

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. 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 Material Safety Data Sheet for nitric acid. Physical properties, hazards, toxic effects, spill response, etc., are all fully described in the MSDS.
- 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
 - **Metal and Metal Compounds:** e.g. lead, zinc (galvanized steel), aluminum, 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, 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.
- Gloves (butyl rubber or neoprene), splash goggles, a face shield and an impervious apron should be worn when handling high concentrations of nitric acid. Nitric acid vapors, fumes and liquids can severely burn the eyes and skin. Nitric acid vapors and fumes 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 “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 a secondary container (a plastic bin or tote works very well).
- Nitric acid spills can be extremely dangerous. If less than 10 ml of concentrated acid or 100 ml of dilute acid is spilled, the spill can be neutralized by 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 911. Stay near the scene to

provide information to the emergency responders.

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

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