chromium(VI) are the most sensitive effects. For the carcinogenic effect, which is non-threshold, an excess lifetime intestinal cancer risk of 8 x 10^{-4} per µg chromium(VI)/kg bw/day has been estimated for the general population, whereas for the reproductive effects, the DNEL for the general population was 17 µg/kg bw/day.

Information on emissions/release/exposure

Not relevant. There is no use of the specified substances in articles that would lead to a potential human exposure to chromium(VI). This also takes into consideration that the assessments of the applications for authorisation (AfAs) were on individual cases and did not investigate the potential cumulative exposure of humans via the environment in a geographic area where, hypothetically, more than one individual use could be carried out. For these cases, the transformation of chromium(VI) to the much less toxic chromium(III) in the environment must be considered (in fact, the Committee for Risk Assessment, RAC, has systematically concluded in his assessment of the individual applications for authorisation that the regional exposure to chromium(VI) is not considered relevant). Indeed, the EU RAR Chromates report (2005)[11] states that this transformation is expected to occur rapidly (97% will be converted to chromium(III) in acidic soils within a few hours) although under less favourable conditions (e.g. alkaline medium, like seawater) this could take longer.

In conclusion, the potential human exposure to chromium(VI) is considered as not relevant.

Characterisation of risk

Not relevant - there is no use of the specified substances in articles that have the potential to lead to human exposure.

A.3.2. Justification that action is required on a Union-wide basis

No restriction is proposed at present.

A.3.3. Justification that the proposed restriction is the most appropriate Union-wide measure

No restriction is proposed at present.

B. Information on hazard and risk

B.1. Identity of the substance and physical and chemical properties

B.1.1. Name and other identifiers of the substance

[11] https://echa.europa.eu/information-on-chemicals/information-from-existing-substances-regulation/-/substance-rev/2561/term

Table 4: Substance identification and composition

Substance name	EC number	CAS number	Molecular formula	Mol. weight (g/mole)	Typical conc. (% w/w)	Conc. range (% w/w)
Acids generated from chromium trioxide and their oligomers. Group containing:	not assigned	not assigned				
• Chromic acid	231-801-5	7738-94-5	CrH_2O_4	118	—	—
• Dichromic acid	236-881-5	13530-68-2	$Cr_2H_2O_7$	218	—	—
• Oligomers of chromic acid and dichromic acid	not yet assigned	not yet assigned	—	—	—	—
Chromium trioxide	215-607-8	1333-82-0	CrO_3	100	min. >98	confidential
Sodium chromate	231-889-5	7775-11-3	$CrNa_2O_4$	162	99	—
Potassium dichromate	231-906-6	7778-50-9	$Cr_2K_2O_7$	294	99.7	—
Potassium chromate	232-140-5	7789-00-6	CrK_2O_4	194	99-99.9	—
Strontium chromate	232-142-6	7789-06-2	CrO_4Sr	203	Ca. 97	96≤[C]≤100
Ammonium dichromate	232-143-1	7789-09-5	$Cr_2H_8N_2O_7$	252	99-99.8	—
Sodium dichromate	234-190-3	10588-01-9	$Cr_2H_4Na_2O_9$	262	>99.3	See “typical conc.”
Potassium hydroxyl-octaoxodizincate-dichromate(1-)	234-329-8	11103-86-9	$Cr_2HKO_9Zn_2$	419	ca. 97	no infomation
Dichromium tris(chromate)	246-356-2	24613-89-6	Cr_5O_{12}	452	ca. 90	80≤[C]≤97
Pentazinc chromate octahydroxide	256-418-0	49663-84-5	$Cr_2H_2O_{10}Zn_3$	579	confidential	confidential

Source: SVHC support document see “References”

