

Pd-101; tetrakis(triphenylphosphino)palladium(0)

Section 1. Identification

Code: C4029

GHS product identifier: Pd-101; tetrakis(triphenylphosphino)palladium(0)

Chemical name: tetrakis(triphenylphosphine)palladium

Other means of identification: Palladium, tetrakis(triphenylphosphine)-, (T-4)-; Tetra(triphenylphosphine)palladium; Palladium, tetrakis(triphenylphosphine)-, (beta-4)-

Product type: Solid.

Relevant identified uses of the substance or mixture and uses advised against: Not applicable.

Supplier's details: Johnson Matthey, 2001 Nolte Drive, West Deptford, NJ 08066 USA

Emergency telephone number (with hours of operation): For Hazardous Materials [or Dangerous Goods] Incident, Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC Day or Night (collect calls accepted).
Within USA and Canada: 1-800-424-9300. Outside USA and Canada: +1 703-527-3887

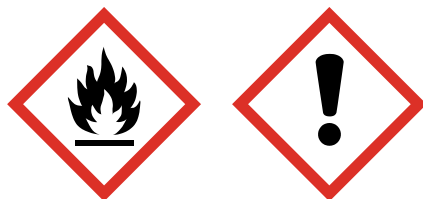
Section 2. Hazards identification

OSHA/HCS status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture FLAMMABLE SOLIDS - Category 2
ACUTE TOXICITY (oral) - Category 4
SKIN SENSITIZATION - Category 1A

GHS label elements

Hazard pictograms



Signal word **Warning**

Hazard statements Flammable solid.
Harmful if swallowed.
May cause an allergic skin reaction.

Precautionary statements

Prevention Wear protective gloves. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Avoid breathing dust. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.

Response IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention.

Storage Not applicable.

Disposal Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements Protect container from physical shock. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Hazards not otherwise classified Unstable. Sensitive to heat or shock. May become explosive.

Section 3. Composition/information on ingredients

Substance/mixture	Substance
Chemical name	tetrakis(triphenylphosphine)palladium
Other means of identification	Palladium, tetrakis(triphenylphosphine)-, (T-4)-; Tetra(triphenylphosphine)palladium; Palladium, tetrakis(triphenylphosphine)-, (beta-4)-

CAS number/other identifiers

CAS number	14221-01-3
Product code	C4029

Ingredient name	%	CAS number
tetrakis(triphenylphosphine)palladium	100	14221-01-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.
Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	No known significant effects or critical hazards.
Inhalation	No known significant effects or critical hazards.
Skin contact	May cause an allergic skin reaction.
Ingestion	Harmful if swallowed.

Over-exposure signs/symptoms

Eye contact	No specific data.
Inhalation	No specific data.
Skin contact	Adverse symptoms may include the following: irritation redness
Ingestion	No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.

Section 4. First aid measures

Protection of first-aiders No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media Use dry chemical, CO₂, water spray (fog) or foam.

Unsuitable extinguishing media Do not use water jet.

Specific hazards arising from the chemical Flammable solid. Material will produce a vigorous reaction under conditions of shock, pressure or temperature.

Hazardous thermal decomposition products Decomposition products may include the following materials:

carbon dioxide
carbon monoxide
phosphorus oxides
metal oxide/oxides

Special protective actions for fire-fighters Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. First move people out of line-of-sight of the scene and away from windows. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Do not fight fire when it reaches the material. Withdraw from fire and let it burn.

Special protective equipment for fire-fighters Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Fire-fighters' protective clothing will only provide limited protection.

Remark Store under nitrogen in a glove box for a 12 month shelf life. Store in mylar bag under nitrogen with cold temperatures for a 6 month shelf-life.

Remark Not available.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Avoid dust generation. Using a vacuum with HEPA filter will reduce dust dispersal. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container.
Advice on general occupational hygiene	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
Conditions for safe storage, including any incompatibilities	Store between the following temperatures: -20 to 0°C (-4 to 32°F). Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

tetrakis(triphenylphosphine)palladium	None.
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Appropriate engineering controls	Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. Engineering controls may be required to control the primary or secondary risks associated with this product. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
Environmental exposure controls	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
Eye/face protection	Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
Skin protection	
Hand protection	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
Body protection	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Section 8. Exposure controls/personal protection

Other skin protection	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Physical state	Solid. [Crystalline solid.]	Melting point	Decomposes.
Color	Yellow. Green.	Boiling point	Not available.
Odor	Not available.	Flash point	Not available.
Odor threshold	Not available.	Burning time	Not available.
Vapor pressure	Not available.	Burning rate	Not available.
Vapor density	Not available.	Flammability (solid, gas)	Store under nitrogen in a glove box for a 12 month shelf life. Store in mylar bag under nitrogen with cold temperatures for a 6 month shelf-life.
Evaporation rate	Not available.	Lower and upper explosive (flammable) limits	Not available.
Relative density	Not available.	Auto-ignition temperature	Not available.
pH	Not available.	Decomposition temperature	Not available.
Partition coefficient: n-octanol/water	Not available.	SADT	Not available.
Solubility in water	Not available.	Viscosity	Not available.
Solubility	Partially soluble in the following materials: methanol. Insoluble in the following materials: cold water and diethyl ether.		

Section 10. Stability and reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product may not be stable under certain conditions of storage or use. See "Possibility of Hazardous Reactions" for further information.
Possibility of hazardous reactions	Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: shock friction high temperature Reactions may include the following: risk of explosion
Conditions to avoid	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Avoid shock and friction.
Incompatible materials	Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Conclusion/Summary Harmful if swallowed.

