

## Chemical Profiles

# Phosphoric Acid (Solutions)

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## What are other names or identifying information for phosphoric acid?

**CAS Registry No.:** 7664-38-2

**Other Names:** Orthophosphoric acid, o-Phosphoric acid, Hydrogen phosphate

**Main Uses:** Manufacture of fertilizers and other chemicals, food additive, bonding agent, laboratory reagent.

**Appearance:** Clear colourless liquid.

**Odour:** Odourless

**Canadian TDG:** UN1805

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## What is the WHMIS classification?

According to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), [phosphoric acid](#) can be classified as:

Skin corrosion/irritation - Category 1



Serious eye damage/eye irritation - Category 1



The signal word is danger.

The hazard statement is:

- Causes severe skin burns and eye damage.

Comments from CNESST: This product could be corrosive to metals, please contact the supplier for additional information.

Please note that this classification was retrieved from the [CNESST](#) site on February 22, 2023 and was established by CNESST personnel to the best of their knowledge based on data obtained from scientific literature and it incorporates the criteria contained in the *Hazardous Products Regulations* (SOR/2015-17). It does not replace the supplier's classification which can be found on its Safety Data Sheet.

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## What are the most important things to know about phosphoric acid in an emergency?

**Emergency Overview:** Clear colourless liquid. Odourless. Will not burn. Can form very hazardous decomposition products. Contact with metals liberates flammable hydrogen gas. CORROSIVE. Causes severe skin burns and eye damage.

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## What are the potential health effects of phosphoric acid?

**Main Routes of Exposure:** Skin contact. Eye contact.

- **Inhalation:** Not expected to be an inhalation hazard unless heated or misted. Can irritate the nose and throat.
- **Skin Contact:** CORROSIVE. Contact can cause pain, redness, burns, and blistering. Permanent scarring can result. A severe exposure can cause death.
- **Eye Contact:** CORROSIVE. Contact causes severe burns with redness, swelling, pain and blurred vision. Permanent damage including blindness can result.
- **Ingestion:** Can burn the lips, tongue, throat and stomach. Symptoms may include nausea, vomiting, stomach cramps and diarrhea. Permanent damage can result.
- **Effects of Long-Term (Chronic) Exposure:** At low concentrations: Can cause dry, red, cracked skin (dermatitis) following skin contact.
- **Carcinogenicity:** Not known to cause cancer.
  - International Agency for Research on Cancer (IARC): Not specifically evaluated.
  - American Conference for Governmental Industrial Hygienists (ACGIH): Not specifically designated.
- **Teratogenicity / Embryotoxicity:** Not known to harm the unborn child.
- **Reproductive Toxicity:** Not known to be a reproductive hazard.
- **Mutagenicity:** Not known to be a mutagen.

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## What are first aid measures for phosphoric acid?

**Inhalation:** Move victim to fresh air. If breathing has stopped, trained personnel should begin artificial respiration (AR). Get medical attention as soon as possible.

**Skin Contact:** Avoid direct contact. Wear chemical protective clothing if necessary. Quickly take off contaminated clothing, shoes, and leather goods (e.g., watchbands, belts). Immediately flush with large amounts of gently flowing water for at least 30 minutes. DO NOT INTERRUPT FLUSHING. If it can be done safely, continue flushing during transport to hospital. Get medical attention immediately. Treatment is urgently required. Transport to a hospital. Thoroughly clean clothing, shoes and leather goods before reuse or dispose of safely.

**Eye Contact:** Avoid direct contact. Wear chemical protective gloves if necessary. Immediately flush the contaminated eye(s) with gently flowing water for at least 30 minutes, occasionally lifting the upper and lower eyelids. If a contact lens is present, DO NOT delay flushing or attempt to remove the lens. Neutral solution may be used as soon as it is available. DO NOT INTERRUPT FLUSHING. If necessary, continue flushing during transport to hospital. Take care not to rinse contaminated water into the unaffected eye or onto the face. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

**Ingestion:** Have victim rinse mouth with water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

**First Aid Comments:** Some of the first aid procedures recommended here require advanced first aid training. All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

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## What are fire hazards and extinguishing media for phosphoric acid?

**Flammable Properties:** Does not burn.

**Suitable Extinguishing Media:** Not combustible. Use extinguishing agent suitable for surrounding fire.

**Specific Hazards Arising from the Chemical:** Reacts with metals to produce highly flammable hydrogen gas. Closed containers may rupture violently when heated releasing contents. In a fire, the following hazardous materials may be generated: corrosive phosphorous oxides.

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## What are the stability and reactivity hazards of phosphoric acid?

