Stanford | Environmental Health & Safety

Information on Picric Acid

Picric acid (CAS No. 88-89-1; 2,4,6-trinitrophenol, picronitric acid) is a pale yellow, odorless crystal that is slightly soluble in water. It is primarily used as a staining reagent and in synthesis reactions.

Explosive when dry

It can be purchased in various forms: for example, as a solid moistened with water (≥ 35% water), as a saturated solutions in water (≈ 1.3%), as a more dilute solution in water, as a solution in ethanol, or as Bouin's solution (which contains picric acid, formaldehyde, and acetic acid in an aqueous solution).

Potential Explosion Hazards

When hydrated, picric acid is a typically safe to handle, but it becomes a powerful explosive when dry (less than 10% water). Dry picric acid is highly sensitive to heat, shock, and friction. The moistened solid is classified as a flammable solid. Picric acid readily forms salts on contact with many metals (including copper, lead, mercury, zinc, nickel, and iron) that are more sensitive explosives than picric acid itself when subjected to heat, friction, or impact. Salts formed with ammonia and amines are also sensitive explosives. Contact with concrete floors or plaster may form the friction-sensitive calcium picrate.

Potential Health Hazards

Picric acid is toxic if swallowed, inhaled, or absorbed through the skin. Inhalation of dust may cause lung damage. Chronic exposure may cause liver or kidney damage. It is irritating to the skin and eyes and may cause an allergic skin reaction. See SDS for additional health effects and symptoms of exposure.

Purchasing

- Purchases of picric acid should be restricted to the smallest practical quantities.
- If possible, eliminate solid picric acid from your inventory by purchasing premixed stains or a 1% solution for use in stain preparation.

Handling

- Do not use metal spatulas to remove picric acid. Do not place in metal containers or containers with metal lids.
- Whether handling the moistened solid or a solution, clean the bottleneck, cap, and threads with a wet cloth before resealing. Collect the used cloth in a plastic or glass container and label as hazardous waste for disposal by EH&S. Ensure that the material is thoroughly wetted.
- Use picric acid in a fume hood.

Personal Protective Equipment

Minimum PPE for handling chemicals include the following:

- Lab coat
- Safety glasses
- Appropriate chemical-resistant gloves.

- Proper street clothing – long pants (or equivalent clothing that covers the legs and ankles) and closed-toed, non-perforated shoes that completely cover the feet.

Additional PPE may be needed, depending upon the specifics of the procedure; for more information, see the Laboratory PPE Assessment Tool.

Self-Inspection of Picric Acid Containers

Inspect containers on a quarterly basis; assign this responsibility to a lab member trained on the hazards of picric acid. Document inspections on bottle.

- First, without opening the bottle, check that no dried crystals have formed on the outside of the bottle near the cap and that there is a layer of water over the crystals within the bottle.
- If there is any evidence of picric acid crystals outside the bottle or If the picric acid inside the bottle is not adequately wetted, dried crystals may also be present within the threads of the container. This presents a potential detonation hazard when opening the container. Contact EH&S at (650) 725-9999 immediately.
- If the container appears safe to open, rehydrate contents with water (deionized or distilled), as needed, to ensure a layer of water above the crystals.
- Check the date received that was recorded on the bottle. Dispose of as hazardous waste after 2 years of storage.
- Record the inspection date on the bottle.

Storage

- Label containers of picric acid or picric acid solutions with date received and date opened.
- Store in original container in a cool, dry, well-ventilated area away from sources of heat.
- Keep solids wet – ensure the solid is under a layer of water.
- Picric acid is classified as Stanford Chemical Storage Group X and must be stored separately from all other chemicals.

Spill Procedures

- Very small spills (< 30 mL) may be absorbed with the absorbent pads in the small spill kits. Keep cleaning materials wet and collect for disposal. Collect all picric acid containing wastes in plastic or glass bottles for disposal by EH&S.
- For larger spills or if clean-up assistance is needed, call 725-9999.