Health and Safety Office

Guidance Note

Picric Acid

What is picric acid? Picric acid is a pale yellow, odourless and crystalline substance. It is slightly water soluble and highly sensitive to heat, shock and friction. It is used as an explosive, a bacteriocide and as a staining reagent. It may also known as trinitrophenol, melinite, TNP, and carbazotic acid. Picric acid is also commercially available in dilute solutions; in this form it poses a lesser but not insignificant hazard. For full details of its physical, chemical and toxicological properties refer to the current MSDS for picric acid which should be held in your unit.

What are the hazards? In its dry state, picric acid is highly shock, heat and friction sensitive. It easily forms picrate salts with amines, bases, most common metals, ammonia, concrete – these salts are often more unstable and explosive than picric acid itself. Trace residues of the acid or its salts left on concrete or metal surfaces are particularly hazardous. Picric acid is a strong eye, skin and respiratory irritant. It is toxic if inhaled or swallowed. Because of its relative instability, its low temperature combustibility and toxicity, its ability to react with other materials, and its extremely explosive nature, picric acid is one of the most dangerous substances found in the laboratory.

What is the correct storage? Picric acid should be stored in small quantities in its original container in a cool, dry, well-ventilated area. The original container should be held in a secondary non-breakable and compatible container. Its date of receipt should be recorded, and access and usage should be restricted and only after adequate training. It must be stored in water to at least 30% (w/v), and it must never be allowed to dry out. Water will reduce the possibility of explosion from friction exerted on the container cap when opening. Stocks should be inspected at least monthly to ensure that there is sufficient water. Dispose of the picric acid after 2 years and reorder only where necessary.

What if picric acid or picrate salt is discovered? If suspect picric acid or picrate salt is discovered the following steps must be taken:

1. Do not touch the container. Depending on its age, even the most minor disturbance could be dangerous.
2. Where appropriate immediately notify the Head of Unit.
3. If authorised to do so, visually inspect the container for product identification. Check the details, such as CAS number with the supplier's MSDS, and look for an expiration date.
4. Still avoiding contact with the container, inspect its contents for signs of water and look for signs of crystal formation inside the bottle and around the cap. Determine if the cap is made of metal or plastic; metal caps and ground-glass stoppers pose even greater risk.
5. If there is plenty of water covering the picric acid and if the bottle or cap is not cracked:

a. Do not attempt to remove the cap. The slightest friction of dried acid between the jar and the cap may cause an explosion.
b. Carefully put it in a suitable secondary container, cover it and place it in a fire-retardant cabinet; this must only be done if wearing nitrile gloves and eye protection.
c. Ensure that the location does not contain chemicals that may pose reactive hazards with picric acid.
d. Notify the relevant Head of Unit so that immediate appropriate disposal can be arranged by a registered chemical waste contactor. Also notify the Safety Office.

6. If there is even the slightest indication of dryness, crystallisation or damp looking paste in the bottle then there is a substantial hazard. Do not move the material or conduct any further investigations.
7. Only if it is safe to do so, and wearing nitrile gloves and eye protection, remove any other chemicals in its immediate vicinity.
8. Spraying water mist over the container can help to reduce the risk of touching any crystals on the outside of the container or on its immediate surroundings.
9. Cordon and secure the area with tape and warning signs. Restrict all access to the room. Inform the Head of Unit, and immediately contact the Safety Office or Buildings Office
   Safety Office ext. 2678/Buildings Office ext. 2134 [Office Hours]
   Security Office ext. 3333 [Out of Hours]
10. The material will be assessed and appropriate disposal/treatment arranged.

What are the general management principles for picric acid?

1. Engineer out the use of picric acid and find a safer substitute.
2. Ensure that all users have been trained in its safe use and wear appropriate PPE, particularly single–use gloves.
3. Ensure that a current MSDS is available close by and understood by users.
4. Only buy Picric Acid where risk assessment has verified that it will be adequately managed.
5. Only buy Picric Acid in the minimum quantities required for immediate use.
6. Keep accurate records of picric acid purchases, storage locations and disposals.
7. Check any stocks of Picric Acid monthly and record these checks
8. Only store Picric Acid in it's original container.
9. Keeps stocks of picric acid low.
10. Dispose of Picric Acid every 2 years.
11. Never allow picric acid to dry out.
12. Make sure that all relevant containers are clearly labelled.
13. Compile and enforce an appropriate standard operating procedure.
14. All work with picric acid should be conducted in a fume hood, avoiding any chemically reactive hazards such as metal spatulas and tinfoil.
15. Ensure that there is no release of picric acid beyond the confines of immediate usage.
16. Ensure that any spill of picric acid is reported and dealt with immediately.
17. Ensure that appropriate first aid resources and procedures are available and understood.