



PAGE 1 of 6	<p style="text-align: center;">PLATINUM METALS REFINERY</p> 
REVISION N ^o : 10	WORK PROCEDURE TASK: SAFETY DATA SHEET - PALLADIUM
	SECTION: VAULTS
	DOCUMENT N ^o : PMR-MSDS-PALLADIUM

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PAGE 2 of 6	PLATINUM METALS REFINERY	
REVISION N ^o .: 10	WORK PROCEDURE TASK:	SAFETY DATA SHEET - PALLADIUM
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SAFETY DATA SHEET

PRODUCT NAME: PALLADIUM POWDER

1. PRODUCT AND COMPANY IDENTIFICATION
<p>Identification of the preparation: Product name: Palladium powder Product code: PD METAL Chemical name: Palladium Formula: Pd Recommended uses: Manufacture of Palladium chemicals for use in catalysts, as metal and/or in alloys for jewelry, dental alloys, electrical contacts Company Identification: Impala Platinum Limited – Refineries Corner East Geduld Road & Cowles Street P O Box 222, Springs 1560, South Africa Tel.: +27 (0)11 360 3111, Fax: +27 (0)11 360 3202 www.implats.co.za *jamie.welman@implats.co.za Emergency telephone no.: Impala Platinum Refineries +27 (0)11 360 3777 Poison Centre - Tygerberg Hospital, Belville, Cape +27 (0)21 931 6129</p>

2. HAZARD IDENTIFICATION
<p>Low toxicity</p> <p>WARNING</p> <div style="text-align: right;">  </div> <p>Harmful - if swallowed, - in contact with skin, - if inhaled The product may cause adverse health effects with high-level dust generation, inhalation or prolonged skin contact. May form palladium salts on contact with acids.</p> <p>Additional Labeling: Each container should be labeled as follows: Before use read Safety Data Sheet If dissolved, ensure adequate enclosure or ventilation; do not breathe mists and avoid solution contact with eyes, skin and clothing – may cause sensitisation or allergic reaction If melted do not breathe furnace fume</p>

Page 3 of 6	Doc No: SDS-PD	IMPALA PLATINUM
REVISION: 10		SAFETY DATA SHEET - PALLADIUM

3. COMPOSITION / INFORMATION ON INGREDIENTS

Major components:	Typical wt %:	CAS #: 7440-05-3
Palladium	99.95-99.99%	EINECS Number: 231-115-6

4. FIRST AID MEASURES

Inhalation: If over exposure occurs leave exposure area immediately. If other than minor symptoms are displayed seek immediate medical attention
Ingestion: If poisoning occurs, contact a Doctor or Poisons Information Centre on +27-21-931-6129. Do not induce vomiting. Give a glass of water to drink. Seek urgent medical attention.
Skin: Gently flush affected areas with soap and water. Seek medical attention if irritation develops.
Eyes: Flush gently with running water for at least 15 minutes. Seek medical attention if irritation develops.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: does not burn
Extinguishing media not be used: not applicable
Special exposure hazards: none
Special protective equipment for fire-fighters: none
NOTE: Unlike some finely divided Palladium powder supplied by other companies, the material supplied by Impala Platinum is non-flammable and therefore DOES NOT present a fire hazard.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: If spilt (bulk) wear goggles and PVC or rubber gloves. Where a dust inhalation hazard exists (i.e. when used in large quantities) wear a Class P1 (particulate) respirator.
Environmental precautions: Prevent this material from entering into surface waters.
Methods for cleaning-up: SOLID – sweep up and place in sealed container. SOLUTION - Absorb with moist sand or similar and place in sealed containers for reprocessing or recovery.

