ID Card
Palladium dinitrate

Version 18 July 2023

Notes:

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

	Proposed by EPMF	Original (in EC inventory)
Name	Palladium dinitrate	Palladium dinitrate
EC number	233-265-8	233-265-8
CAS number	10102-05-3	10102-05-3
Description	Palladium dinitrate is produced by the dissolution of palladium metal or palladium (II) hydroxide/hydrated oxide in nitric acid. The resulting product will contain Palladium nitrate, nitrato species and nitrito species. Because the exact proportions of any nitrato, nitrito and aqua ligands are variable, this 'palladium (II) nitrate' substance has been declared as a UVCB.[1]	Not available
Composition type	UVCB	

[1] See also paper 'The chemistry of palladium, platinum and rhodium 'nitrates'' by D. Boyd, 10 September 2013

2. Synonyms and other identifiers of the substance

Table 2. Synonyms and other identifiers of the substance

IUPAC name	Palladium (2+) dinitrate
CAS name	Nitric acid, palladium(2+) salt (2:1)
Abbreviations	None
Other commercial or international names	Palladium nitrate Palladous nitrate Hydrogen tetranitropalladate (II) Nitric acid, Palladium(2+) salt Palladium(II) nitrate Palladium(II) nitrate solution Palladium(II) nitrate dihydrate
Other identity codes	None

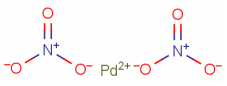
3. Substances (with core identifiers) also falling under this substance (with justification)

Table 3. Substances also falling under this substance

Name	EC number	CAS number	Justification
Palladium(II) nitrate monohydrate		207596-32-5, 313222-87-6, 82279-70-7	According to Annex V(6) of the REACH Regulation, hydrates of a substance are exempted from Registration provided that the anhydrous form has been registered by the manufacturer or importer using this exemption.
Palladium(II) nitrate dihydrate		32916-07-7	

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

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

Name	Palladium(2+) dinitrate
Molecular formula	N2O6Pd (anhydrous basis)
Structural formula	
Smiles notation	[Pd+2].[O-][N+]([O-])=O.[O-][N+]([O-])=O
Optical activity	Not available
Typical ratio of (stereo) isomers	Not available
Molecular Weight / Molecular Weight range	230,43 g/mol (anhydrous basis)

5. Usual composition of the substance

The composition given below represents the usual composition available to the Members of the Consortium by the date given above on the document. This usual content represents the majority of the Palladium dinitrate 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 below do not exclude sameness and are usually referred to as unusual or exceptional situations. Each potential registrant is responsible for performing its own analysis.

Table 5. Usual constituents

Name	Symbol / Formula	Min & Max concentrations (%)	Typical concentration (%)
Palladium dinitrate (including nitrato and nitrito species)	N2O6Pd.xH2O	94.0 – 99.5#	≥ 98.9
Chloride	Cl	0 - 1	≤ 0.2
Nitric acid	HNO3	0 – 1	≤ 0.1
Nitrous acid	HNO2	0 – 0.5	≤ 0.1
Water (residual damp)	H2O	0 - 3	≤ 0.5
Several minor (especially metallic) constituents 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, Cu, Ir, Pt, Rh, Ru	0 – 0.5	≤ 0.2

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

** ≥ 1 % (or lower if contributing to the hazard). 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. An additive is a substance that has been intentionally added to stabilise the substance.

Corresponds to 38 – 42 % Pd.

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

Table 6. Appearance / physical state / properties of the solid substance

Physical state	Solid
Physical form*	Crystalline
Appearance	Brown crystals, damp powder
Particle size**	Fine to coarse powder
Does the solid hydrolyse?#	No
Is the solid hygroscopic?§	Yes

* 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 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.

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

§ Hygroscopic substance: readily attracts water from its surroundings, through either absorption or adsorption.

Table 7. Appearance / physical state / properties of the substance in solution

Physical state	Solution
Solvent	Water / HNO2 / HNO3
Concentration range of substance in solution	6 – 50 %
pH (range) of the solution	< 1
Excess acid	1 - 10 % HNO2 1 - 40 % HNO3

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 8. 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			
Mineralogical analysis			
X-Ray Fluorescence (XRF)		X	
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 Deutschland GmbH & Co. KG (Germany) volunteers to be the Lead Registrant for Palladium dinitrate. 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 IR (solid) and Raman (solution) analysis of a reference sample used for testing.

IR analysis (solid)

