



ID Card

Residues, precious metal refining cementation and reduction

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Notes:

- This ID card is used to support the substance sameness discussions and to describe the substance/group to the best of the members' knowledge.
- It also aims at grouping communications relevant to the request of available data or information and the registration strategy
- It is the responsibility of each individual registrant to identify their substance and to report company-specific identity in their Registration Dossier (section 1 of IUCLID).

DISCLAIMER

The proper identification and characterisation of a substance or intermediate is the responsibility of each registering legal entity.

All data and information contained in this document shall be treated by the receiving party (i) in full confidence with the adequate respect of any confidential and/or proprietary nature of such information and (ii) only in the framework of the purpose of agreeing on substance sameness, Lead Registrant and overall REACH Strategy for the concerned Substance under REACH (the 'Purpose').

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1. Identification of the group

Table 1. Identification of the group

| | Original (in EC inventory) |
|---------------------------|---|
| Name | Residues, precious metal refining cementation |
| EC number | 310-051-3 |
| CAS number | 102110-50-9 |
| Description | The residues obtained by the addition of aluminum or zinc to end liquors obtained from secondary refining of gold, iridium, osmium, palladium, platinum, rhenium, ruthenium, or silver. Composed primarily of the precious metals, ammonium chloride and chlorides of aluminum, magnesium, and zinc. |
| * EPMF Description | Residues, precious metal refining cementation and reduction Dry and wet residues recovered through cementation and/or reduction with a reducing agent (such as aluminium, copper, iron, zinc or organic agents) of precious metal refining streams before release to waste water treatment operations. Residues include cements and polishing sludges which generally contain precious metals, metal oxides, and metal chlorides in varying concentrations. |
| Composition type | UVCB |

* The description has been further detailed by EPMF in the registration dossier IUCLID Reference substance record (Description field) and in the CSR.

2. Synonyms and other identifiers of the group

- (Silver) Cements

3. Substances (with core identifiers) also falling under this group (with justification)

Although cements resulting from other metals refining processes (e.g.: Cement copper – 266-964-1; 67711-88-0) may be very similar to precious metals cements, they are not listed here as they are covered by other consortia and must hence, not be registered using the same information or in the same Registration Dossier.

4. Boundary composition of the substance

Table 2. Typical composition

| Element | Typical concentration (%) | Minimum concentration (%) | Maximum concentration (%) | Species |
|-----------|---------------------------|---------------------------|---------------------------|--------------------------------|
| Silver | 15.47 | 0.00 | 90.00 | Metallic |
| Gold | 2.06 | 0.00 | 16.00 | Metallic |
| Iridium | 1.84 | 0.00 | 9.90 | Metallic |
| Palladium | 10.41 | 0.00 | 70.00 | Metallic |
| Platinum | 6.98 | 0.00 | 80.00 | Metallic |
| Rhenium | 0.19 | 0.00 | 1.60 | Metallic |
| Rhodium | 3.27 | 0.00 | 20.00 | Metallic |
| Ruthenium | 7.81 | 0.00 | 40.00 | Metallic |
| Aluminium | 0.22 | 0.00 | 1.00 | Al ₂ O ₃ |
| Antimony | 0.80 | 0.00 | 4.40 | |
| Arsenic | 0.14 | 0.00 | 10.00 | |
| Bismuth | 0.81 | 0.00 | 5.20 | Metallic - alloy |
| Calcium | 0.80 | 0.00 | 6.53 | |
| Carbon | 0.10 | 0.00 | 0.70 | |
| Chlorine | 2.18 | 0.00 | 10.00 | assumed compounds |
| Chromium | 0.19 | 0.00 | 1.90 | Cr ₂ O ₃ |
| Cobalt | 0.07 | 0.00 | 0.50 | |
| Copper | 11.15 | 0.00 | 67.70 | Metallic and compounds |
| Iron | 1.49 | 0.00 | 8.10 | oxide and metallic |
| Lead | 0.46 | 0.00 | 10.00 | compounds |
| Magnesium | 0.26 | 0.00 | 0.87 | |
| Manganese | 0.05 | 0.00 | 0.20 | |
| Nickel | 0.42 | 0.00 | 4.29 | |
| Nitrogen | 0.03 | 0.00 | 0.40 | |



