



C5. Handling Picric Acid

BACKGROUND

Physical Appearance

- dehydrated picric acid appears as a bright yellow, dry crystalline solid with visible air pockets below the surface
- when wet with 10-11% water, picric acid is a yellow, compact crystalline solid with the consistency of wet sand
- when dissolved in water or organic solvent, picric acid forms a bright yellow solution¹

Characteristics

- Picric acid (PA) or trinitrophenol is a trinitro-aromatic compound related to TNT (trinitrotoluene) and is a flammable solid when purchased with 10 - 11% water.
- PA is a high-powered explosive when dehydrated.
- PA is not shock sensitive, but when in contact with metals, can form shock sensitive metal picrates.
- PA usually needs a “booster” such as extreme heat, a blasting cap or an electric charge to be explosive.
- PA, wetted with less than 10% water is classified as an IATA Transportation of Dangerous Goods (TDG) Class D1.1 explosive or a WHMIS Class E, Dangerously Reactive Material.
- PA, wetted with greater than 10% water is classified as a flammable solid, TDG Class 4.1 or a WHMIS Class E, Dangerously Reactive Material.

Historical Issues

Each year containers of picric acid that have dried out and have not been used for several years are found in cupboards around the UBC campus. Often the original owner/user of the material is no longer around and the history of its use and its age is unknown. The result is a costly pick up and disposal process to the current owners. **Please carefully review the following protocols and suggestions when considering the use of PA.**

The following protocols address procedures for laboratory personnel when they:

- a. consider the purchase of picric acid;
- b. handle picric acid solutions or in the solid form;
- c. find an old container that appears dry or just very old; or
- d. need to dispose of it.

¹ http://www.ehs.washington.edu/LabSaf/chemical_faq.htm#picric



PURCHASING CONSIDERATIONS

Prior to purchasing picric acid (PA), consider the following questions:

1. Is there a less hazardous material/procedure that can accomplish the same outcome? If yes, use it.
2. Is PA available in a solution form that would be applicable to the work/research? If so, order it in the dilute form as it decreases the potential hazard considerably.
3. How long will it take to use up the quantity that is to be ordered? Do not order more than what can be used up in 6 months.
4. Last, but not least, recognize that the disposal costs of picric acid far outreach the original cost and is **payable by the department, or researcher**. These costs are approximately **\$400-500/container**.

SPECIAL HANDLING CONSIDERATIONS

1. Wear appropriate personal protective equipment (i.e., goggles, gloves, lab coat as a minimum) and work in a fume hood when dispensing picric acid.
2. Labelling on the bottle must include a cautionary statement: "Keep picric acid crystals immersed in water to maintain in a safe condition".
3. Do not use metal spatulas to remove the material from the container.
4. Always clean the neck of the bottle, cap and thread with a wet cloth before recapping.
5. Seal cap with Parafilm®.
6. Put the name and phone number of a contact person on the label if further information is required.
7. **All containers of PA must be monitored regularly (recommend every 6 months at a minimum) "to ensure that the minimum moisture content is maintained" according to the BC Occupational Health and Safety Regulation, section 30.22.**
8. Do not break the seal on the container until the material is needed.
9. After the container is opened and an aliquot is taken, note the weight of the container. Prior to subsequent use, weigh the container. If the weight is less than the previous weight, add distilled water to the container as needed and reweigh.
10. Before closing a container of picric acid, ensure that there is not PA on the threads or cap before closing. Solutions of picric acid must not be allowed to accumulate and dry around cap threads.
11. Do not allow picric acid to contact metal that is readily oxidized, or do not transfer the material to a container with a metal cap. Lead, iron and copper should be considered particularly dangerous. **Metal picrates are extremely shock sensitive and will detonate with the slightest motion or vibration.**

EMERGENCY RESPONSE FINDING / DISPOSAL OF OLD PICRIC ACID

1. When a suspect (old, dry looking, user unknown) container of picric acid is found, the user/finder should secure the container in an area ensuring that the container and cupboard are posted clearly with warnings "**Potentially Explosive Picric Acid - Do Not Touch**".
2. Once the container is secured, contact HSE through Campus Security 250-807-8111



3. If the container is suspect, HSE personnel will investigate and determine the next course of action. This may require interim secure storage until HSE can arrange to have it picked up for disposal.
4. If the container is not suspect, or after being determined to be safe for short-term storage, the container and cupboard must be signed posted clearly, "**Potentially Explosive Picric Acid - Do Not Touch**".
5. HSE arranges on an annual basis for potentially explosive material to be removed from UBC laboratories.
6. To be included in the next disposal contract, call 250-807-8656 to register your material.

Picric acid is regulated as a Class.1 Flammable solid under the Canadian Transportation of Dangerous Goods Regulations, and as a WHMIS Class E (dangerously active when dry) under the Canadian WHMIS regulations and BC WCB Occupational Health and Safety Regulations (1999).

Reference:

1. http://www.ehs.washington.edu/LabSaf/chemical_faq.htm#picric