Assessment of regulatory needs

Authority: ECHA

Date: 03/03/2022

Group Name: Zirconium and its simple inorganic compounds

General structure:

Revision history

Version	*Date*	*Description*
1	14/06/2022	

Substances within this group:

Table 1: Substances within the group

EC/List number	CAS number	Substance name	Molecular formula	Registration type (full, OSII or TII, NONS), highest tonnage band among all the registrations (t/y) [1]
215-227-2	1314-23-4	Zirconium dioxide	ZrO_2	Full, > 1000
231-176-9	7440-67-7	Zirconium	Zr	Full, > 1000
231-717-9	7699-43-6	Zirconium dichloride oxide	$ZrOCl_2$	Full, > 1000
231-727-3	7704-99-6	Zirconium dihydride	ZrH_2	Full, not (publicly) available
233-058-2	10026-11-6	Zirconium tetrachloride	$ZrCl_4$	Full, not (publicly) available
234-337-1	11105-03-6	Sodium zirconium oxide sulfate	-	Not registered
234-373-8	11129-15-0	Calcium zirconium oxide	ZrO_2:Ca	Full, > 1000
234-666-0	12021-95-3	Dihydrogen hexafluorozirconate(2-)	H_2ZrF_6	Full, 100-1000
234-847-4	12036-39-4	Strontium zirconium trioxide	$SrZrO_3$	Full, not (publicly) available
235-125-1	12070-14-3	Zirconium carbide	ZrC	Full, not (publicly) available
235-770-9	12688-15-2	Zirconium hydroxide	-	C&L notifications
237-324-9	13746-89-9	Zirconium tetranitrate	$Zr(NO_3)_4$	OSII or TII
237-401-7	13772-29-7	Zirconium bis(hydrogen phosphate)	$Zr(HPO_4)_2$	Full, 1-10
237-519-9	13824-85-6	Zirconium sulphate	$Zr(SO_4)_2$	Not registered
237-529-3	13826-66-9	Zirconium dinitrate oxide	$ZrO(NO_3)_2$	Full, 10-100
238-472-7	14475-63-9	Zirconium tetrahydroxide	$Zr(OH)_4$	C&L notifications
238-694-4	14644-61-2	Zirconium sulphate	$Zr(SO_4)_2$	Full, 100-1000
240-970-4	16919-31-6	Ammonium hexafluorozirconate	$(NH_4)_2ZrF_6$	Full, not (publicly) available
240-985-6	16923-95-8	Dipotassium hexafluorozirconate	K_2ZrF_6	Full, 100-1000
253-113-4	36577-48-7	Zirconium dicarbonate	$Zr(CO_3)_2$	C&L notifications

[1] Note that the total aggregated tonnage band may be available on ECHA's webpage at https://echa.europa.eu/information-on-chemicals/registered-substances

EC/List number	CAS number	Substance name	Molecular formula	Registration type (full, OSII or TII, NONS), highest tonnage band among all the registrations (t/y) [1]
260-633-5	57219-64-4	[μ-[carbonato(2-)-O:O']]dihydroxydioxodizirconium	$Zr_2(CO_3)(OH)_2O_2$	Full, > 1000
263-372-5	62010-10-0	Zirconium oxide sulphate	$Zr_5O_8(SO_4)_2$	Full, not (publicly) available
269-682-7	68309-95-5	Diammonium bis[carbonato-O] dihydroxyzirconate	$(NH_4)_2Zr(CO_3)_2(OH)_2$	Full, > 1000
414-390-9	-	JM2363	-	NONS
677-706-6	14985-18-3	Zirconium dinitrate oxide hydrate	$ZrO(NO_3)_2 \cdot x\ H_2O$	C&L notifications
938-677-8	-	Hydroxido potassium zirconium carbonate, where there are 0, 1 or 2 hydroxide groups and 2, 3 or 4 potassium atoms and 2, 3 or 4 carbonate groups.	-	Full, 100-1000
939-960-9	-	Magnesium zirconium oxide	ZrO_2:Mg	Full, not (publicly) available
947-793-8	-	Reaction mass of trizirconium monoxide and zirconium dioxide	Zr_3O / ZrO_2	Full, not (publicly) available
947-897-3	-	Reaction Mass of zirconium difluoride oxide and fluorozirconic acid	-	Full, not (publicly) available
948-229-3	-	Reaction product of zirconium (IV) dioxide and zirconium (IV) dicarbonate with nitric acid	-	Full, not (publicly) available
950-052-1	-	Zirconium hydroxysulphate	-	Full, not (publicly) available