Irritation/Corrosion

Not available.

Section 11. Toxicological information

Skin Not available.
Eyes Not available.
Respiratory Not available.

Sensitization

Not available.

Conclusion/Summary

Skin May cause an allergic skin reaction.
Respiratory Not available.

Mutagenicity

Not available.

Conclusion/Summary Not available.

Carcinogenicity

Not available.

Conclusion/Summary Not available.

Reproductive toxicity

Not available.

Conclusion/Summary Not available.

Teratogenicity

Not available.

Conclusion/Summary Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure Routes of entry anticipated: Dermal, Inhalation.
Routes of entry not anticipated: Oral.

Potential acute health effects

Eye contact No known significant effects or critical hazards.
Inhalation No known significant effects or critical hazards.
Skin contact May cause an allergic skin reaction.
Ingestion Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.
Inhalation No specific data.
Skin contact Adverse symptoms may include the following:
irritation
redness
Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects Not available.
Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.
Potential delayed effects Not available.

Potential chronic health effects

Section 11. Toxicological information

Not available.

Conclusion/Summary	Not available.
General	Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
Carcinogenicity	No known significant effects or critical hazards.
Mutagenicity	No known significant effects or critical hazards.
Teratogenicity	No known significant effects or critical hazards.
Developmental effects	No known significant effects or critical hazards.
Fertility effects	No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Interactive effects	Not available.
Other information	Not available.

Section 12. Ecological information

Toxicity

Not available.

Conclusion/Summary May cause long-term adverse effects in the aquatic environment.

Persistence and degradability

Not available.

Conclusion/Summary Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) Not available.

Mobility Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.




Waste stream Not available.

RCRA classification Not available.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	UN1325	UN1325	UN1325

Section 14. Transport information

UN proper shipping name	Flammable solids, organic, n.o.s. (tetrakis (triphenylphosphine) palladium)	FLAMMABLE SOLID, ORGANIC, N.O.S. (tetrakis (triphenylphosphine) palladium)	Flammable solid, organic, n.o.s. (tetrakis (triphenylphosphine) palladium)
Transport hazard class(es) and Packing group	4.1 III 	4.1 III 	4.1 III 
Environmental hazards	No.	No.	No.
Additional information	<p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: 25 kg</p> <p>Cargo aircraft Quantity limitation: 100 kg</p> <p>Special provisions A1, IB8, IP3, T1, TP33</p>	<p>Emergency schedules (EmS) F-A, S-G</p> <p>Special provisions 223, 274, 915</p>	<p>Passenger and Cargo Aircraft Quantity limitation: 25 kg Packaging instructions: 446</p> <p>Cargo Aircraft Only Quantity limitation: 100 kg Packaging instructions: 449</p> <p>Limited Quantities - Passenger Aircraft Quantity limitation: 10 kg Packaging instructions: Y443</p> <p>Special provisions A3, A803</p>

Special precautions for user **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code Not available.

Proper shipping name Not available.
Ship type Not available.
Pollution category Not available.

Section 15. Regulatory information

U.S. Federal regulations TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) Not listed
Clean Air Act Section 602 Class I Substances Not listed
Clean Air Act Section 602 Class II Substances Not listed
DEA List I Chemicals (Precursor Chemicals) Not listed
DEA List II Chemicals (Essential Chemicals) Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ Not applicable.

SARA 311/312

Section 15. Regulatory information

Classification Fire hazard
Reactive
Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
tetrakis(triphenylphosphine) palladium	100	Yes.	No.	Yes.	Yes.	No.

State regulations

Massachusetts This material is not listed.
New York This material is not listed.
New Jersey This material is not listed.
Pennsylvania This material is not listed.
Not available.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

Australia This material is listed or exempted.
Canada This material is not listed in DSL but is listed in NDSL.
China Not determined.
Europe This material is listed or exempted.
Japan **Japan inventory (ENCS):** Not determined.
Japan inventory (ISHL): Not determined.
Malaysia Not determined.
New Zealand This material is listed or exempted.
Philippines This material is listed or exempted.
Republic of Korea Not determined.
Taiwan This material is listed or exempted.
Turkey Not determined.

Section 16. Other information

Procedure used to derive the classification



Classification	Justification
FLAMMABLE SOLIDS - Category 2	Expert judgment
ACUTE TOXICITY (oral) - Category 4	Expert judgment
SKIN SENSITIZATION - Category 1A	Expert judgment

History

Date of printing	10/01/2017
Date of issue/Date of revision	10/01/2017
Date of previous issue	29/11/2016
Version	4
Prepared by	Not available.
Key to abbreviations	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	Not available.

Indicates information that has changed from previously issued version.

US Label (29 CFR 1910.1200(f)(1))

<p>Pd-101; tetrakis(triphenylphosphino) palladium(0)</p> <p>CAS: 14221-01-3 Code: C4029</p> <p>Warning</p> <p>Flammable solid. Harmful if swallowed. May cause an allergic skin reaction.</p> <p>Wear protective gloves. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Avoid breathing dust. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention. Dispose of contents and container in accordance with all local, regional, national and international regulations.</p> <p>Supplemental label elements: Protect container from physical shock. Read SDS before using this product. Do not handle until all safety precautions have been read and understood.</p> <p>Johnson Matthey 2001 Nolte Drive, West Deptford, NJ 08066 USA non-emergencies: +1 856 384 7050; emergencies +1 800 424 9300</p>	 
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