Material Safety Data Sheet
Phosphorus pentasulfide, 98+%

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Phosphorus pentasulfide, 98+
**Synonyms:** Diphosphorus pentasulfide; Sulfur phosphide; Thiophosphoric anhydride.

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1314-80-3</td>
<td>Phosphorus pentasulfide</td>
<td>98-100</td>
<td>215-242-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: gray to yellow-green crystalline.

**Danger!** Reacts with water to form hydrogen sulfide, sulfur dioxide, and phosphoric acid. Flammable solid. Water-reactive. Causes severe eye and skin irritation. May ignite or explode on contact with moist air. Harmful if inhaled or swallowed. Causes respiratory tract irritation. Stench. May cause central nervous system effects.

**Target Organs:** Central nervous system, respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Contact may cause severe eye irritation and possible eye damage.

**Skin:** Causes severe skin irritation.

**Ingestion:** Harmful if swallowed. May cause irritation of the digestive tract.

**Inhalation:** May cause respiratory tract irritation. Vapors may cause dizziness or suffocation. Inhalation of high concentrations may cause pulmonary edema. Higher exposures may cause the loss of sense of smell (anosmia). Inhalation overexposure may lead the CNS effect such as: headache, dizziness, weakness, confusion, sweating, nausea, and vomiting. Higher levels can cause seizures and death.

**Chronic:** Prolonged exposure to hydrogen sulfide may result in pulmonary edema.

Section 4 - First Aid Measures
**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

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### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Water Reactive. Material will react with water and may release a flammable and/or toxic gas. Containers may explode in the heat of a fire. Flammable solid. May ignite or explode on contact with steam or moist air. Dangerous fire hazard in the form of dust when exposed to heat or flame.

**Extinguishing Media:** Use dry sand or earth to smother fire. Water may be ineffective. Do NOT use straight streams of water. DO NOT USE WATER OR FOAM. For large fires, use dry sand, dry chemical, soda ash or lime or withdraw from area and let fire burn. For small fires, use dry chemical, soda ash, lime or dry sand.

**Flash Point:** Not available.

**Autoignition Temperature:** 142 deg C (287.60 deg F)

**Explosion Limits, Lower:** N/A

**Upper:** N/A

**NFPA Rating:** (estimated) Health: 2; Flammability: 1; Instability: 2; Special Hazard: -W-

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### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Cover with sand, dry lime or soda ash and place in a closed container for disposal. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Do not expose spill to water. A vapor suppressing foam may be used to reduce vapors.

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### Section 7 - Handling and Storage
Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not allow water to get into the container because of violent reaction. Minimize dust generation and accumulation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not allow contact with water. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Keep from contact with moist air and steam.


Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus pentasulfide</td>
<td>1 mg/m3 TWA; 3 mg/m3 STEL</td>
<td>1 mg/m3 TWA 250 mg/m3 IDLH</td>
<td>1 mg/m3 TWA</td>
</tr>
</tbody>
</table>

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Section 9 - Physical and Chemical Properties

Physical State: Crystalline
Appearance: gray to yellow-green
Odor: stench
pH: Not available.
Vapor Pressure: 1 mmHg @ 300 C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 514 deg C @ 760.00mm Hg
Freezing/Melting Point: 286.00 - 290.00 deg C
Decomposition Temperature: Not available.

Solubility: Insoluble in cold water

Specific Gravity/Density: 2.0300g/cm³

Molecular Formula: P₄S₁₀

Molecular Weight: 444.48

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Combines vigorously or explosively with water. Contact with water or acids liberates poisonous and flammable hydrogen sulfide. Reaction with water also yields phosphoric acid, and sulfur dioxide.

Conditions to Avoid: Ignition sources, dust generation, excess heat, exposure to moist air or water.

Incompatibilities with Other Materials: Oxidizing agents, acids, alcohols, alkalis, water, steam.

Hazardous Decomposition Products: Phosphine, oxides of phosphorus, hydrogen sulfide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 1314-80-3: TH4375000

LD50/LC50:

CAS# 1314-80-3:
   - Draize test, rabbit, eye: 20 mg/24H Moderate;
   - Draize test, rabbit, skin: 500 mg/24H Moderate;
   - Oral, rat: LD50 = 389 mg/kg;
   - Skin, rabbit: LD50 = 3160 mg/kg;

Carcinogenicity: CAS# 1314-80-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found.

Teratogenicity: No information found.

Reproductive Effects: No information found.

Mutagenicity: No information found.

Neurotoxicity: No information found.

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Very toxic to aquatic organisms.
Physical: No information found.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series:
CAS# 1314-80-3: waste number U189 (Reactive waste).

Section 14 - Transport Information

<table>
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<th>IATA</th>
<th></th>
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<tbody>
<tr>
<td>Shipping Name:</td>
<td>PHOSPHORUS PENTASULFIDE</td>
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<tr>
<td>Hazard Class:</td>
<td>4.3</td>
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<tr>
<td>UN Number:</td>
<td>UN1340</td>
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<tr>
<td>Packing Group:</td>
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</table>

Section 15 - Regulatory Information

Hazard Symbols:
XN F N

Risk Phrases:
R 11 Highly flammable.
R 20/22 Harmful by inhalation and if swallowed.
R 29 Contact with water liberates toxic gas.
R 50 Very toxic to aquatic organisms.

Safety Phrases:
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

Section 16 - Additional Information
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall INDO GULF GROUP be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if INDO GULF GROUP has been advised of the possibility of such damages.