B.1.3. Physicochemical properties

Table 5: Physicochemical properties of the specified chromium(VI) compounds

Substance name	EC number	Physical state	Density [g/cm³ at 20°C]	Melting point [°C]	Water Solubility [g/L]
Acids generated from chromium trioxide and their oligomers. Group containing:	Not assigned				
• Chromic acid	231-801-5	—	1.7-2.8	196	1854
• Dichromic acid	236-881-5	—	—	—	—
• Oligomers of chromic acid and dichromic acid	not yet assigned	—	—	—	—
Chromium trioxide	215-607-8	solid	2.7	196	1667
Sodium chromate	231-889-5	Slightly deliquescent yellow crystals in hydrated form	2.4-2.7	20 (decahydrate) 762 (anhydrous)	530
Potassium dichromate	231-906-6	Orange-red triclinic crystals	2.7	398	45
Potassium chromate	232-140-5	Yellow orthorhombic crystals	2.7	975	629
Strontium chromate	232-142-6	Light yellow powder or granular solid	3.9	Decomposition >500°C	1.2
Ammonium dichromate	232-143-1	Bright orange-red crystals, monoclinic, prismatic	2.2	Decomposition 180°C	308
Sodium dichromate	234-190-3	crystals	not provided	Ca. 357	2.36
Potassium hydroxyloctaoxo-dizincatedichromate(1-)	234-329-8	Green-yellow powder	3.5	Decomposition >500°C	0.5-1.5
Dichromium tris(chromate)	246-356-2	dark granular solid; amorphous non-crystalline	2.3	>300°C	96.6
Pentazinc chromate octahydroxide	256-418-0	Light yellow powder	3.4	Decomposition >300°C	<0.02

Sources: SVHC support document see “References”

B.1.4. Justification for grouping

For the purposes of this report, the following chromium(VI) compounds are considered a group comprising of: acids generated from chromium trioxide and their oligomers containing chromic acid, dichromic acid, and oligomers of chromic acid and dichromic acid, chromium trioxide, sodium chromate, potassium dichromate, potassium chromate, strontium chromate, ammonium dichromate, sodium dichromate, potassium hydroxyloctaoxo-dizincatedichromate(1-), dichromium tris(chromate), and pentazinc chromate octahydroxide. Grouping of these substances was proposed after their identification as substances of very high concern (SVHC) and their inclusion on the candidate list. In the SVHC support documents, many similarities in terms of, for example: their chemical nature, intrinsic physicochemical properties and their chemical structure, are documented.

These chromium(VI) compounds are inorganic substances that are used to formulate mixtures for chrome plating e.g. metal finishing/surface treatment onto metal parts to provide a decorative or protective coating, or, in much smaller amounts, as specific processing agents in e.g. cooling systems, mainly for their ability to confer anticorrosion and antiscaling properties to the finished product.

Therefore, these chromium(VI) compounds can be considered as a group (for the reasons stated above) for which the relevant human exposure and hence the risk, (through direct worker exposure as well as indirectly via the environment) associated with the uses applied for, has already been taken into consideration in their respective applications for authorisation.

B.2. Manufacture and uses

B.2.1. Manufacture, import and export of a substance

Table 6 summarises the annual volumes of the specified chromium(VI) compounds manufactured and/or imported in the EU.

Table 6: Information on amount of substances manufactured and/or imported in the EU*

Substance name	EC number	Amount manufactured and/or imported in EU (t/y)
Acids generated from chromium trioxide and their oligomers. Group containing:	not assigned	<10
• Chromic acid	231-801-5	<10
• Dichromic acid	236-881-5	<10
• Oligomers of chromic acid and dichromic acid	not yet assigned	
Chromium trioxide	215-607-8	10,000-100,000
Sodium chromate	231-889-5	1-10
Potassium dichromate	231-906-6	100-1,000
Potassium chromate	232-140-5	1-10
Strontium chromate	232-142-6	1,000-10,000
Ammonium dichromate	232-143-1	10-1,000
Sodium dichromate	234-190-3	100-1,000
Potassium hydroxyl-octaoxodizincate-dichromate(1-)	234-329-8	100-1,000
Dichromium tris(chromate)	246-356-2	10-100
Pentazinc chromate octahydroxide	256-418-0	100-1,000

*Date when ECHAs dissemination site has been accessed: 20/05/2020

B.2.2. Uses, including uses in articles

The main uses of the chromium(VI) compounds are in industrial sites, for example: surface treatment, including e.g. functional and decorative electroplating, passivation, anodising, plastic plating, use of catalysts, intermediate (precursor), corrosion inhibitors, anti-scaling agents, coil coating, and mordant in the dyeing of wool. Other uses identified were widespread uses by professional workers, for example: small scale laboratory use, intermediate (precursor), and laboratory chemicals.

Related to these uses, ECHA has received applications for authorisation for the industrial uses (see Table 2 with details section A.3.1). Based on the information in the authorisation applications, the cumulated volume of chromium(VI) used within the EU for these uses is above 1 000 t/y.

There are no SiA notifications made under Article 7(2) for any of the chromium(VI) compounds.