- **Chemical Stability:** Normally stable.
  - **Conditions to Avoid:** Heat.
  - **Incompatible Materials:** Reacts violently with: strong bases (e.g., sodium hydroxide). Increased risk of fire and explosion on contact with: strong oxidizing agents (e.g., perchloric acid). Forms flammable chemicals on contact with: metals (e.g., aluminum). Corrosive to: carbon steel, aluminum alloys, and other metals.
  - **Hazardous Decomposition Products:** None known.
  - **Possibility of Hazardous Reactions:** None known.
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## What are unintentional release measures for phosphoric acid?

**Personal Precautions:** Keep unnecessary and unprotected personnel out of the spill area. Ventilate area. Use personal protective equipment as required.

**Methods for Containment and Clean-up:** Do not touch spilled material. Stop or reduce leak if safe to do so. Contain and soak up spill with absorbent that does not react with spilled product. Dike spilled product to prevent runoff. Small spills or leaks: neutralize with sodium bicarbonate ( $\text{NaHCO}_3$ ) or a mixture of soda ash/slaked lime. Collect using shovel/scoop or approved HEPA vacuum and place in a suitable container for disposal. Large spills or leaks: place used absorbent into suitable, covered, labelled containers for disposal. Collect using shovel/scoop or approved HEPA vacuum and place in a suitable container for disposal.

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## What handling and storage practices should be used when working with phosphoric acid?

**Handling:** Before handling, it is important that all engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. Only use where there is adequate ventilation. Avoid generating vapours or mists. Immediately report leaks, spills or failures of the safety equipment (e.g., ventilation system). If product is transferred to another container, ensure new container is suitable for the product. Prevent unintentional contact with incompatible chemicals. Never add water to a corrosive. Always add corrosives slowly to COLD water. Never reuse empty containers, even if they appear to be clean.

**Storage:** Store in an area that is: cool, dry, well-ventilated, out of direct sunlight and away from heat and ignition sources, separate from incompatible materials. Keep amount in storage to a minimum. Shelving, floors, walls, etc. should be made from materials that resist attack from phosphoric acid. Store in the original, labelled, shipping container. Store in tightly closed, properly labelled containers. Regularly inspect for physical changes or signs of crystallization, damage or leaks. Contain spills or leaks by storing containers in trays made from compatible materials. Install pressure and vacuum-relief venting in all drums. Equip storage tank vents with a flame arrestor. Do not handle swollen drums. Get expert advice.

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## What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for phosphoric acid?

ACGIH® TLV® - TWA:  $1 \text{ mg/m}^3$

ACGIH® TLV® - STEL [C]:  $3 \text{ mg/m}^3$

**Exposure Guideline Comments:** TLV® = Threshold Limit Value. TWA = Time-Weighted Average. STEL = Short-term Exposure Limit.

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Adapted from: 2022 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on [Canadian Governmental Occupational Health & Safety Departments](#).

A list of which acts and regulations that cover [exposure limits to chemical and biological agents](#) is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

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## What are the engineering controls for phosphoric acid?

**Engineering Controls:** Use local exhaust ventilation, if general ventilation is not adequate to control amount in the air. Use local exhaust ventilation if material is heated or misted. Use a corrosion-resistant exhaust ventilation system separate from other ventilation systems. Exhaust directly to the outside, taking any necessary precautions for environmental protection. Provide eyewash and safety shower if contact or splash hazard exists.

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## What Personal Protective Equipment (PPE) is needed when working with phosphoric acid?

**Eye/Face Protection:** Wear chemical safety goggles. A face shield (with safety goggles) may also be necessary.

**Skin Protection:** Wear chemical protective clothing e.g. gloves, aprons, boots. [Suitable materials](#) (phosphoric acid > 70%) include: butyl rubber, natural rubber, neoprene rubber, nitrile rubber, polyvinyl chloride (PVC), Viton®, Viton®/butyl rubber, AlphaTec® (02-100, 4000, EVO, VPS), Kemblok®, Silver Shield® - PE/EVAL/PE, , Saranex®™, Chemprotex® 300, ChemMAX® (3, 4 Plus), Frontline® 500, Tychem® (5000, 6000, 6000 FR, 9000, Responder® CSM, 10000, 10000 FR), Zytron® (300, 500). Recommendations are NOT valid for very thin natural rubber, neoprene rubber, nitrile rubber, and PVC gloves (0.3 mm or less).

### Respiratory Protection:

Up to 25 mg/m

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*.

\*Reported to cause eye irritation or damage; may require eye protection.

Up to 50 mg/m<sup>3</sup>:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter; Any self-contained breathing apparatus with a full facepiece; Any supplied-air respirator with a full facepiece.

Up to 1000 mg/m<sup>3</sup>:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the [NIOSH Pocket Guide to Chemical Hazards](#) for more information.

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