This table contains also group members that are only notified under the CLP Regulation. However, the list is currently non-exhaustive. Should further regulatory risk management action on one or more substances in the group be considered, ECHA will make an additional search for related C&L notified substances to be included in the group and develop an assessment of regulatory needs for them.

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The author does not accept any liability with regard to the use that may be made of the information contained in this document. Usage of the information remains under the sole responsibility of the user. Statements made or information contained in the document are without prejudice to any further regulatory work that ECHA, the Member States or other regulatory agencies may initiate at a later stage. Assessment of regulatory needs and their conclusions are compiled on the basis of available information and may change in light of newly available information or further assessment.

Foreword

The purpose of the assessment of regulatory needs of a group of substances is to help authorities conclude on the most appropriate way to address the identified concerns for a group of substances or a single substance, i.e. the combination of the regulatory risk management instruments to be used and any intermediate steps, such as data generation, needed to initiate and introduce these regulatory measures.

An assessment of regulatory needs can conclude that regulatory risk management at EU level is required for a (group of) substance(s) (e.g. harmonised classification and labelling, Candidate List inclusion, restriction, other EU legislation) or that no regulatory action is required at EU level. While the assessment is done for a group of substances, the (no) need for regulatory action can be identified for the whole group, a subgroup or for single substance(s).

The assessment of regulatory needs is an important step under ECHA's Integrated Regulatory Strategy. However, it is not part of the formal processes defined in the legislation but aims to support them.

The assessment of regulatory needs can be applied to any group of substances or single substance, i.e., any type of hazards or uses and regardless of the previous regulatory history or lack of such. It can be done based on different level of information. A Member State or ECHA can carry out this case-by-case analysis. The starting point is available information in the REACH registrations and any other REACH and CLP information. However, more extensive set of information can be available, e.g. assessment done under REACH/CLP or other EU legislation, or can be generated in some cases (e.g. further hazard information under dossier evaluation). Uncertainties associated to the level of information used should be reflected in the documentation. It will be revisited when necessary. For example, after further information is generated and the hazard has been clarified or when new insights on uses are available. It can be revisited by the same or another authority.

The responsibility for the content of this assessment rests with the authority that developed it. It is possible that other authorities do not have the same view and may develop further assessment of regulatory needs. The assessment of regulatory needs does not yet initiate any regulatory process but any authority can consequently do so and should indicate this by appropriate means, such as the Registry of Intentions.

For more information on Assessment of regulatory needs please consult ECHA website[2].

[2] https://echa.europa.eu/understanding-assessment-regulatory-needs

Glossary

CCH	Compliance check
CLH	Harmonised classification and labelling
CMR	Carcinogenic, mutagenic and/or toxic to reproduction
DEv	Dossier evaluation
ED	Endocrine disruptor
NONS	Notified new substances
OEL	Occupational exposure limit
OSII or TII	On-site isolated intermediate or transported isolated intermediate
PBT/vPvB	Persistent, bioaccumulative and toxic/very persistent and very bioaccumulative
RMOA	Regulatory management options analysis
RRM	Regulatory risk management
SEv	Substance evaluation
STOT RE	Specific target organ toxicity, repeated exposure
SVHC	Substance of very high concern

1 Overview of the group

ECHA has grouped together simple zirconium containing inorganic substances. The group consists of 23 registered substances, four substances which have been only notified for purposes of classification and labelling, one notified substance (NONS) and two substances which have been only pre-registered. Calcium zirconium oxide (EC 234-373-8) and magnesium zirconium oxide (EC 939-960-9) are included in this group. Other zirconium containing mixed metal oxides will be or have been addressed in the group assessment of the corresponding metal other than zirconium.