From the information received in the applications for authorisation, the concentrations of chromium(VI) remaining in the finished article is typically below detection levels (and certainly below 0.1%), however, occasionally, chromium(VI) may be present on purpose. Machining operations, like fettling, drilling, riveting, edging, abrading, or sanding, might be necessary during industrial post-treatment of coated parts. Therefore, exposure to chromium(VI) containing dust during these activities is also considered in the relevant applications for authorisation. Examples of sector specific surface treatment applications include, amongst others, the following: building components for architectural purposes (envelopes, windows, doors); automotive: belt locks, bumpers, cylinder heads; packaging: food and beverage cans, twist-off caps and aerosol bottoms and tops (including electrolytic chromium coated steel (ECCS)) and general engineering: printed circuit boards, photochemical machining, and power transformers. In this regard, the authorisation decisions are expected to contain the condition "*…shall be subject to the condition that the authorisation holder and its downstream users ensure that there is no chromium(VI) above the detectable level present in articles for supply to the general public*."[12]

In principle, imported articles, which are not within the scope of the applications for authorisations, might contain the substances of very high concern above the concentration limit of 0.1%. However, in practise, there is no actual indication of this, as no notifications of substances in articles have been submitted to ECHA.

B.2.3. Uses advised against by the registrants

There are uses advised against in the registrations for chromium(Vi), in particular advice against all consumer uses.

B.2.4. Description of targeting

This report is targeted on the potential release of chromium(VI) from articles and exposure during the use of these compounds in articles and whether or not such use should be restricted. Furthermore, targeting is based on the hazard for which the substances were included on Annex XIV, i.e. carcinogenicity, mutagenicity and reproductive toxicity. It is to be noted however, that

[12] https://www.asd-europe.org/sites/default/files/atoms/files/CTACSub%20Consortium%20combined%2021%20February%202019%20(55%20pages)_0.pdf

according to article 56 of REACH, incorporation of an Annex XIV substance in articles falls under the authorisation procedure. This is further explained in the Q&A ID no 564 (see footnote 2).

B.3. Classification and labelling

B.3.1. Classification according to CLP

Several of the specific chromium(VI) compounds have harmonised classifications which are summarised in Table 7. All of those are classified for carcinogenicity 1 (1A or 1B), most of them also for mutagenicity (1B or 2) and reproductive toxicity (1B or 2).

Table 7: Harmonised classifications

Substance name	EC number	Classification		Classification (continued)	
		Hazard Class and Category Code(s)	Hazard statement Code(s)	Hazard Class and Category Code(s)	Hazard statement Code(s)
Acids generated from chromium trioxide and their oligomers. Group containing:					
• Chromic acid	231-801-5	See “Notified classifications”			
• Dichromic acid	236-881-5	See “Notified classifications”			
• Oligomers of chromic acid and dichromic acid	not yet assigned				
Chromium trioxide	215-607-8	Ox. Sol. 1 Acute Tox. 3 Acute Tox. 3 Skin Corr. 1A Skin Sens. 1 Acute Tox 2 Resp. Sens. 1	H271 H301 H311 H314 H317 H330 H334	**Muta. 1B** **Carc. 1A** STOT RE 1 Aqua Acute 1 Aqua Chronic 1 **Repr. 2**	**H340** **H350** H372 H400 H410 **H361f**
Sodium chromate	231-889-5	Acute Tox. 3 Acute Tox. 4 Skin Corr. 1A Skin Sens. 1 Acute Tox 2 Resp. Sens. 1	H301 H312 H314 H317 H330 H334	**Muta. 1B** **Carc. 1B** STOT RE 1 Aqua Acute 1 Aqua Chronic 1 **Repr. 1B**	**H340** **H350** H372 H400 H410 **H360FD**
Potassium dichromate	231-906-6	Ox. Sol. 2 Acute Tox. 3 Acute Tox. 4 Skin Corr. 1A Skin Sens. 1 Acute Tox 2 Resp. Sens. 1	H272 H301 H312 H314 H317 H330 H334	**Muta. 1B** **Carc. 1B** STOT RE 1 Aqua Acute 1 Aqua Chronic 1 **Repr. 1B**	**H340** **H350** H372 H400 H410 **H360FD**
Potassium chromate	232-140-5	Skin Irrit. 2 Eye Irrit. 2 Skin Sens. 1 STOT SE 3	H315 H319 H317 H335	**Muta. 1B** **Carc. 1B** Aqua Acute 1 Aqua Chronic 1	**H340** **H350i** H400 H410
Strontium chromate	232-142-6	Acute Tox. 4 **Carc. 1B**	H302 H350	Aqua Acute 1 Aqua Chronic 1	H400 H410
		See also “Notified classifications”			
Ammonium dichromate	232-143-1	Ox. Sol. 2 Acute Tox. 3 Acute Tox. 4 Skin Corr. 1A Skin Sens. 1 Acute Tox 2	H272 H301 H312 H314 H317 H330	**Muta. 1B** **Carc. 1B** STOT RE 1 Aqua Acute 1 Aqua Chronic 1 **Repr. 1B**	**H340** **H350** H372 H400 H410 **H360FD**

