ID Card
Iridium

Version 4 July 2023

Notes:

- *This ID card is used to support the substance sameness discussions and to describe the substance to the best members' knowledge.*
- *It also aims at grouping communications relevant to the request of available data or information, the approval of the Lead Registrant 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).*

1. Identification of the substance

Table 1. Identification of the substance

	Original (in EC inventory)
Name	Iridium
EC number	231-095-9
CAS number	7439-88-5
Description	Not available
Composition type	Mono-constituent substance

2. Synonyms and other identifiers of the substance

Table 2. Synonyms and other identifiers of the substance

IUPAC name	Iridium(3+)
CAS name	
Abbreviations	
Other commercial, brand or international names	Iridium black
Other identity codes	

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

None

4. Information related to molecular and structural formula of the substance

Table 3. Information related to molecular and structural formula of the substance

Molecular formula	Ir
Structural formula	Ir
Smiles notation	[Ir]
Optical activity	Not applicable
Typical ratio of (stereo) isomers	Not applicable
Molecular Weight / Molecular Weight range	192,22 g/mol

5. Typical composition of the substance

Iridium can be placed on the market in fine and coarse powders, and massive forms. All forms of iridium will be addressed in the same Registration Dossier.

Table 4. Typical composition

	Name	Symbol / Formula	Min & Max concentrations (%)	Typical concentration (%)
Main constituent(s)*	Iridium	Ir	98 - 100	≥ 99
Impurities#	Several minor (especially metallic) impurities which do not affect the classification of the substance because of their non-hazardous nature or because they do not exceed the classification cut-off limits in the substance	e.g. Ag, Au, Ca, Cu, Fe, Na, Ni, Os, Pd, Pt, Rh, Ru, …	0 - 2	≤ 1

* ≥ 80 % (w/w) for mono-constituent substances; ≥ 10 % (w/w) and < 80 % (w/w) for multi-constituent substances.

An impurity is an unintended constituent present in a substance, as produced. It may originate from the starting materials or be the result of secondary or incomplete reactions during the production process. While impurities are present in the final substance, they were not intentionally added.

The composition given above is typical and should therefore represent the majority of Iridium as manufactured and/or imported in the EEA market.

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

Table 5. Appearance / physical state / properties of the solid substance

Physical state	Solid
Physical form*	Crystalline
Appearance	Silvery-white metal; cubic (CRC Handbook)
Particle size**	Fine powder / Coarse powder / Massive object
Does the solid hydrolyse?#	No
Is the solid hygroscopic?§	No

* Crystalline form: solid material whose constituent atoms, molecules, or ions are arranged in an ordered pattern extending in all three spatial dimensions. Amorphous form: solid material whose constituent atoms, molecules, or ions are randomly arranged.

** Nanoform: particles in the size range 1 - 100 nm (for definition of a nanomaterial, see http://ec.europa.eu/environment/chemicals/nanotech/faq/definition_en.htm). 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.

Hydrolysis: decomposition (cleavage of chemical bonds) by the addition of water.

§ Hygroscopic substance: readily attracts moisture from its surroundings in open air, through either absorption or adsorption. Cf. also water/moisture content in Table 4.

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.

Table 6. 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			X
Raman spectroscopy			X
Mineralogical analysis			
X-Ray Fluorescence (XRF)			
X-Ray Diffraction (XRD)	X		

Morphology and particle sizing			
Electron microscopy (SEM, TEM, REM)* #			
Laser diffraction* #	X		
Particle size by other means (e.g. sieve analysis)#			
Surface area by N-BET* #	X		
Other			

* 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 Iridium. The EPMF will provide support to the Lead Registrant as laid down in the EPMF Agreement.

9. Scope of the Registration Dossier

The uses included in this Registration Dossier are listed on the EPMF website

10. Analytical reference information

Below the results of XRD analysis of a reference sample used for testing.

X-ray diffraction data was determined using the following instrument parameters:

Diffractometer:	Bruker AXS D8 fitted with the option of 90 position sample changer (reflection mode) or capillary stage (transmission mode).
Radiation:	Cu $K\alpha$ (λ = 1.5406 + 1.54439 Å)
Primary Optics:	Göbel Mirror
Scan Range:	10 to 130 ° 2θ, 0.022 ° step size
Scan Mode:	θ/θ coupled
Tube voltage, Current:	40 kV, 40 mA
Detector:	Lynxeye PSD
Temperature:	**Ambient**
Phase ID:	**Software:** Bruker AXS Diffrac Plus, Eva V18 (1996-2012), Bruker AXS Diffrac Eva V2.1 (2010-2012) **Databases:** PDF-4+, Release 2014, COD (REV30738 2011.11.2)
Calculation of Lattice Parameters and Crystallite Sizes:	**Software:** Bruker-AXS Topas 4.2 (1999-2009) **Rietveld analysis:** powder diffraction pattern fitting using full structural models including atomic positions. Crystallite sizes calculated using LVol-IB method. **Pawley analysis:** powder diffraction pattern fitting using unit cell only models. Reflection intensities assigned as required. **Calculated errors:** (reported in brackets) for crystallite size (nm) and lattice parameter data (Å) are attached to the last significant figure. For example, 3.9189(3) Å is 3.9189±0.0003 Å and 29(3) nm is 29±3 nm.
Sample preparation:	Powdered samples, typically <50µm particle size were packed in flat plate sample holders or borosilicate glass capillaries depending on the mode of measurement. The hazards associated with the sample(s) reported were checked prior to data collection.

Phase Identification

Figure 1 shows the diffraction patterns from the submitted sample in black along with the literature reflection positions from:

- Iridium metal, (PDF: 04-001-0409) in red

From this it can be seen that all of the observed scattering can be assigned to crystalline cubic phase matching iridium metal.

Rietveld Refinements

Fitting the observed scattering using a full structural model for iridium metal gave the refined lattice parameter and calculated crystallite size in **table 1:**

Table 1:

Sample	*a* / Å	C.S. / nm
011362	3.839736(7)	~100
04-001-0409	3.839	---

From this it would appear that the sample is pure crystalline iridium metal.

Figure 1:
011362