Based on information reported in the REACH registration dossiers, zirconium and its simple inorganic compounds have a wide range of uses, including cleaning, lubricants, pharmaceuticals, and intermediates in ceramics, coatings, and laboratory chemicals. For some substances in the group these uses can range from industrial or professional, to consumer and article service life. Therefore, there is a high potential for exposure to human health and the environment from these substances (see section 3 for details).

Via the EU Observatory for nanomaterials, we note that zirconium dioxide (EC 215-227-2) is listed in the Belgian nano inventory. This information is not reflected in the registration dossiers of that substance. Consequently, there is uncertainty whether this substance is manufactured or imported in the European Union as nanoforms. The REACH Regulation (as amended by Commission Regulation (EU) 2018/1881) sets out explicit information requirements for nanoforms of substances. Manufacturers and importers of nanoforms should meet these specific information requirements as of 1 January 2020. However, as the registration dossiers currently submitted on the substance do not cover any nanoforms, the present assessment relates only to non-nanoforms.

Note on the scope of ECHA's assessment of regulatory needs

Regarding hazards, the focus of ECHA's assessment is on CMR (carcinogenic, mutagenic and/or toxic to reproduction), sensitiser, ED (endocrine disruptor), PBT/vPvB or equivalent (e.g. substances being persistent, mobile and toxic), aquatic toxicity hazard endpoints and therefore only those are reflected in the table in section 3. This does not mean that the substances do not have other known or potential hazards. In some specific cases, where ECHA identifies a need for regulatory risk management action at EU level for other hazards (e.g. neurotoxicity, STOT RE), such additional hazards may be addressed in the assessment. An overview of classification is presented in Annex 1.

On the exposure side, ECHA is mainly using the information on uses reported in the registration dossiers (IUCLID) as a proxy for assessing the potential for exposure to humans and releases to the environment. The potential for release / exposure is generally considered high for "widespread" uses, i.e. professional and consumer uses and uses in articles. For these uses, normally happening at many places, the expected level of control is *à priori* considered limited. The chemical safety reports are not necessarily consulted and no quantitative exposure assessment is performed at this stage.

2 Justification for the no need for regulatory risk management action at EU level

Based on currently available information, there is no need for EU regulatory risk management for all substances in the group.

All the substances of the group are inorganic. Therefore, the requirements set out under Annex XIII to REACH (i.e., on the criteria for the identification of persistent, bioaccumulative and toxic (PBT) substances and very persistent and very bioaccumulative (vPvB) substances) do not apply. Nevertheless, it is possible to address their PBT properties. The substances in this group are unlikely to fulfil the PBT/vPvB screening criteria, because they have a low potential for bioaccumulation and are unlikely to fulfil the T criterion.

These conclusions are based on the following considerations:

- Zirconium cannot biodegrade and hence the substances are considered persistent by default in the environment;
- Zirconium from the substances is not expected to bioaccumulate due to the low bioavailability, and hence low uptake of Zirconium in the aquatic, sediment and soil compartments. The dopants that could potentially leach from the 4 doped ZrO2 substances as Mg2+, Ca2+, Sr2+ and Ag+ are not bioaccumulative. Furthermore, the counterions from the water-soluble (WS) substances, i.e. NH4+, Cl-, SO42-, NO3-, CO32-, F- and K+, are not bioaccumulative. In conclusion the substances are likely not (v)B.
- Available acute studies on aquatic organisms do not support classification for acute aquatic toxicity. The dopants that could potentially leach from the doped ZrO2 substances (as Mg2+, Ca2+ and Sr2+) are not toxic to aquatic organisms. Silver-doped zirconium oxide (EC 414-390-9) could potentially release Ag+, which is of high ecotoxicity. However, no acute effects in fish or Daphnia or algal effects were observed at the water-solubility limit. The counterions from the water-soluble substances, i.e. NH4+, Cl-, SO42-, NO3-, CO32-, F- and K+, are not toxic to aquatic organisms. There are no long-term aquatic organism studies in fish and Daphnia.

CCH is proposed on two representative substances to confirm the hypothesis of suspected low aquatic organism toxicity: diammonium bis[carbonato-O]dihydroxyzirconate (EC 269-682-7) as WS and ZrO_2 (EC 215-227-2) as poorly WS.