Substance name	EC number	Classification		Classification (continued)	
		Hazard Class and Category Code(s)	Hazard statement Code(s)	Hazard Class and Category Code(s)	Hazard statement Code(s)
		Resp. Sens. 1	H334		
Sodium dichromate	234-190-3	Ox. Sol. 2 Acute Tox. 3 Acute Tox. 4 Skin Corr. 1B Skin Sens. 1 Acute Tox 2 Resp. Sens. 1	H272 H301 H312 H314 H317 H330 H334	**Muta. 1B** **Carc. 1B** STOT RE 1 Aqua Acute 1 Aqua Chronic 1 **Repr. 1B**	**H340** **H350** H372 H400 H410 **H360FD**
Potassium hydroxyloctaoxo-dizincatedichromate(1-)	234-329-8	See “Notified classifications”			
Dichromium tris(chromate)	246-356-2	Ox. Sol. 1 Skin Corr. 1A Skin Sens. 1	H2712 H314 H317	**Carc. 1B** Aqua Acute 1 Aqua Chronic 1	**H350** H400 H410
		See also “Notified classifications”			
Pentazinc chromate octahydroxide	256-418-0	See “Notified classifications”			

Sources: ECHA C&L Inventory

B.3.1. Classification according to the Classification and Labelling Inventory

There have been several notifications to the C&L inventory for the specific chromium(VI) compounds, most of them reproducing the harmonised classification. Some of them have a lower hazard class for certain endpoints or they are deviating e.g. on the pictograms. Several notifications, as summarised in Table 8, cover additional endpoints.

Table 8: Notified classifications (aggregated; in addition to the harmonised classification if applicable)

Substance name	EC number	Number of aggregated notific.	Classification		Classification (continued)	
			Hazard Class and Category Code(s)	Hazard statem. Code(s)	Hazard Class and Category Code(s)	Hazard statem. Code(s)
Acids generated from chromium trioxide and their oligomers. Group containing:						
• Chromic acid	231-801-5	9	Acute Tox. 2 Acute Tox. 2 Skin Corr. 1A Eye Dam. 1 Skin Sens. 1 Acute Tox 1 Resp. Sens. 1	H300 H310 H314 H317 H318 H330 H334	**Muta. 2** **Carc. 1B** **Repr 2** STOT RE 1 Aqua Acute 1 Aqua Chronic 1	**H341** **H350** **H361** H372 H400 H410
• Dichromic acid	236-881-5	2	Skin Sens. 1 **Carc. 1B**	H317 **H350**	Aqua Acute 1 Aqua Chronic 1	H400 H410
• Oligomers of chromic acid and dichromic acid	not yet assigned					
Chromium trioxide	215-607-8	38	See “Harmonised classifications”			
Sodium chromate	231-889-5	9	See “Harmonised classifications”			
Potassium dichromate	231-906-6	18	See “Harmonised classifications”			
Potassium chromate	232-140-5	16	See “Harmonised classifications”			
Strontium chromate	232-142-6	15	Skin Sens. 1 Acute Tox. 2 STO SE 3	H317 H330 H335	**Muta. 2** **Carc. 1A** **Repr 2**	H341 H350 H361
Ammonium dichromate	232-143-1	8	See “Harmonised classifications”			
Sodium dichromate	234-190-3	19	See “Harmonised classifications”			
Potassium hydroxyloctaoxodizincatedichromate(1-)	234-329-8	10	Acute Tox. 4 Skin Sens. 1B Acite Tox. 2 STOT SE 3	H302 H317 H330 H335	**Muta. 2** **Carc. 1A** **Repr 2** Aqua Acute 1	**H341** **H350i** **H361** H400
Dichromium tris(chromate)	246-356-2	5	Met. Corr. 1 Acute Tox. 3 Acute Tox. 2	H290 H301 H330	**Muta. 2** **Repr. 2**	**H341** **H361**
Pentazinc chromate octahydroxide	256-418-0	5	Acute Tox. 3/4 Skin Sens 1B Acute Tox. 2 STOT SE 3	H301/302 H317 H330 H335	**Muta. 2** **Carc. 1A** **Repr. 2** Aqua Acute 1 Aqua Chronic 1	**H341** **H350i** **H361** H400 H410

Sources: ECHA C&L Inventory

B.4. Environmental fate properties

Not relevant.

