

PALLADIUM CHLORIDE

GHS Safety Data Sheet

Version No:3

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

PALLADIUM CHLORIDE

OTHER NAMES

Cl₂-Pd, PdCl₂, "palladium(2+) chloride", NCI-C60184, "palladous chloride"

PRODUCT USE

Photography; in the preparation of images for transfer to porcelain; toning solutions; electroplating parts for clocks and watches; in the manufacture of indelible inks; in the preparation of palladium as a catalyst. PdCl₂ paper for detecting carbon monoxide in gas-pipe leaks. Reduced in solution by hydrogen or CO to produce the metal.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,

248, WORLI,

MUMBAI- 400030.INDIA.

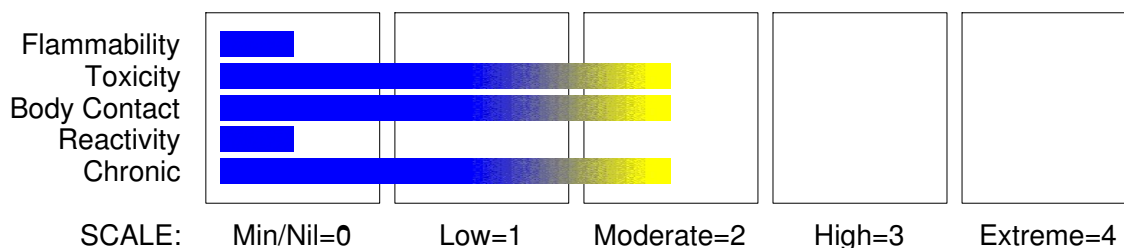
technical@sdfine.com

Telephone: 91- 22- 24959898

Telephone: 91- 22- 24959899

Fax: 91- 22- 24937232

HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Oral) Category 5
 Skin Corrosion/Irritation Category 3
 Skin Sensitizer Category 1

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Section 2 - HAZARDS IDENTIFICATION



EMERGENCY OVERVIEW

HAZARD

WARNING

Determined by using GHS criteria:

H303 H316 H317

May be harmful if swallowed

Causes mild skin irritation

May cause allergic skin reaction

PRECAUTIONARY STATEMENTS

Prevention

Avoid breathing dust/fume/gas/mist/vapours/spray.

Contaminated clothing should not be allowed out of the workplace.

Response

Wash contaminated clothing before reuse.

If skin irritation occurs, seek medical advice/attention.

If skin irritation or rash occurs, seek medical advice/attention.

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

IF ON SKIN: Gently wash with plenty of soap and water.

Specific treatment: refer to Label or MSDS.

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
palladium chloride	7647-10-1	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

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Section 4 - FIRST AID MEASURES

EYE

If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

- Non combustible.
 - Not considered a significant fire risk, however containers may burn.
- Decomposition may produce toxic fumes of: hydrogen chloride, metal oxides.
May emit poisonous fumes.
May emit corrosive fumes.

FIRE INCOMPATIBILITY

None known.

Personal Protective Equipment

Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set 30 mins.

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Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable labelled container for waste disposal.

MAJOR SPILLS

Moderate hazard.

- CAUTION: Advise personnel in area.
- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.
- Recover product wherever possible.
- IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
- ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise Emergency Services.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

palladium chloride 500 mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

palladium chloride 3 mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:

palladium chloride 0.4 mg/m³

The threshold concentration below which most people will experience no appreciable risk of health effects:

palladium chloride 0.15 mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	$\geq 0.1\%$	Toxic (T)	$\geq 3.0\%$
R50	$\geq 0.25\%$	Corrosive (C)	$\geq 5.0\%$
R51	$\geq 2.5\%$		
else	$\geq 10\%$		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+ + + + + +

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Section 6 - ACCIDENTAL RELEASE MEASURES

+: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE INCOMPATIBILITY

Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidiser. It ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition. The state of subdivision may affect the results.

