

Palladium 10% on Carbon (wetted with ca. 55% Water)

sc-296011



The Power to Question

Material Safety Data Sheet

Hazard Alert Code Key: **EXTREME** **HIGH** **MODERATE** **LOW**

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

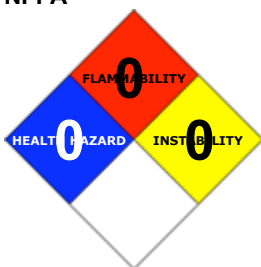
PRODUCT NAME

Palladium 10% on Carbon (wetted with ca. 55% Water)

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and Canada:
877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE

Laboratory material; in alloys for electrical relays and switches, catalyst for reforming cracked petroleum fractions and hydrogenation.
Catalyst

SYNONYMS

Pd

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Harmful to aquatic organisms.

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POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ The material has NOT been classified as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, unintentional ingestion is not thought to be cause for concern.

■ Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastrointestinal tract.

■ Colloidal palladium is reported to increase body temperature, producediscoloration and tissue death at the site of injection, decreasebody-weight and cause some destruction of blood cells.

EYE

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

■ Contact with the eye, by metal dusts, may produce mechanical abrasion or foreign body penetration of the eyeball.

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

■ 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 respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

■ Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.

■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

■ The inhalation of small particles of metal oxide results in sudden thirst, a sweet, metallic our foul taste, throat irritation, cough, dry mucous membranes, tiredness and general unwellness. Headache, nausea and vomiting, fever or chills, restlessness, sweating, diarrhea, excessive urination and prostration may also occur. After exposure is removed, recovery occurs within 24-36 hours.

CHRONIC HEALTH EFFECTS

■ There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.

Metallic dusts generated by the industrial process give rise to a number of potential health problems. The larger particles, above 5 micron, are nose and throat irritants. Smaller particles however, may cause lung deterioration. Particles of less than 1.5 micron can be trapped in the lungs and, dependent on the nature of the particle, may give rise to further serious health consequences.

There is a weak association between palladium chloride and tumor productionon the basis of a single study.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

	Min		Max
Flammability:	0		
Toxicity:	2		Min/Nil=0 Low=1 Moderate=2
Body Contact:	0		High=3
Reactivity:	2		Extreme=4

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Chronic: 2

NAME	CAS RN	%
palladium	7440-05-3	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Center or a doctor.

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.
 - DO NOT attempt to remove particles attached to or embedded in eye .
 - Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.
 - Seek urgent medical assistance, or transport to hospital.

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.
 - Lay patient down. Keep warm and rested.
 - Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
 - Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
 - Transport to hospital, or doctor.

NOTES TO PHYSICIAN

- Treat symptomatically.
Copper, magnesium, aluminum, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, galvanizing or smelting operations all give rise to thermally produced particulates of smaller dimension than might be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce "metal fume fever" in workers from an acute or long term exposure.
 - Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
 - Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
 - Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
 - The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
 - Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology].

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Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not applicable
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	12.0
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA

■ Metal dust fires need to be smothered with sand, inert dry powders.

DO NOT USE WATER, CO₂ or FOAM.

- Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- Chemical reaction with CO₂ may produce flammable and explosive methane.
- If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.
- DO NOT use halogenated fire extinguishing agents.

FIRE FIGHTING

-
- Alert Emergency Responders 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 course.
- 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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

-
- Metal powders, while generally regarded as non-combustible, may burn when metal is finely divided and energy input is high.
- May react explosively with water.
- May be ignited by friction, heat, sparks or flame.
- Metal dust fires are slow moving but intense and difficult to extinguish.
- Will burn with intense heat.
- DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.
- Containers may explode on heating.
- Dusts or fumes may form explosive mixtures with air.
- May REIGNITE after fire is extinguished.
- Gases generated in fire may be poisonous, corrosive or irritating.
- DO NOT use water or foam as generation of explosive hydrogen may result.

Decomposition may produce toxic fumes of: metal oxides.

May emit poisonous fumes.

May emit corrosive fumes.

FIRE INCOMPATIBILITY

- - Reacts with acids producing flammable / explosive hydrogen (H₂) gas
- None known.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

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Section 6 - ACCIDENTAL RELEASE MEASURES

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 Responders 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.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGLE) (in ppm)

AEGLE 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGLE 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGLE 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

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.

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- 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.

RECOMMENDED STORAGE METHODS

- CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release Heavy gauge metal packages / Heavy gauge metal drums.
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



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

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z3)	palladium (Inert or Nuisance Dust: (d) Total dust)		10						*
US OSHA Permissible Exposure Levels (PELs) - Table Z3	palladium (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	palladium (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	palladium (Particulates not other wise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	palladium (Particulates not other wise regulated - Respirable fraction)		5						