| Oxygen | 0.71 | 0.00 | 10.00 | |
|---|---------------------------|---------------------------|---------------------------|---|
| Phosphorus | 0.18 | 0.00 | 1.00 | |
| Potassium | 0.44 | 0.00 | 3.00 | |
| Selenium | 13.76 | 0.00 | 90.00 | compounds |
| Silicon | 0.66 | 0.00 | 15.00 | SiO ₂ |
| Sodium | 0.80 | 0.00 | 5.00 | |
| Sulfur | 0.95 | 0.00 | 9.79 | Sulfides, sulphates |
| Tellurium | 4.58 | 0.00 | 37.00 | compounds |
| Titanium | 0.07 | 0.00 | 4.50 | |
| Zinc | 0.05 | 0.00 | 1.00 | |
| Elemental composition total: 89.4% | | | | |
| Species | Typical concentration (%) | Minimum concentration (%) | Maximum concentration (%) | |
| PM - present in various (inter)metallic and alloy compounds | 70.00 | 0.10 | 90.00 | PM - present in various (inter)metallic and alloy compounds |
| Mineralogical composition total: 70.0% | | | | |

Species were determined based on mineralogical analysis (by means of XRD analysis) and/or information available to registrants.

The composition given above represents the usual elemental/compound content available to the Members of the EPMF by July 2023. This usual content represents the majority of the Residues, precious metal refining cementation and reduction that is placed on the EEA market.

In a UVCB substance, the number of constituents is relatively large and/or; the composition is, to a significant part, unknown and/or; the variability of composition is relatively large or poorly predictable. Hence, concentration ranges outside the ones given above do not exclude sameness and are usually referred to as unusual or exceptional situations. Each potential registrant is responsible for performing its own composition analysis.

5. Substance identity profile (SIP) of the substance

| | | | | | | |
|---|--|--|----------------------------------|-------------------|--|------------------|
| Substance Name Residues, precious metal refining cementation and reduction | | Substance Information Page http://echa.europa.eu/brief-profile/-/briefprofile/100.099.980 | | | Legend Decisive substance sameness criterion Indicative substance sameness criterion No substance sameness criterion | |
| Substance description: Dry and wet residues recovered through cementation and/or reduction with a reducing agent (such as aluminium, copper, iron, zinc or organic agents) of precious metal refining streams before release to waste water treatment operations. Residues include cements and polishing sludges which generally contain precious metals, metal oxides, and metal chlorides in varying concentrations. | | | | | | |
| Substance Identity | | Sameness criteria | | | Indication of variability (fixed, low or high variation) | |
| EC/list name: | | Residues, precious metal refining cementation | | | SMILES: not applicable | |
| IUPAC name: | | | | | InChI: not applicable | |
| Other names: | | Cements | | | Type of substance: UVCB | |
| EC/List no.: | | 310-051-3 | | | origin: Inorganic | |
| CAS no.: | | 102110-50-9 | | | | |
| Molecular formula: | | not applicable | | | Substance listed | |
| Sources (input materials) | | Primary and secondary sources and recycled plant intermediates, containing dissolved and/or suspended precious metals - PM containing spent reaction residues from hydro-metallurgical refining steps (e.g. mothers liquors from PM compound manufacturing, PM bearing leaching solutions, plating bath) | | | medium variability | |
| Process | | Cementation and reduction, using various agents depending on content of the sources. Targeted creation of a metal in its elemental/metallic state from a dissolved and/or suspended species by the addition of a reduction agent (e.g. a more electropositive metal = cementation; reductants like hydrazine, formic acid etc. = reduction; enforced by an electric current = electrodeposition, electrowinning). Since metals are not (physically) soluble in aqueous media, they form a metallic precipitate that is collected as an intermediate. | | | medium variability | |
| Elemental composition | | Core | min (%w/w) | max (%w/w) | Typical (%w/w) | |
| | | PM | 0.1 | 90.0 | 48.0 | high variability |
| | | Ag + Au | 0.0 | 90.0 | 17.5 | |
| | | PGM | 0.0 | 90.0 | 30.5 | |
| | | Copper | 0.0 | 67.7 | 11.2 | high variability |
| | | Selenium | 0.0 | 90.0 | 13.8 | high variability |
| | | Tellurium | 0.0 | 37.0 | 4.6 | high variability |
| | | Sum= | | | 125.6 | |
| Mineralogical composition | | PM - present in various (inter)metallic and alloy compounds | 0.1 | 90.0 | 70.0 | high variability |
| | | Sum= | | | 70.0 | |
| Physical characteristics | | physical state (at 20°C, 1013 hPa) | grey-black or brown solid powder | | | fixed |
| Conclusion | | Residues, precious metal refining cementation and reduction are <u>metallic precipitates</u> recovered through <u>cementation, reduction and electrowinning</u> by adding a reduction agent to <u>sources containing dissolved and/or suspended precious metals</u> . The resulting residues include cements and polishing sludges which generally contain <u>precious metals, metal oxides, and metal chlorides</u> in varying concentrations. | | | | |