STORAGE REQUIREMENTS

Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- palladium chloride: CAS:7647- 10- 1

MATERIAL DATA

These "dusts" have little adverse effect on the lungs and do not produce toxic effects or organic disease. Although there is no dust which does not evoke some cellular response at sufficiently high concentrations, the cellular response caused by P.N.O.C.s has the following characteristics:

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- the architecture of the air spaces remain intact,
- scar tissue (collagen) is not synthesised to any degree,
- tissue reaction is potentially reversible.

Extensive concentrations of P.N.O.C.s may:

- seriously reduce visibility,
- cause unpleasant deposits in the eyes, ears and nasal passages,
- contribute to skin or mucous membrane injury by chemical or mechanical action, per se, or by the rigorous skin cleansing procedures necessary for their removal. [ACGIH]

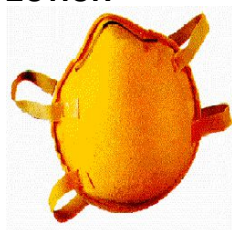
This limit does not apply:

- to brief exposures to higher concentrations
- nor does it apply to those substances that may cause physiological impairment at lower concentrations but for which a TLV has as yet to be determined.

This exposure standard applies to particles which

- are insoluble or poorly soluble* in water or, preferably, in aqueous lung fluid (if data is available) and
- have a low toxicity (i.e.. are not cytotoxic, genotoxic, or otherwise chemically reactive with lung tissue, and do not emit ionizing radiation, cause immune sensitization, or cause toxic effects other than by inflammation or by a mechanism of lung overload).

PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

Suitability and durability of glove type is dependent on usage. Factors such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity,

are important in the selection of gloves.

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocarbon
- polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

NOTE: The material may produce skin sensitisation in predisposed individuals. Care must

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	P1 Air- line*	- -	PAPR- P1 -
50 x ES	Air- line**	P2	PAPR- P2
100 x ES	-	P3	-
		Air- line*	-
100+ x ES	-	Air- line**	PAPR- P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.

· If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered.

Such protection might consist of:

- (a): particle dust respirators, if necessary, combined with an absorption cartridge;
- (b): filter respirators with absorption cartridge or canister of the right type;
- (c): fresh-air hoods or masks.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:
direct spray, spray painting in shallow booths,
drum filling, conveyer loading, crusher dusts,
gas discharge (active generation into zone of
rapid air motion)
grinding, abrasive blasting, tumbling, high
speed wheel generated dusts (released at high
initial velocity into zone of very high rapid
air motion).

Air Speed:
1- 2.5 m/s (200- 500 f/min.)

2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

1: Room air currents minimal or favourable to capture

2: Contaminants of low toxicity or of nuisance value only.

3: Intermittent, low production.

4: Large hood or large air mass in motion

Upper end of the range

1: Disturbing room air currents

2: Contaminants of high toxicity

3: High production, heavy use

4: Small hood- local control only

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Reddish-brown crystalline powder; mixes with water, alcohol, acetone.

PHYSICAL PROPERTIES

Solid.

Mixes with water.

Molecular Weight: 177.3

Melting Range (°C): 678- 688

Solubility in water (g/L): Miscible

pH (1% solution): Not available

Volatile Component (%vol): Negligible

Relative Vapour Density (air=1): >1

Lower Explosive Limit (%): Not applicable

Autoignition Temp (°C): Not applicable

State: Divided solid

Boiling Range (°C): Not available

Specific Gravity (water=1): 4.0

pH (as supplied): Not applicable

Vapour Pressure (kPa): Negligible

Evaporation Rate: Not applicable

Flash Point (°C): Not applicable

Upper Explosive Limit (%): Not applicable

Decomposition Temp (°C): Not applicable

Viscosity: Not Applicable

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Accidental ingestion of the material may be damaging to the health of the individual. Signs of acute toxicity of several palladium salts in rats or rabbits included death, decrease in feed and water uptake, emaciation, cases of ataxia and tiptoe gait, clonic and tonic convulsions, cardiovascular effects, peritonitis or biochemical changes (e.g. changes in activity of hepatic enzymes, proteinuria or ketonuria). Functional or histological changes in the kidneys were found with both palladium compounds and elemental palladium powder. There were also haemorrhages of the lungs and small intestines. The magnitude of the toxic effect often depends on the route of

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PALLADIUM CHLORIDE

Section 11 - TOXICOLOGICAL INFORMATION

administration with the oral route generally producing lower toxicity. Clinical effects recorded in rodents and rabbits after short-term exposure to various palladium compounds include sluggishness, weight loss, haematoma or exudations. Colloidal palladium ($\text{Pd}(\text{OH})_2$) is reported to increase body temperature, produce discolouration and necrosis at the site of injection, decrease body-weight and cause slight haemolysis.