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US - Oregon Permissible Exposure Limits (Z3)	palladium (Inert or Nuisance Dust: (d) Respirable fraction)		5		*
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	palladium (Particulates Not Otherwise Classified (PNOC))		10		
Canada - Prince Edward Island Occupational Exposure Limits	palladium (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)		3		See Appendix B current TLV/BEI Book
US ACGIH Threshold Limit Values (TLV)	palladium (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10		See Appendix B current TLV/BEI Book
Canada - British Columbia Occupational Exposure Limits	palladium (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		10 (N)		
US ACGIH Threshold Limit Values (TLV)	palladium (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)		3		See Appendix B current TLV/BEI Book
US - Washington Permissible exposure limits of air contaminants	palladium (Particulates not otherwise regulated - Respirable fraction)		5	10	
US - Washington Permissible exposure limits of air contaminants	palladium (Particulates not otherwise regulated - Total particulate)		10	20	
Canada - Nova Scotia Occupational Exposure Limits	palladium (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10		See Appendix B current TLV/BEI Book
Canada - Prince Edward Island Occupational Exposure Limits	palladium (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10		See Appendix B current TLV/BEI Book
Canada - Nova Scotia Occupational Exposure Limits	palladium (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)		3		See Appendix B current TLV/BEI Book
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	palladium (Particulates not otherwise regulated Respirable fraction)		5		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	palladium (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5		
US - Michigan Exposure Limits for Air Contaminants	palladium (Particulates not otherwise regulated, Respirable dust)		5		

MATERIAL DATA

PALLADIUM:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace. At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational

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exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

PERSONAL PROTECTION



Consult your EHS staff for recommendations

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

HANDS/FEET

NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

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

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- Protective gloves eg. Leather gloves or gloves with Leather facing

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride

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

OTHER

- Overalls.
 - P.V.C. apron.
 - Barrier cream.
 - Skin cleansing cream.
 - Eye wash unit.
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information,

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exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).

- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

RESPIRATOR

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

* - Negative pressure demand ** - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

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

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

■ Metal dusts must be collected at the source of generation as they are potentially explosive.

- Vacuum cleaners, of flame-proof design, should be used to minimize dust accumulation.
- Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimizes the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminum, zinc, magnesium or titanium.
- Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.
- Wet scrubbers are preferable to dry dust collectors.
- Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.
- Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted state.
- Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 meter/sec.

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: Air Speed:

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welding, brazing fumes (released at relatively low velocity into moderately still air) 0.5-1.0 m/s (100-200 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

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 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters 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

PHYSICAL PROPERTIES

Solid.
Does not mix with water.
Sinks in water.

State	Divided solid	Molecular Weight	106.4
Melting Range (°F)	2829.2	Viscosity	Not Applicable
Boiling Range (°F)	5072	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not applicable	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not applicable
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	12.0
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	Not applicable
Volatile Component (%vol)	Not applicable	Evaporation Rate	Not applicable

APPEARANCE

Silver-white, ductile metal which does not tarnish in air. When finely divided becomes an active catalyst capable of strong self heating to the point of ignition of combustibles. UN 3189.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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

STORAGE INCOMPATIBILITY

-
- WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.
- The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono-or

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- poly-fluorobenzene show extreme sensitivity to heat and are explosive.
- Avoid reaction with borohydrides or cyanoborohydrides
 - Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.
 - Some metals can react exothermically with oxidizing acids to form noxious gases.
 - Very reactive metals have been known to react with halogenated hydrocarbons, sometimes forming explosive compounds (for example, copper dissolves when heated in carbon tetrachloride).
 - Many metals in elemental form react exothermically with compounds having active hydrogen atoms (such as acids and water) to form flammable hydrogen gas and caustic products.
 - Elemental metals may react with azo/diazo compounds to form explosive products.
 - Some elemental metals form explosive products with halogenated hydrocarbons.
 - Several platinum compounds, including trimethylplatinum derivatives are explosively unstable.
 - Some compounds of the other platinum group metals are also of limited stability
- Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidizer. It ignites on contact (without external source of heat or ignition) with recognized 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.
- Classed as a metal of low activity.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

palladium

TOXICITY AND IRRITATION

- No significant acute toxicological data identified in literature search.

CARCINOGEN

METALS	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
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Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

PALLADIUM:

- Harmful to aquatic organisms.
 - The data regarding environmental toxicity of palladium and its compounds/ salts is very limited.
- Palladium chloride has a very low effect concentration on Tubifex tubifex and should as such be regarded as very toxic to aquatic organisms.
- Palladium is found as Pd(OH)₂ in fresh water, and Pd(OH)₂ and PdCl₄²⁻ in sea water. Palladium can also bind to organic matter in aquatic environments. The palladium assimilated by algae and plankton is released during degradation of organic material.
- The relatively high solubility of Pd(II)-ion compounds can result in fast dispersion, impeding accumulation in recipients or other environments that receive palladium, e.g. sludge amended farmland.
- Palladium can decrease the enzymatic activity in the organisms that assimilate the metal, due to its ability to bind amino acids.
- DO NOT discharge into sewer or waterways.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
palladium			LOW	

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

‡ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

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A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

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

Section 14 - TRANSPORTATION INFORMATION

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

Section 15 - REGULATORY INFORMATION

palladium (CAS: 7440-05-3) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US CERCLA Priority List of Hazardous Substances", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Inhalation may produce health damage*.
- Cumulative effects may result following exposure*.
- Limited evidence of a carcinogenic effect*.
- Possible skin sensitizer*.

* (limited evidence).

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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Palladium 10% on Carbon (wetted with ca. 55% Water)

sc-296011



The Power is Question

Material Safety Data Sheet

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

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