7. HANDLING AND STORAGE

Handling: Avoid inhalation of dust or fumes. Avoid contact with skin or eyes. Use local ventilation which is adequate to limit exposure to levels not exceeding occupational exposure limits. Activities generating dust should be avoided.
Storage: Store in tightly sealed containers in a cool, dry and well-ventilated area removed from formic acid, sodium borohydride, active metals (e.g. Aluminium), hydrogen peroxide, ignition sources and foodstuffs. Ensure containers are adequately labeled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limit: (ACGIH, edition 2008)
TLV-TWA: 10mg/m³ (inhalable particles); 3mg/m³ (respirable particles) based on “particulates not otherwise classified”
Respiratory protection: Use an appropriate and approved respirator for toxic dust or fume if airborne concentration is likely to exceed the occupational exposure limits.
Hand protection: Wear suitable gloves (PVC or rubber)
Eye protection: Wear dust-proof goggles.
Skin protection: Safety shoes, overalls or similar full-body work clothes should be worn and laundered daily. This protective clothing should not be worn at home.
Personal Hygiene: Practice good housekeeping and personal hygiene procedures. No eating, drinking or smoking in work area. Wash hands thoroughly before eating, drinking or smoking. Avoid ingestion, inhalation and skin and eye contact. Medical examinations, monitoring, record keeping and hygiene facilities are recommended.

Page 4 of 6	Doc No: SDS-PD	IMPALA PLATINUM
REVISION: 10		SAFETY DATA SHEET - PALLADIUM

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Pale gray metallic lumps
Odour: Odourless
pH: not applicable
Boiling point / boiling range: 2963°C; 5365°F
Melting point / melting range: 1555°C; 2831°F
Flash point: not applicable
Flammability (solid, gas): non-flammable solid
Autoflammability: not applicable
Explosive properties: finely divided dust (also known as ultra-fine dust) may form explosive mixture with air
Oxidizing properties: not applicable
Vapour pressure: unknown
Tapped density: 2.9 – 3.6 (variable) g/cm³
Solubility : - **hydrosolubility:** insoluble in water
liposolubility (solvent-oil): insoluble in solvent-oil
Partition coefficient (n-octanol/water): not applicable

10. STABILITY AND REACTIVITY

The material is stable under normal circumstances
Conditions to avoid: Exposure to high temperatures (>1000°C), generation of dust.
Materials to avoid: Contact with acids and strong oxidizing agents
Hazardous decomposition products: Nil

11. TOXICOLOGICAL INFORMATION

11.1 ACUTE TOXICITY

Ingestion: Palladium powder is **non-toxic**. May cause irritation of the gastro-intestinal tract. Palladium **salts** may be more toxic e.g. Palladium Chloride LD₅₀ 2704mg/kg Rat, oral (other salts LD₅₀ 5 – 170mg/kg Rat)

11.2 SKIN CORROSION / IRRITATION

Low-irritant: Palladium metal is relatively inert. Prolonged and repeated exposure to dust/power may result in irritation due to mechanical action. Possible sensitizer.

11.3 SERIOUS EYE DAMAGE / IRRITATION

Irritant: Exposure may result in eye irritation, lachrymation, pain, redness, conjunctivitis and possible corneal burn with prolonged contact.

11.4 RESPIRATORY OR SKIN SENSITISATION

Non-irritant: Palladium metal is unlikely to cause irritation except as a dust. Palladium **salts** are irritating to eyes, skin and mucous membranes and may cause sensitization.

11.5 GERM CELL MUTAGENICITY

The effects of Palladium **salts** have not been fully investigated.

11.6 CARCINOGENICITY

Non-carcinogenic: Palladium **salts** are listed as a non-carcinogenic in (all U.S.):

- i) in the National Toxicity Program (NTP) Report on Carcinogens
- ii) in the International Agency for Research on Cancer (IARC) monographs
- iii) by the Occupational Safety and Health Administration (OSHA)

Palladium chloride has caused tumours in some animal studies.

Page 5 of 6	Doc No: SDS-PD	IMPALA PLATINUM
REVISION: 10		SAFETY DATA SHEET - PALLADIUM

11.7 REPRODUCTIVE TOXICITY

Animal experiments indicate that exposure to Palladium **salts** may result in production of abnormal foetuses. Pregnant women should avoid therefore contact with Palladium **salts**. However, the effects have not been fully investigated.