EYE

Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

SKIN

The material may produce mild skin irritation; limited evidence or practical experience suggests, that the material either:

- produces mild inflammation of the skin in a substantial number of individuals following direct contact, and/or
- produces significant, but mild, inflammation when applied to the healthy intact skin of animals (for up to four hours), such inflammation being present twenty-four hours or more after the end of the exposure period.

Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (non allergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.

Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.

Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS

On the basis, primarily, of animal experiments, concern has been expressed by at least one classification body that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.

Long term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

There exists limited evidence that shows that skin contact with the material is capable either of inducing a sensitisation reaction in a significant number of individuals, and/or of producing positive response in experimental animals.

Several case studies report skin disorders in patients exposed to palladium-containing jewellery or unspecified sources. Serial patch tests with palladium(II) chloride indicated a high frequency of palladium sensitivity in special groups under study.

Several recent and large-sized studies from different countries found frequencies of palladium sensitivity of 7-8% in patients of dermatology clinics as well as in school-children with a preponderance in females and younger persons. Compared with other allergens, palladium belongs to the seven most frequently reacting sensitizers (ranked

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Section 11 - TOXICOLOGICAL INFORMATION

second after nickel within metals). Solitary palladium reactions (monoallergy) occurred with a low frequency. Mostly, combined reactions with other metals (multisensitivity), primarily nickel, have been observed.

A review article (without details) reported on a frequent occurrence of allergic diseases of the respiratory passages, dermatoses and affections of the eyes among Russian production workers exposed to palladium. A small number of palladium-exposed workers show positive reactions to a complex palladium halide salt in sensitization tests (skin prick test; radioallergosorbent test; monkey passive cutaneous anaphylaxis test). Some workers (4/130) of an automobile catalyst plant had positive reactions in prick tests with palladium(II) chloride.

Mice given palladium(II) chloride (5 mg palladium/ litre) in drinking water from weanling to natural death showed suppression of body weight, a longer life span (in males, but not in females), and an increase in amyloidosis of several inner organs.

In a single study where palladium chloride was introduced into the drinking water of mice (5 ppm) over a lifetime, a minimally significant increase in malignant tumours was recorded. These were of the lymphoma-leukemia type and adenocarcinoma of the lung. The increased longevity of males, concomitant with palladium administration, may partly explain the increased tumour rate.

Palladium compounds may interact with isolated DNA in vitro. Mutagenicity tests, however, with bacterial and mammalian cells in vitro generally give negative results.

There is insufficient data of the reproductive and developmental effects of palladium and its compounds. In one screening study, reduced testis weights were reported in mice receiving 30 daily subcutaneous doses of palladium(II) chloride at a dose equal to 3.5 mg/kg body weight.

Environmental Health Criteria 226: Palladium: IPCS Series, WHO: 2002.

TOXICITY AND IRRITATION

TOXICITY

Oral (rat) LD50: 2704 mg/kg

Intraperitoneal (rat) LD50: 70 mg/kg

Intravenous (rat) LD50: 3 mg/kg

Intraperitoneal (mouse) LD50: 174 mg/kg

IRRITATION

Skin (rabbit): 100 mg/24h - Mild

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

Convulsions, lung tumors, leukaemia, paternal effects recorded.

Carcinogenic by RTECS criteria.

Section 12 - ECOLOGICAL INFORMATION

DO NOT discharge into sewer or waterways.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

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Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN, IATA,
IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS

palladium chloride (CAS: 7647-10-1) is found on the following regulatory lists;
OECD Representative List of High Production Volume (HPV) Chemicals
WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have
not been established

Section 16 - OTHER INFORMATION

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

Issue Date: 9-Jun-2018