The substance identity profile (SIP) outlines the main substance identifier/qualifiers relevant for substance identity. It reports sameness information on physical state (solid, liquid, gas), physical form (massive, powder), source, process descriptions and composition. Parameters are given a color code depicting importance for substance sameness. Dark green for decisive/fixed/low variability identity criteria, light green for indicative parameters that support the substance identity but are less well defined and/or characterized by medium variability, and white for parameters not relevant for substance identity.

6. Information on appearance, physical state and properties of the substance

Table 3. Appearance / physical state / properties of the substance

| | |
|-----------------------|-----------------------|
| Physical state | Solid |
| Appearance | Grey-black or brown |
| Particle size* | Fine to coarse powder |

* Nanoform: particles in the size range 1 - 100 nm (for full definition of a nanomaterial, see <http://ec.europa.eu/environment/chemicals/nanotech/index.htm#definition>). Fine powder: particles in the size range 100 – 2.500 nm. Coarse powder: particles in the size range 2.500 nm – 1 mm. Massive object: particles in the size range > 1 mm.

7. Analytical data

Annex VI of REACH requires the registrant to describe the analytical methods and/or to provide the bibliographical references for the methods used for identification of the substance and, where appropriate, for the identification of impurities and additives. This information should be sufficient to allow the methods to be reproduced.

In addition to analytical data, all registrants should use expert judgment and process knowledge to characterize their substance.

Table 4. Analytical methods for identification of the substance

| Parameter / Method | Recommended for substance identification and sameness check | Applicable | Not applicable or not recommended |
|---|---|------------|-----------------------------------|
| Elemental analysis | | | |
| ICP (ICP-MS or ICP-OES) | X | | |
| Atomic absorption spectroscopy (AAS) | | | |
| Glow discharge mass spectrometry (GDMS) | | | |
| Molecular analysis | | | |
| Infrared (IR) spectroscopy | | | |
| Raman spectroscopy | | | |
| Mineralogical analysis | | | |
| X-Ray Fluorescence (XRF) | | | |
| X-Ray Diffraction (XRD) | X | | |
| Morphology and particle sizing | | | |
| Optical microscopy and electron microscopy (SEM, TEM, REM)* # | X | | |
| Laser diffraction* # | X | | |
| Particle size by other means (e.g. sieve analysis)# | | | |
| Surface area by N-BET* # | | | |
| Other | | | |



| | | | |
|---|--|---|--|
| Magnetite analyser | | X | |
| S/C analyzer | | X | |
| Separation technique: ion exchange chromatography | | X | |

* Analytical techniques particularly (but not exclusively) relevant for nanomaterials.

The choice of the technique for particle size depends on the size of the material as manufactured/imported/placed on the market/used.

8. Lead Registrant

Heraeus (Germany) is the Lead Registrant for this intermediate. The European Precious Metals Federation (EPMF) will provide support to the Lead Registrant as laid down in the EPMF Agreement.

9. Scope of the Registration Dossier

All UVCB precious metal Refinables have only uses as an intermediate. Moreover, UVCB exposure scenarios are developed on a company / site-specific basis.