Based on ECHA's assessment of currently available hazard information, no likely hazards were identified for human health. These conclusions are based on the available studies for repeated dose toxicity, carcinogenicity, mutagenicity and reproductive toxicity (fertility). However, there is no information (data) regarding pre-natal developmental toxicity (PNDT).

Based on currently available data, the substances are also considered unlikely sensitisers, with the exception of ammonium hexafluorozirconate (EC 240-970-4) and zirconium bis(hydrogen phosphate)(EC 237-401-7).

Zirconium is not stable in solution at physiologically relevant pH levels and most of it precipitates. The dissolved zirconium remaining in solution is expected to be complexed and not readily available for uptake. There is no information on a possible absorption through specialized transport systems for Zr ions, but due to its extremely low solubility under the conditions in the gastrointestinal lumen, no significant specific transport is expected for Zr ions. Very low absorption can be expected after oral, inhalation and dermal exposure to both poorly WS and WS zirconium compounds. However, there are remaining uncertainties on the

hypothesis for low potential bioavailability based on physicochemical properties and/or limited data availability that need to be further assessed under CCH.

Based on the available information, an unlikely hazard for human health is expected and thus, currently, there is no need for EU RRM. To confirm this hypothesis, and to clarify the hazard for PNDT, CCH on two substances (a representative WS substance and a representative poorly WS substance) is proposed, i.e. diammonium bis[carbonato-O]dihydroxyzirconate (EC 269-682-7) from the WS group, and ZrO_2 (EC 215-227-2) from the poorly WS group.

Zirconium acetate is a WS compound used as read-across source substance for some of the substances in this group. However, this substance does not belong to this group. Nevertheless, it is a good candidate substance to follow up the intrinsic hazard properties of zirconium ion in a future work on groups of substances with zirconium to assess regulatory needs.

Overall, clarification of the hazard profile is important as many substances in the group have widespread uses with high potential for exposure to professionals and consumers or from articles.

Two substances in the group have known or likely hazards and therefore require a more specific justification for the no need for regulatory risk management:

- Ammonium hexafluorozirconate (EC 240-970-4) and zirconium bis(hydrogen phosphate (EC 237-401-7) are self-classified as skin sensitisers (Skin Sens. 1). However, they are only used at industrial sites or at very low volumes (1-10 t/y). Therefore, sufficient and consistent self-classification by registrants should require adequate risk management measures to be in place according to workplace legislation. Therefore, there is currently no need for EU-wide regulatory risk management.
- Ammonium hexafluorozirconate (EC 240-970-4) is self-classified as STOT RE 1. However, it is only used at industrial sites and at very low volumes (1-10 t/y). Therefore, sufficient and consistent self-classification by registrants should require adequate risk management measures to be in place according to workplace legislation. Therefore, there is currently no need for EU-wide regulatory risk management.

In conclusion, for all substances in the group no need for regulatory risk management action at EU level is currently proposed as they have either unlikely hazard for human health and environment, or where some human health hazard is likely or known, the exposure potential is limited.

3 Conclusions and actions

The conclusions and actions proposed in the table below are based on the REACH and CLP information available at the time of the assessment by ECHA. The main source of information is the registration dossiers. Relevant public assessments may also be considered. When new information (e.g. on hazards through evaluation processes, or on uses) become available, the document will be updated and conclusions and actions revisited

Table 2: Overview of the identified hazards, uses, last foreseen action, and proposed actions

Subgroup name, EC number, substance name	Human Health Hazard	Environmental Hazard	Relevant use(s) & exposure potential	Last foreseen action	Action
EC 215-227-2 Zirconium dioxide	No hazard or unlikely hazard	No hazard or unlikely hazard	Widespread uses with high potential for exposure to professionals and consumers, e.g. in washing and cleaning, ceramics, lubricants, textiles, coatings, adhesives, etc.	**Currently no need for EU RRM** Justification: No hazard or unlikely hazard for environment and human health.	CCH
EC 269-682-7 Diammonium bis[carbonato-O]dihydroxyzirconate	No hazard or unlikely hazard	No hazard or unlikely hazard	Widespread uses with high potential for exposure to professionals and consumers, e.g. paper and board treatment, coatings.	**Currently no need for EU RRM** Justification: No hazard or unlikely hazard for environment and human health.	CCH

