Safe Use of Nitric Acid

SafetyNet #: 14

Nitric acid is both a strong acid and a strong oxidizer. As such it will contribute oxygen to flammable or combustible reactions, causing those reactions to become hotter and faster. Seventy percent nitric acid is commercially available as concentrated nitric acid. Concentrations above 90% nitric acid are called fuming nitric acid. On contact with air, "fuming nitric acid" gives off white or red fumes that are extremely toxic, corrosive, and reactive with combustible materials.

Safety Tips To Keep In Mind:

- Become familiar with the information in the Safety Data Sheet for nitric acid. Physical properties, hazards, toxic effects, spill response, etc., are all fully described in the SDS.
- Nitric acid reacts vigorously and violently with the following:
  - **Combustibles**: e.g. glacial acetic acid, diesel fuel
  - **Flammables** (including flammable organic solvents): e.g. acetone, ether, and toluene
  - **Bases**: e.g. ammonium hydroxide, potassium hydroxide, sodium hydroxide
  - **Reducing Agents**: e.g. metal hydrides, ammonia, and phosphorus
  - **Metals**: e.g. lead, zinc (galvanized steel), aluminum
  - **Metal Compounds (as an etchant)**: e.g. steel, metal alloys

Do not allow nitric acid to come in accidental or uncontrolled contact with these materials! Reaction products of nitric acid with organic chemicals or ammonia may also be explosive.

- When using high concentrations of nitric acid, or when heating nitric acid above room temperature, work should be done in a fume hood equipped with a water wash down system. Clear the hood of flammable materials and make sure the hood ductwork is not “ganged” to other hoods where organic solvents or ammonia might be used. The hood must be washed down after each use or at the end of the work day.
- Gloves (butyl rubber or neoprene), chemical splash goggles, a face shield and an impervious apron should be worn when handling high concentrations or large quantities (greater than 4 liters) of nitric acid. Nitric acid vapors, mists and liquids can severely burn the eyes and skin. Nitric acid vapors and mists are irritating to the respiratory system. Inhalation of high concentrations of nitric acid vapor should be treated as a medical
emergency: call 911 immediately. Delaying treatment can result in lung edema and death.

- When diluting nitric acid, add the **acid to water, slowly**.

- Review [SafetyNet #44][1] “Alternatives to Chromic/Sulfuric Acid for Cleaning Laboratory Glassware” for substitutes for concentrated nitric acid to clean glassware.

- Store nitric acid in the original container. Dilute solutions must be stored in acid-resistant bottles. Do not store nitric acid near materials with which it might react. Because of its wide range of incompatible chemicals, if at all possible, store nitric acid in its own storage cabinet near floor level. If a dedicated storage cabinet is not available, store nitric acid with inorganic acids, segregated from the other acids in secondary container (a plastic dish tub or bucket works very well). Storage cabinets constructed of plastic laminate are preferred over metal or wooden cabinets.

- Nitric acid spills can be extremely dangerous. If less than 10ml of concentrated acid or 100ml of dilute acid is spilled, the spill can be neutralized by gently adding soda ash or sodium bicarbonate and rinsing with copious quantities of water. If the spill is large (greater than 1 liter of concentrated acid or more than you have materials to handle), evacuate the laboratory, close the doors, and call 9-1-1. Stay near the scene to provide information to the emergency responders.

**Contact**

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**More information**
[https://safetyservices.ucdavis.edu/research-safety-staff-listing][2]

**Related content**

1. Alternatives to Chromic/Sulfuric Acid for Cleaning Laboratory Glassware

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