B.5. Human health hazard assessment

As summarised in Table 3 above, the specified chromium(VI) compounds are included in REACH Annex XIV based on their carcinogenic properties, and some of them also based on mutagenic and reproductive toxic properties. Other human health endpoints are not relevant for this dossier.

Carcinogenicity

In developing its opinions on the application for authorisation, RAC confirmed that it is not possible to determine a DNEL for the carcinogenic (category 1A or 1B) properties of the chromium(VI) compounds in accordance with Annex I of the REACH Regulation, because there was insufficient evidence to exclude a genotoxic mode of action (ECHA, 2013). This opinion is applicable to all chromium(VI) substances covered in this report.

Chromium(VI) causes lung tumours in humans and animals by the inhalation route and tumours of the gastrointestinal tract in animals by the oral route. These are both local, site-of-contact tumours – there is no evidence that chromium(VI) causes tumours elsewhere in the body.

A clear mode of action (MoA) for these tumours has not been established. The overall body of evidence indicates that chromium(VI) is genotoxic in vivo, resulting in the formation of DNA adducts and oxidative DNA damage. However, clear evidence of mutagenicity in vivo in the target tissues (lung and intestine) by relevant routes of exposure is lacking. This supports the contention that chromium(VI) is only weakly mutagenic in vivo and that its mutagenicity is most likely to be only one contributory factor in the carcinogenic process, together with tissue injury/irritation/inflammation and cell proliferation. However, there is insufficient evidence to exclude a genotoxic mode of action and therefore a threshold cannot be assumed.

Dose-response relationships were derived by linear extrapolation. Extrapolating outside the range of observation inevitably introduces uncertainties. As the mechanistic evidence is suggestive of non-linearity, it is acknowledged that the excess risks in the low exposure range might be an overestimate.

With regards to bioavailability, information from epidemiological and mechanistic studies indicated that the carcinogenic potency of chromium(VI) compounds to the lung is greater for substances of high and moderate solubility in comparison to the insoluble chromates. However, quantifying any differences in lung carcinogenic potency for chromium(VI) compounds of different solubility is not possible with the currently available data. Therefore, the proposed lung cancer risk estimates should be applied to inhalation exposures to aerosols of highly soluble, slightly soluble and insoluble chromium(VI) compounds, accepting that they will perhaps overestimate risks in the case of exposure to insoluble chromates.

Inhalation exposures to chromium(VI) compounds are to a range of particle sizes. Larger inhaled particles that are deposited in the upper respiratory tract are cleared by the mucociliary escalator and swallowed. It therefore seems reasonable to associate the “inhalable, non-respirable fraction” of chromium(VI) inhalation exposure with the potential for an increased risk of cancer of the small intestine.

For exposure by the oral route, tumours of the small intestine were observed in animals dosed with soluble chromium(VI) compounds. There is no information on the oral carcinogenic potential of chromates of lower solubility, but it is expected that these will be less bioavailable. As noted above, and in the absence of further information, the proposed small intestine cancer risk estimates should be applied to exposures to highly soluble, slightly soluble and insoluble chromium(VI) compounds, accepting that they will perhaps overestimate risks in the case of exposure to slightly soluble and insoluble chromates (ECHA, 2013).

The excessive lifetime lung cancer mortality following inhalation exposure and the excess lifetime intestinal cancer risk following oral and inhalation exposure for workers and the general population are summarised in Table 9 below. There are no data to indicate that dermal exposure to chromium(VI) compounds presents a cancer risk to humans (ECHA, 2013).