EC 240-970-4 Ammonium hexafluoro zirconate	Known or potential hazard for skin sensitisation and STOT RE1	No hazard or unlikely hazard	Only used at industrial sites at low volumes tonnage band (1-10 t/y) in metal surface treatment and coating	**Currently no need for EU RRM** Justification: self-classification followed by implementation of necessary RRMs should be sufficient to ensure safe use at the workplace	No action
EC 237-401-7 Zirconium bis(hydrogen phosphate)	Known or potential hazard for skin sensitisation	No hazard or unlikely hazard	Only used at low volumes tonnage band (1-10 t/y) in pigmented articles with low potential for release and coatings	**Currently no need for EU RRM** Justification: Given the low volume and the adequate self-classification, correct labelling should sufficiently address the concern via the specific legislation	No action
ECs 231-176-9 231-717-9 231-727-3 233-058-2 234-337-1 234-373-8 234-666-0 234-847-4	No hazard or unlikely hazard	No hazard or unlikely hazard	Several substances in the group have widespread uses with high potential for exposure to professionals and consumers, e.g., in washing and cleaning, lubricants, coatings, cosmetics. Other substances are only used at industrial sites in surface treatment or only as intermediates	**Currently no need for EU RRM** Justification: Overall, no or unlikely hazard that would lead to concern for the reported uses	No action

235-125-1 235-770-9 237-324-9 237-519-9 237-529-3 238-472-7 238-694-4 240-985-6 253-113-4 260-633-5 263-372-5 414-390-9 677-706-6 938-677-8 939-960-9 947-793-8 947-897-3 948-229-3 950-052-1			or monomers with limited exposure		

Annex 1: Overview of classifications

Data extracted on 23/11/2021.

Table 3: overview of the classifications for each substance of the group

EC/ List No	CAS No	Substance name	Harmonised classification	Classification in registrations	Classification in C&L notifications (*)
269-682-7	68309-95-5	Diammonium bis[carbonato-O]dihydroxyzirconate			STOT Single Exp. 3 H335, affected organs: respiratory system [1 out of 20] Skin Irrit. 2 H315 [1 out of 20] Eye Irrit. 2 H319 [1 out of 20]
238-694-4	14644-61-2	Zirconium sulphate		Skin Corr. 1B H314 Eye Damage 1 H318	Acute Tox. 4 H302 [3 out of 21] Acute Tox. 4 H332 [1 out of 21] Aquatic Chronic 2 H411 [1 out of 21] Skin Irrit. 2 H315 [6 out of 21] STOT Single Exp. 3 H335, affected organs: respiratory system [1 out of 21] Eye Irrit. 2 H319 [6 out of 21] Skin Corr. 1A H314 [1 out of 21] STOT Single Exp. 3 H335 [7 out of 21] STOT Single Exp. 3 H335, affected organs: respiratory tract [1 out of 21]
260-633-5	57219-64-4	[μ-[carbonato(2-)-O:O']]dihydroxydioxodizirconium			Skin Irrit. 2 H315 [1 out of 29] Eye Irrit. 2 H319 [1 out of 29]
231-727-3	7704-99-6	Zirconium dihydride			Eye Irrit. 2 H319 [1 out of 4] Skin Irrit. 2 H315 [1 out of 4] STOT Single Exp. 3 H335 [1 out of 4]
233-058-2	10026-11-6	Zirconium tetrachloride		Skin Corr. 1B H314	Skin Sens. 1 H317 [1 out of 9] Acute Tox. 4 H312 [2 out of 9 Resp. Sens. 1 H334 [1 out of 9 Eye Damage 1 H318 [1 out of 9 Acute Tox. 4 H302 [3 out of 9] Acute Tox. 4 H332 [2 out of 9] Skin Corr. 1C H314 [2 out of 9]
234-666-0	12021-95-3	Dihydrogen hexafluorozirconate (2-)		Acute Tox. 3 H301 Acute Tox. 3 H311 Acute Tox. 3 H331 Skin Corr. 1B H314	Acute Tox. 4 H312 [1 out of 14] Acute Tox. 4 H302 [2 out of 14]