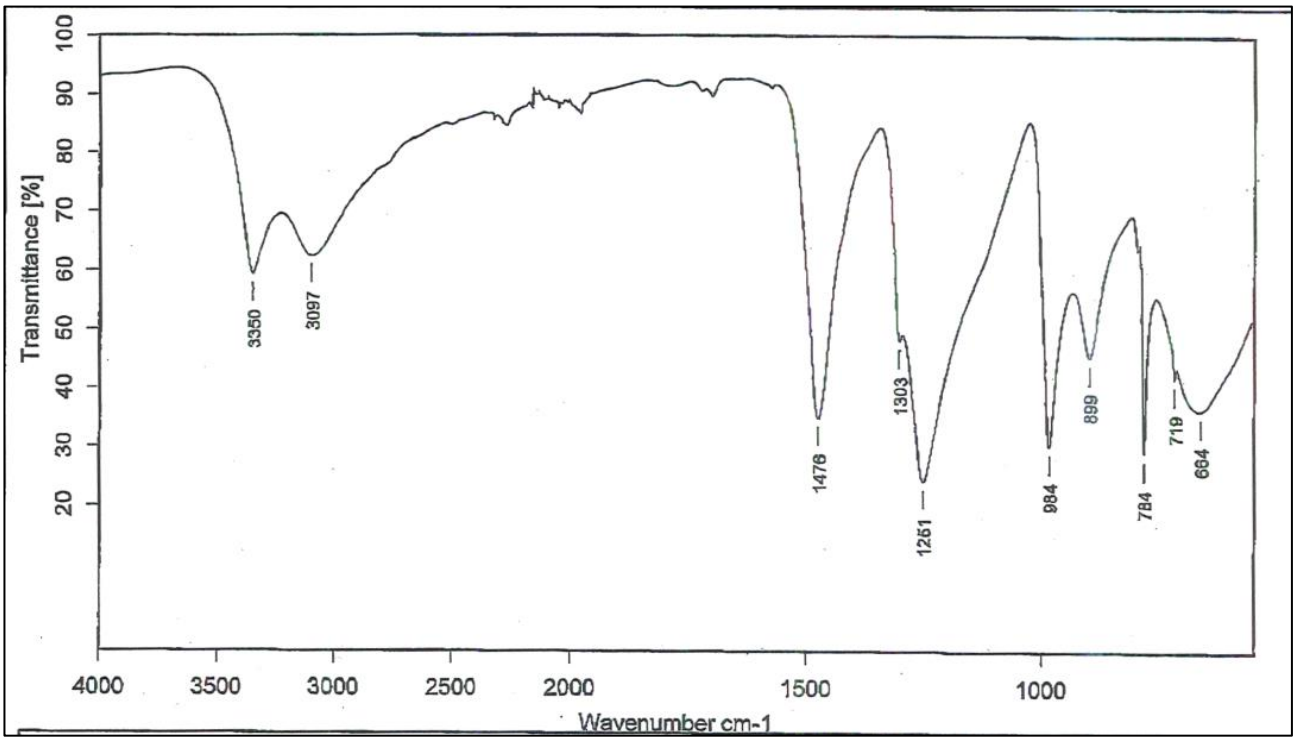


Figure 1. IR spectrum of Palladium dinitrate hydrate

Raman analysis (solution)

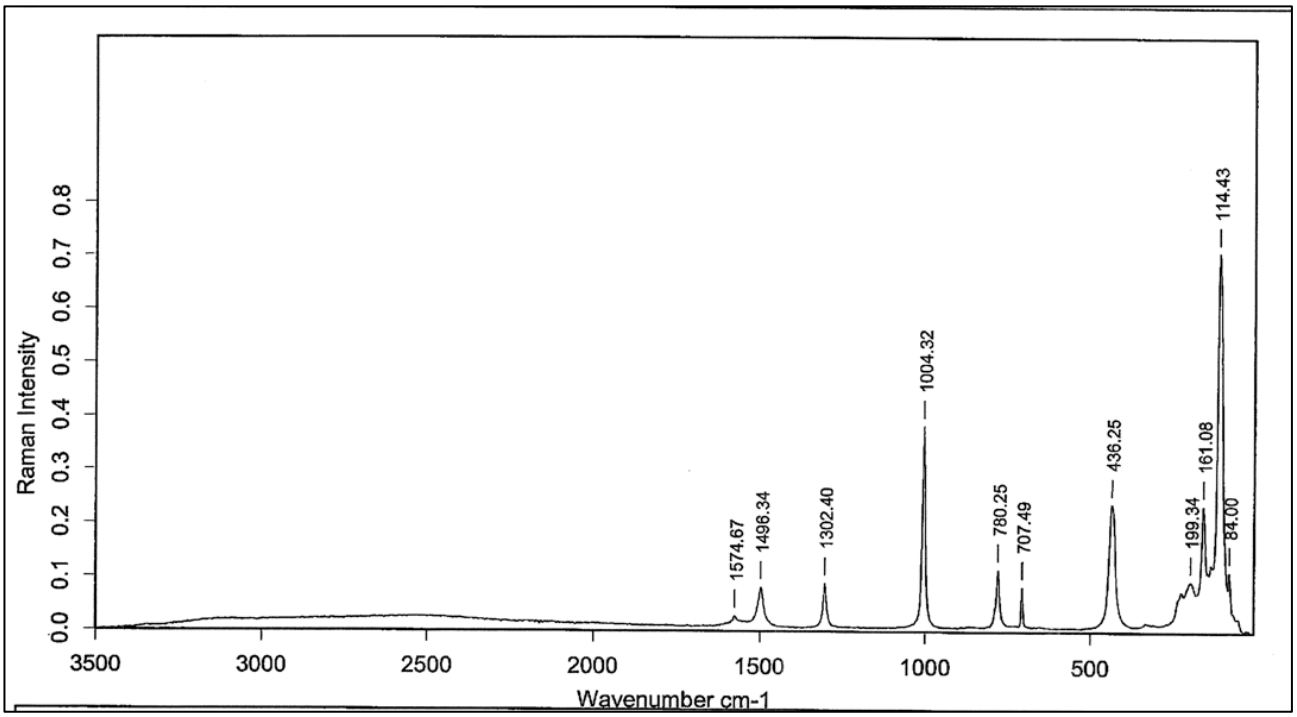


Figure 1. Raman spectrum of Palladium dinitrate solution