Table 9: Excess lifetime lung and cancer risk for chromium(VI) compounds (ECHA; 2013)

Population	Parameters	Excess lifetime lung cancer mortality risk (inhalation)	Excess lifetime intestinal cancer risk (oral and inhalation)
Workers	40 year working life (8h/day, 5d/week)	4×10^{-3} per µg Cr(VI)/m^3	2.0×10^{-4} per µg Cr(VI)/kg bw/day
General population	70 years (24 h/day every day);	2.9×10^{-2} per µg Cr(VI)/m^3	8×10^{-4} per µg Cr(VI)/kg bw/day

Reproductive toxicity

In developing its opinions on the application for authorisation, RAC considered, in addition, that it is possible to determine DNELs for the fertility effects (category 1B) and the developmental toxicity (category 1B) of four soluble chromium(VI) compounds (ammonium dichromate, sodium dichromate, sodium chromate and potassium dichromate) in accordance with Annex I of the REACH Regulation (ECHA, 2015).

Bioavailability was considered 5% for the oral route, 30% for inhalation and 4% for the dermal route. Point of departure for DNEL derivation with regards to fertility was a LOAEL of 5.2 mg Cr(VI)/kg bw/day (testicular toxicity) derived from a 6-day oral rat study. Point of departure for DNEL derivation with regards to developmental effects was a LOAEL of 7.9 mg Cr(VI)/kg bw/day derived from a developmental toxicity study in rats with several foetal effects in the absence of significant maternal toxicity. Reference DNELs have been derived for both fertility and development for workers and the general public in accordance with the ECHA guidance on chemical safety assessment, chapter R8. The calculated reference DNELs are summarised in Table 10.

Table 10: Reference DNELs for workers and general population for fertility and developmental toxicity (ECHA, 2015)

Reference DNEL	Fertility		Developmental toxicity	
	Workers	General population	Workers	General population
Inhalation (µg Cr(VI)/m^3)	43	11	85	15
Dermal (µg Cr(VI)/kg bw/day)	43	22	93	34
Oral (µg Cr(VI)/kg bw/day)	-	17	-	26

B.6. Human health hazard assessment of physicochemical properties

Not relevant.

B.7. Environmental hazard assessment

Not relevant.

B.8. PBT and vPvB assessment

Not relevant.

B.9. Exposure assessment

B.9.1. General discussion on releases and exposure

For this report only releases from articles and exposure from the use in articles are relevant. When identified uses do not lead to chromium(VI) being present in articles, there is no potential for releases or exposure and no need for further assessment of that use.

An exhaustive list of the reported uses can be seen in table 2. The chromium(VI) compounds are generally used for their capacity to deposit metallic chromium on different substrates to achieve an improvement in the surface appearance, level of corrosion protection and to enhance durability, in a number of industrial processes such as: hard chrome plating, surface treatment, functional chrome plating for decorative purposes, passivation of steel, etc. in various industry sectors, such as e.g. aerospace, architectural, automotive, metal manufacturing and finishing, and general engineering. The key functionalities of chromium(VI) compounds include corrosion resistance, active corrosion inhibition, adhesion promotion and chemical resistance.

The quantity of unreacted chromium(VI) is below detectable limits for all the uses listed in table 2. As indicated above, for this report, only releases and exposure from articles are relevant (as those arising from the production of articles are within the scope of the authorisation process and therefore covered in their respective AfAs). Therefore, no relevant release has been identified.

As indicated earlier, there is no indication that imported articles contain the substances of very high concern, above the concentration limit of 0.1%, as no notifications of substances in articles have been submitted to ECHA.

ECHA has not investigated the exposure from the recycling or waste handling of articles where the specific substances are incorporated. However, these are not expected to cause exposure to humans (workers or humans indirectly exposed via the environment) or to the environment as the concentrations of the substances in articles are reported to be negligible or low (below 0.1 %) as described in the authorisations.

B.9.1.1. Summary of the existing legal requirements (non-exhaustive list)

Under REACH, the specified chromium(VI) compounds were included in the candidate list for authorisation (either 15/12/2010; ED/68/2009 or 19/12/2011) and included into Annex XIV of REACH (Commission Regulation (EU) No 143/2011) on the basis of art 57(a) Carc 1B. with a sunset date of 21/09/2017 (for potassium chromate, sodium chromate, potassium dichromate, sodium dichromate, chromium trioxide and chromic acid) and 22/01/2019 for potassium hydroxyloctaoxo-dizincatedichromate(1-), dichromium tris(chromate), pentazinc chromate octahydroxide, and strontium chromate).

Additionally, the binding occupational limit value (BOELV) for chromium(VI), on the protection of workers from the risks related to exposure to carcinogens or mutagens at work, is set under EU Directive 2004/37/EC.