EC/ List No	CAS No	Substance name	Harmonised classification	Classification in registrations	Classification in C&L notifications (*)
234-847-4	12036-39-4	Strontium zirconium trioxide		Eye Irrit. 2 H319	
234-373-8	11129-15-0	Calcium zirconium oxide			
231-717-9	7699-43-6	Zirconium dichloride oxide		Skin Corr. 1B H314 Eye Damage 1 H318	Aquatic Chronic 3 H412 [1 out of 26] Acute Tox. 4 H302 [2 out of 26] Skin Corr. 1A H314 [1 out of 26] STOT Single Exp. 3 H335, affected organs: respiratory system [1 out of 26]
215-227-2	1314-23-4	Zirconium dioxide			Skin Irrit. 2 H315 [12 out of 149] STOT Single Exp. 3 H335 [4 out of 149] STOT Single Exp. 3 H335, affected organs: lungs [1 out of 149] STOT Rep. Exp. 2 H373, affected organs: liver [1 out of 149] STOT Single Exp. 3 H335, affected organs: Respiratory system [1 out of 149] STOT Single Exp. 3 H335, affected organs: organ [1 out of 149] STOT Single Exp. 3 H335, affected organs: respiratory system [2 out of 149] Eye Irrit. 2 H319 [13 out of 149]
939-960-9		Magnesium zirconium oxide			
240-970-4	16919-31-6	Ammonium hexafluorozirconate		Acute Tox. 3 H301 Skin Irrit. 2 H315 Eye Damage 1 H318 Skin Sens. 1 H317 STOT Rep. Exp. 1 H372, affected organs: bones, teeth Aquatic Chronic 3 H412	Eye Irrit. 2 H319 [8 out of 12] STOT Single Exp. 3 H335 [4 out of 12] Acute Tox. 3 H331 [4 out of 12] Acute Tox. 3 H311 [4 out of 12] Skin Corr. 1B H314 [4 out of 12] STOT Single Exp. 3 H335, affected organs: respiratory tract [2 out of 12]
950-052-1	-	Zirconium hydroxysulphate		Skin Corr. 1 H314 Eye Damage 1 H318	
947-897-3	-	Reaction Mass of zirconium difluoride		Met. Corr. 1 H290 Acute Tox. 3 H301 Acute Tox. 3 H311	

EC/ List No	CAS No	Substance name	Harmonised classification	Classification in registrations	Classification in C&L notifications (*)
		oxide and fluorozirconic acid		Acute Tox. 3 H331 Skin Corr. 1A H314 Eye Damage 1 H318 Aquatic Chronic 3 H412	
238-472-7	14475-63-9	Zirconium tetrahydroxide			STOT Single Exp. 3 H335 [1 out of 3] Skin Irrit. 2 H315 [3 out of 3] Eye Irrit. 2 H319 [3 out of 3] STOT Single Exp. 3 H335, affected organs: respiratory system [2 out of 3]
240-985-6	16923-95-8	Dipotassium hexafluorozirconate		Acute Tox. 3 H301 Eye Damage 1 H318	Acute Tox. 2 H300 [1 out of 29] STOT Single Exp. 3 H335 [1 out of 29] Skin Irrit. 2 H315 [1 out of 29] Acute Tox. 3 H311 [2 out of 29] Aquatic Chronic 3 H412 [14 out of 29] Eye Irrit. 2 H319 [1 out of 29] Acute Tox. 3 H331 [3 out of 29] Skin Corr. 1B H314 [1 out of 29]
237-324-9	13746-89-9	Zirconium tetranitrate			Eye Damage 1 H318 [4 out of 7] Skin Corr. 1B H314 [2 out of 7]
235-125-1	12070-14-3	Zirconium carbide			Acute Tox. 4 H312 [2 out of 5] Acute Tox. 4 H332 [2 out of 5] Acute Tox. 4 H302 [2 out of 5]
237-529-3	13826-66-9	Zirconium dinitrate oxide		Acute Tox. 4 H302 Skin Corr. 1B H314 Eye Damage 1 H318	Skin Irrit. 2 H315 [1 out of 19] Aquatic Chronic 3 H412 [1 out of 19] Skin Corr. 1A H314 [2 out of 19] Eye Irrit. 2 H319 [1 out of 19]
231-176-9	7440-67-7	Zirconium			Skin Corr. 1B H314 [1 out of 86]
253-113-4	36577-48-7	Zirconium dicarbonate			
938-677-8		Hydroxido potassium zirconium carbonate, where there are 0, 1 or 2 hydroxide groups and 2, 3 or 4 potassium atoms			

