

Picric Acid: Guidelines for Laboratories

Picric acid (trinitrophenol) is used as a staining agent for microscopic specimens and reagent in many laboratory procedures. It is an odorless, pale yellow, crystalline organic solid that is slightly soluble in water. Although commonly treated as an acidic material, the real hazards of picric acid are its unstable nature and ability to react with other materials and create potentially explosive compounds.

BEFORE any use of picric acid, all researchers involved **MUST**:

1. Contact EHS for training and guidance.
2. Read the safety data sheets for the picric acid sample purchased as this contains information related to first aid and emergency response.
3. Complete and submit a standard operating procedure (SOP) to EHS for approval. Be sure to consult multiple references when creating this document. Be sure to contact EHS at 205-348-5905 with any questions while developing this SOP.

- **Hazards**

- When diluted or hydrated with water or moisture, picric acid can be safely handled, but when dry, the material becomes an explosive hazard.
 - It **MUST** be stored under a certain volume of water to prevent explosion.
 - Picric acid must be stored wet with at least 30% water.
 - Picric acid allowed to dry out to less than 10% water by volume becomes unstable and may pose an explosion hazard in your laboratory.
 - If the material appears dry, **DO NOT** open or handle the container.
 - In dry form, it is considered a secondary explosive and is shock, heat, and friction sensitive.
 - ***Do not touch, move, or open a container of dry picric acid!*** Contact EHS **IMMEDIATELY** at 205-348-5905.
 - The following steps can reduce the chances of dry picric acid occurring in the laboratory:
 - Attach a copy of the “Picric Acid Inspection Log” (included at the end of this document) to your picric acid container and write the date of initial receipt.
 - After initially opening the container, inspect the material every two weeks to ensure that it contains enough water. Send a copy or a picture of the log sheet to [EHS’ lab safety](#)

- [manager](#) monthly. The material should look like a wet paste or be in solution if purchased as such. Document this inspection on the “Picric Acid Inspection Log” in the inspection column.
- Rehydrate the contents of the container with deionized water to maintain a wet paste. This must be done as often as needed to keep picric acid wet. Document this rehydration on the “Picric Acid Inspection Log” in the rehydration column.
 - Dispose all picric acid as a hazardous waste within two years of initial receipt.
 - Waste should have a designated waste container properly labeled with hazardous waste labels provided on the UA EHS website.
 - Always make sure picric acid has excess water for disposal. Place any pads, pillows, or rags into a compatible, impervious container with excess water.
 - Dispose of picric acid solutions if there is no further projected use. **DO NOT** store picric acid solutions for “just in case” investigations. The bi-weekly schedule **MUST** be maintained for any holidays, vacations, or sabbaticals. If any circumstance arises, such as suspension of UA operations for disaster or health crisis, contact EHS to have the picric acid solutions removed and disposed (see references section).
 - Picric acid is not compatible with metals and some other materials causing formation of picrate salts.
 - These picrate salts are often more unstable and explosive than pure picric acid.
 - Unstable picrate salts are formed when upon contact with concrete, amines, bases, ammonia, and metals (copper, lead, mercury, zinc).
 - Mixtures with aluminum and water may also ignite.
 - Incompatible with oxidizers, reducing agents, inorganic salts, alkaloids, and albumin.
 - Avoid heat, flame, ignition sources, shock, dryness, and the many incompatible materials indicated that can create explosive compounds.
 - Picric acid and its derivatives should be stored in small quantities in the original container in a cool, dry, well-ventilated, and flame-proof area.
 - Clean the bottleneck, cap, and threads with a wet cloth before re-sealing.
 - Picric acid is toxic by inhalation, by contact with the skin, and if swallowed.
 - It is a strong irritant and allergen that causes local and systemic allergic reactions.
 - It can cause skin damage and staining at the contact site.

- Systemic poisoning may occur when ingested or absorbed.
 - Animal experiments indicate that ingestion of less than 40 grams may be fatal and can cause serious complications.
- Symptoms of exposure may include:
 - Headache
 - Nausea
 - Vomiting
 - Diarrhea
 - Abdominal pain
 - Itching
 - Urinary dysfunction
 - Stupor
 - Convulsions
 - Renal damage
 - Death
- **Protection**
 - Wear appropriate personal protective equipment including:
 - Laboratory coat
 - Safety glasses
 - Appropriate gloves
 - Close-toed shoes
 - Long pants
 - Respiratory equipment for exposure exceeding 0.1 mg/m₃
 - Fume Hood
 - In case of a spill inside a chemical fume hood, keep the spilled material wet and contact EHS at 205-348-5905.
 - **Never** work alone while using picric acid.
 - Laboratory personnel must be familiar with the location and operation of safety features.
 - Eyewash/drench hose
 - Safety Shower
- **Emergency Procedures for Exposure**
 - Immediately provide first aid based on the chemical SDS instructions.
 - Seek medical attention as soon as possible.
 - A copy of the SDS should be taken with the exposed person for quick treatment.

- **References**

- [37_110345400_PicricAcid-CASNO-88-89-1-MSDS.pdf \(cdhfinechemical.com\)](https://www.cdhfinechemical.com/37_110345400_PicricAcid-CASNO-88-89-1-MSDS.pdf)
- [Hazardous Waste Labels – Environmental Health & Safety | The University of Alabama \(ua.edu\)](#)
- [Waste Disposal Request – Environmental Health & Safety | The University of Alabama \(ua.edu\)](#)

- **Training**

- EHS requires in-person training for use, handling, and storage of hydrofluoric acid in laboratories on UA campus.

For further questions, contact the [EHS Laboratory Safety Team](#).