The use of chromium(VI) has been prohibited by Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles and by Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The Toy Safety Directive 2009/48/EC is considered as the most stringent toy regulation in the globe requiring all toys to access the EU market should meet the requirements hereof. The migration testing of chromium(VI) is an essential part for chemical testing of toys in the EU market. The limit is 0.02 mg/kg in dry, brittle, powder-like or pliable toy material, 0.053 mg/kg in scraped-off toy material and 0.005 mg/kg in liquid or sticky toy material.

The European Directive 94/62/EC on packaging and packaging waste, and the Model Toxics in Packaging Legislation require, that the sum of the concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components shall not exceed 100 ppm by weight.

The Drinking Water Directive (Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerns the quality of water intended for human consumption and sets the limit for total chromium at 50 µg/l. The WHO remarks that the value for chromium remains under review. Ongoing discussions with many toxicologists suggest introducing a lower value for chromium, and in particular for the more toxic chromium(VI). The Commission will therefore apply to chromium the same approach taken for lead. It proposes reducing the value by 50 % to 25 µg/l after a transition period of 10 years after the entry into force of the Directive[13].

REACH has several requirements for substances on the candidate list including notification of its presence in articles if above concentrations of 0.1% (w/w) and if it is present in those articles in quantities totalling over 1 tonne per producer or importer per year (Article 7(2)) and that suppliers must inform their customers on request if an article contains more than 0.1% by weight of substance (Article 33(2)).

[13] https://ec.europa.eu/environment/water/water-drink/pdf/revised_drinking_water_directive.pdf

Information on existing legislations in the European Union relevant for chromium(VI) compounds, is available on ECHA's website under EU Chemicals Legislation Finder (EUCLEF).[14]

B.10. Risk characterisation

Not relevant for this dossier as no uses have been identified where chromium(VI) is present in articles.

C. Available information on alternatives

Not relevant, as no restriction is proposed at present.

D. Justification for action on a Community-wide basis

Not relevant, as no restriction is proposed at present.

E. Justification why the proposed restriction is the most appropriate Community-wide measure

Not relevant, as no restriction is proposed at present.

F. Socio-economic Assessment of Proposed Restriction

Not relevant, as no restriction is proposed at present.

G. Stakeholder consultation

The Annex XV report was subject to a Call for evidence from xxx [2021] to xx xxx [2021] (6 weeks). [To be updated following CfE.]

H. Other information

Not relevant.

[14] https://echa.europa.eu/legislation-finder

References

ECHA (2013) Application for authorisation: establishing a reference dose response relationship for carcinogenicity of hexavalent chromium. Helsinki, 04 December 2013, RAC/27/2013/06Rev.1 (Agreed at RAC-27). Available at: https://echa.europa.eu/documents/10162/13579/rac_carcinogenicity_dose_response_crvi_en.pdf/facc881f-cf3e-40ac-8339-c9d9c1832c32

ECHA (2015) Amendment of the RAC note "Application for Authorisation: Establishing a reference dose-response relationship for carcinogenicity of hexavalent chromium" to include the intrinsic property "Toxic to reproduction" of the Cr(VI) compounds (RAC/27/2013/06 Rev.1), agreed on 4 December 2013 at RAC-27. 35th meeting of the Committee for Risk Assessment 24-27 November, 1-4 December 2015, Helsinki, Finland. Concern. Available at: https://echa.europa.eu/documents/10162/21961120/rac_35_09_1_c_dnel_cr-vi-_en.pdf/8964d39c-d94e-4abc-8c8e-4e2866041fc6