EC/ List No	CAS No	Substance name	Harmonised classification	Classification in registrations	Classification in C&L notifications (*)
		and 2, 3 or 4 carbonate groups.			
235-770-9	12688-15-2	Zirconium hydroxide			
947-793-8		Reaction mass of trizirconium monoxide and zirconium dioxide			
237-401-7	13772-29-7	Zirconium bis(hydrogen phosphate)		Skin Sens. 1 H317	
677-706-6	14985-18-3	Zirconium dinitrate oxide hydrate			Skin Corr. 1B H314 [2 out of 3]
263-372-5	62010-10-0	Zirconium oxide sulphate			
948-229-3		Reaction product of zirconium (IV) dioxide and zirconium (IV) dicarbonate with nitric acid		Skin Corr. 1 H314 Eye Damage 1 H318 Aquatic Chronic 2 H411	

(*) the number in brackets indicates the number of notifications received. Each notification can represent a group of notifiers, therefore the number may differ from the C&L inventory which displays number of notifiers.

Annex 2: Overview of uses based on information available in registration dossiers (01/11/2021)

Table 4: overview of the main types of applications for each substance within the group

Main types of applications structured by product or article types	EC 237-401-7	EC 215-227-2	EC 240-985-6	EC 234-373-8	EC 939-960-9	EC 238-694-4	EC 231-176-9	EC 269-682-7	EC 938-677-8
PC 1: Adhesives, sealants		F, I, P, C						I	
PC 11: Explosives		I					I		
PC 12: Fertilisers		I, P, C							
PC 13: Fuels		I							
PC 14: Metal surface treatment products		F, I, P, C	I	I, P	I, P	F, I, P	I		
PC 15: Non-metal-surface treatment products		F, I, P, C		I, P	I, P	F, I, P	I		
PC 16: Heat transfer fluids		I, P, C		I, P					
PC 17: Hydraulic fluids		I, P, C							
PC 18: Ink and toners	F, I, P, C	F, I, P, C		I, P		F			
PC 19: Intermediate		F, I, P	I	I, P	I, P	F, I, P			

PC 2: Adsorbents	**I**	**F, I, P**					**F, I**		
PC 20: Products such as ph-regulators, flocculants, precipitants,		**F, I, P**				**F, I, P**		**I**	
PC 21: Laboratory chemicals	**F, I**	**F, I, P, C**	**I, P**			**F, P**	**I**		
PC 23: Leather treatment products		**I**				**F, I, P**			
PC 24: Lubricants, greases, release products		**I, P, C**							
PC 25: Metal working fluids		**I, P, C**							
PC 26: Paper and board treatment products		**I, P**						**F, I, C, A**	**F, I, A**
PC 27: Plant protection products		**I**							
PC 28: Perfumes, fragrances		**I, C**							
PC 29: Pharmaceuticals	**I,**	**I, P, C**							
PC 3: Air care products		**I**							
PC 30: Photo-chemicals		**I**							
PC 31: Polishes and wax blends		**I, P, C, A**							
PC 32: Polymer preparations and compounds	**F, I, C, A**	**F, I, P, C**				**F, I, P**	**A**		
PC 33: Semiconductors		**F, I, P**		**F, I, P**	**I, P**		**I**		
PC 34: Textile dyes, and impregnating products		**I, P, C**	**I, P, A**			**F, I, P**		**F, I**	