11.8 SPECIFIC TARGET ORGAN SYSTEMIC TOXICITY – Single exposure

Palladium **salts** have caused bone marrow, liver and kidney damage in experimental animals. They may also interfere with the use of energy in nerves and muscles and induce lung malfunctions. However, the effects have not been fully investigated.

11.9 SPECIFIC TARGET ORGAN SYSTEMIC TOXICITY – Repeated exposure

Palladium **salts** have caused bone marrow, liver and kidney damage in experimental animals. They may also interfere with the use of energy in nerves and muscles and induce lung malfunctions. However, the effects have not been fully investigated.

11.10 ASPIRATION HAZARD

Inhalation : Low irritant. Inhalation of dusts may result in upper respiratory tract irritation. Palladium metal poses a low hazard but palladium **salts** are potential irritants and sensitisers.

12. ECOLOGICAL INFORMATION

Due to the very low solubility of Palladium powder it does not directly pose any ecological threat. However, if converted to soluble Palladium salts it may have the following effects:

12.1 Accumulation:

- **Persistence:** hazard of palladium persistency in the environment
- **Bioaccumulation potential:** hazard of palladium accumulation
- **Biomagnification:** potential hazard of palladium magnification
- **Biodegradability:** no information available

12.2 Ecotoxicity:

- **Aquatic organisms: Very toxic** to aquatic organisms. May cause long term adverse effects in the aquatic environment.

LC₅₀ Fish 24h; 7mg/l EC₅₀ Algae 24h; 0.03mg/l

EC₅₀ Algae 72h 0.02mg/l LC₅₀ Worm 24h; 0.24mg/l

- **Soil organisms:** unknown
- **Plants and terrestrial animals:** unknown

12.3 Other adverse effects:

- **Ozone depletion potential:** does not contain ozone depleting substances
- **Photochemical ozone creation potential:** not applicable
- **Global warming potential:** not applicable
- **Effects on waste water treatment plants:** unknown

The environmental effects of Palladium and its compounds have not been fully evaluated.

13. DISPOSAL CONSIDERATIONS

Disposer must comply with state and local laws. This material can be metallurgically recycled by Impala Platinum, South Africa, which is a pre-authorized facility for the environmentally sound recovery of metals.

14. TRANSPORT INFORMATION

NOT REGULATED FOR TRANSPORT PURPOSES

Packing : in plastic bags sealed in tins which in turn are sealed in boxes

UN-Nr.: not applicable

IMDG-Code: not applicable

ICAO / IATA : not applicable

RID / ADR : not applicable

Page 6 of 6	Doc No: SDS-PD	IMPALA PLATINUM
REVISION: 10		SAFETY DATA SHEET - PALLADIUM

15. REGULATORY INFORMATION

United States: CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated
 Canada: WHMIS Classification: D2B (toxic material)
 EU/EC Classification: X_n (Harmful); not classified in Annex I of Directive 67/548/EEC (will change with implementation of GHS/REACH)

16. OTHER INFORMATION :

Hazard Information References :

- 16.1 RTECS : Registry of toxic effects of Chemical Substances, NIOSH, edition January 1999
- 16.2 Sax's Dangerous Properties of Industrial Materials (8th edition), R J Lewis Sr.
- 16.3 Material Safety Data Sheet: Palladium Standard solution National Institute of Standards and Technology (USA) June 2006
- 16.4 Screening of Platinum Group Metals; Pt, Rh, Pd SWECO VIAK Screening Report 2007:2 (For Swedish Environmental Protection Agency)
- 16.5 ECOTOX database; <http://cfpub.epa.gov/ecotox>
- 16.6 ENVIRONMENTAL HEALTH CRITERIA 125 Palladium WHO: <http://www.who.int/ipcs/publications/ehc/en/ehc226.pdf>

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