Substance Name	Member State Committee support document for identification as a substance of very high concern (SVHC)	Background document developed in the context of ECHA's second Recommendation for the inclusion of substances in Annex XIV	Applications for authorisation received by ECHA are available at the following links
Acids generated from chromium trioxide and their oligomers. Group containing:	ECHA (2010): https://echa.europa.eu/documents/10162/721a6caa-3e94-5d77-c482-81f45415fe58	ECHA (2011): https://echa.europa.eu/documents/10162/944e18a2-78ef-4056-845a-75431d2ab3c6	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=236-881-5&search_criteria_casnumber=13530-68-2&search_criteria_name=Dichromic+acid
• **Chromic acid**			
• **Dichromic acid**			
• **Oligomers of chromic acid and dichromic acid**			
Chromium trioxide	ECHA (2010): https://echa.europa.eu/documents/10162/6a6af1aa-08e4-579e-0d01-ab26ca140900	ECHA (2011): https://echa.europa.eu/documents/10162/ca724e1d-6d7c-4c61-9473-17dd92ababb0	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=215-607-8&search_criteria_casnumber=1333-82-0&search_criteria_name=Chromium+trioxide
Sodium chromate	ECHA (2010): https://echa.europa.eu/documents/10162/c5d6f8de-bbe1-4b31-b7c4-d8e5b8d65517	ECHA (2011): https://echa.europa.eu/documents/10162/922d6dab-64dd-4d4a-a5af-ba0280ece826	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=231-889-5&search_criteria_casnumber=7775-11-3&search_criteria_name=Sodium+chromate
Potassium dichromate	ECHA (2010): https://echa.europa.eu/documents/10162/3ac167c4-9f8e-4375-92f6-285a2911cee0	ECHA (2011): https://echa.europa.eu/documents/10162/bd262002-6935-41b3-af73-facaf86c11b9	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=231-906-6&search_criteria_casnumber=7778-50-9&search_criteria_name=Potassium+dichromate
Potassium chromate	ECHA (2010): https://echa.europa.eu/documents/10162/e6da86f5-0988-4fb2-9dcf-84087571c5af	ECHA (2011): https://echa.europa.eu/documents/10162/02c71a8d-8fc9-4eda-8551-d82e8bf5725d	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=232-140-5&search_criteria_casnumber=7789-00-6&search_criteria_name=Potassiu

Substance Name	Member State Committee support document for identification as a substance of very high concern (SVHC)	Background document developed in the context of ECHA's second Recommendation for the inclusion of substances in Annex XIV	Applications for authorisation received by ECHA are available at the following links
			m+chromate
Strontium chromate	ECHA (2011): https://echa.europa.eu/documents/10162/b404f6d6-e6a2-412a-8362-542d297fd1bd	ECHA (2012): https://echa.europa.eu/documents/10162/abc0fe7a-ded9-4e17-8c1d-aa2451e5c804	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=232-142-6&search_criteria_casnumber=7789-06-2&search_criteria_name=Strontium+chromate
Ammonium dichromate	ECHA (2010): https://echa.europa.eu/documents/10162/b09ce051-1fe5-425a-bdd0-0f6eb628230b	ECHA (2011): https://echa.europa.eu/documents/10162/ee3db677-c1a2-497c-9ae5-f27dd024001c	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=232-143-1&search_criteria_casnumber=7789-09-5&search_criteria_name=Ammonium+dichromate
Sodium dichromate	ECHA (2008): https://echa.europa.eu/documents/10162/52c64496-821b-4a74-bc1a-d9fc2040b651	ECHA (2011): https://echa.europa.eu/documents/10162/b352a886-530d-4d34-b62e-d5e0069f3b3c	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=234-190-3&search_criteria_casnumber=10588-01-9&search_criteria_name=Sodium+dichromate
Potassium hydroxyl-octaoxodizincate-dichromate(1-)	ECHA (2011): https://echa.europa.eu/documents/10162/fb533ed0-2765-4ad3-acf7-79d9ca8a5b02	ECHA (2012): https://echa.europa.eu/documents/10162/7c084780-5848-4c3a-a9f1-f06e9b97eaca	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=234-329-8&search_criteria_casnumber=11103-86-9&search_criteria_name=Potassium+hydroxyoctaoxodizincatedichromate%281-%29
Dichromium tris(chromate)	ECHA (2011): https://echa.europa.eu/documents/10162/6426d317-2c05-40ba-90ae-0fbd67774f53	ECHA (2012): https://echa.europa.eu/documents/10162/8e2138a9-fd3b-48dc-8763-5893c7184fc2	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=246-356-2&search_criteria_casnumber=24613-89-6&search_criteria_name=Dichromium+tris%28chromate%29
Pentazinc chromate octahydroxide	ECHA (2011): https://echa.europa.eu/documents/10162/ce28c0be-379f-461e-9197-3af36d5c7f53	ECHA (2012): https://echa.europa.eu/documents/10162/321d2646-e065-427e-b0c2-613196891ac2	https://echa.europa.eu/applications-for-authorisation-previous-consultations?diss=true&search_criteria_ecnumber=256-418-0&search_criteria_casnumber=49663-84-5&search_criteria_name=Pentazinc+chromate+octahydroxide