PC 35: Washing and cleaning products		**F, I, P, C**	**I, P**	**F**	**F**				
PC 36: Water softeners		**I**							
PC 37: Water treatment chemicals	**I**	**I**							
PC 38: Welding and soldering products, flux products		**F, I, P, C**		**I, P**			**I**		
PC 39: Cosmetics, personal care products		**I, C, A**							
PC 4: Anti-freeze and de-icing products		**I**							
PC 40: Extraction agents		**I**							
PC 7: Base metals and alloys		**F, I, P, C**	**I**	**I, P**	**I, P**		**F, I, P, C, A**		
PC 8: Biocidal products (e.g. disinfectants, pest control)		**I, P, C**							
PC 9a: Coatings and paints, thinners, paint removes	**F, I, P, C**	**F, I, P, C, A**		**I, P**	**I, P**	**F, I, P**	**I**	**F, I, A**	**I**
PC 9b: Fillers, putties, plasters, modelling clay		**F, I, P, C**		**I, P**	**I, P**				
PC 9c: Finger paint		**F, I, P, C**		**I, P**	**I, P**				
PC42: Electrolytes for batteries	**I**								

F: formulation, I: industrial use, P: professional use, C: consumer use, A: article service life; P, C and A are highlighted in red to indicate widespread use with potential for exposure/release

Main types of applications structured by product or article types	EC 947-897-3	EC 234-666-0	EC 950-052-1	EC 948-229-3	EC 240-970-4	EC 237-529-3	EC 947-793-8
PC 1: Adhesives, sealants			F, I				
PC 12: Fertilisers	I						
PC 14: Metal surface treatment products	F, I	F, I	F, I	I	F, I	F, I	
PC 15: Non-metal-surface treatment products			F	I			I
PC 17: Hydraulic fluids						I	
PC 19: Intermediate	I	I	I	I		I	
PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents			F	F, I	F, I		
PC 21: Laboratory chemicals	I	I, P	F, I				I
PC 23: Leather treatment products			F, I				
PC 25: Metal working fluids					F, I		
PC 31: Polishes and wax blends			F				
PC 33: Semiconductors							I

PC 34: Textile dyes, and impregnating products	**I**						
PC 35: Washing and cleaning products					**F, I**		
PC 37: Water treatment chemicals			**F**	**I**			
PC 8: Biocidal products (e.g. disinfectants, pest control)							
PC 9a: Coatings and paints, thinners, paint removes			**F, I**	**I**	**F, I**	**F, I**	
PC41: Oil and gas exploration or production products						**I**	

F: formulation, I: industrial use.

Main types of applications structured by product or article types	EC 233-058-2	EC 263-372-5	EC 234-847-4	EC 260-633-5	EC 231-717-9
PC 15: Non-metal-surface treatment products					**I**
PC 17: Hydraulic fluids					**I**
PC 19: Intermediate	**I**	**F, I**	**F, I**	**F, I**	**F, I**
PC 20: Products such as ph-regulators, flocculants, precipitants, neutralisation agents					**I**
PC 21: Laboratory chemicals		**F, I**	**I**	**F, I,**	**F, I**
PC 23: Leather treatment products					**I**
PC 26: Paper and board treatment products					**I**
PC 7: Base metals and alloys	**I**				
PC 9a: Coatings and paints, thinners, paint removes				**F, I**	**I**
PC 9b: Fillers, putties, plasters, modelling clay				**F, I**	
PC41: Oil and gas exploration or production products					**I**

F: formulation, I: industrial use.

Annex 3: Overview of completed or ongoing regulatory risk management activities

Data extracted on 23/11/2021.

Table 5: overview of the regulatory risk management activities (completed or ongoing) for the substances within the group

EC/List number	RMOA	Authorisation		Restriction*	CLH	Actions not under REACH/ CLP
		Candidate list	Annex XIV	Annex XVII	Annex VI (CLP)	
269-682-7				Restriction 65		
240-970-4				Restriction 65		

*Some of the broad restriction entries in the Annex XVII of REACH are not represented in the overview, e.g. when the scope of the restriction is defined by its classification or the substance identification is broad (e.g. entries 3, 28-30 and 40).

There are no relevant completed or ongoing regulatory risk management activities for the remaining substances.