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| University of Pittsburgh Safety Manual | EH&S Guideline Number: 04-026 | |
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GUIDELINES FOR THE SAFE USE OF NITRIC ACID

Nitric acid (HNO₃) is a colorless to slightly yellow, strong oxidizing inorganic acid. Spontaneous ignition or combustion occurs due to contact with a variety of organic substances including but not limited to acetone, acetic anhydride, various alcohols, thiols, amines, dichloromethane, and certain aromatic compounds. Nitric acid also reacts violently with bases, metallic powders, carbides, reducing agents, metallic compounds, hydrogen sulfide, and combustible organic substances.

Nitric acid is listed by The Department of Homeland Security as a “Chemical of Interest”. Due to security issues associated with nitric acid, minimizing quantities of nitric acid is required.

1. Health Hazards

The health hazards of nitric acid are dependent upon the concentration and type of exposure.

- 1.1 Concentrated nitric acid and its vapors are corrosive to the eyes, skin, and mucous membranes. Contact can cause severe burns and permanent damage.
- 1.2 Inhalation of nitric acid vapors can lead to respiratory irritation causing coughing and shortness of breath. Inhalation of nitric acid vapors in high concentrations can lead to pulmonary edema.
- 1.3 Ingestion of nitric acid will result in burning and corrosion of the mouth, throat, and stomach.

2. Safety Precautions

- 2.1 Employees who work with nitric acid should receive training on the associated hazards and what to do in the event of an exposure or a spill. A Safety Data Sheet (SDS) should be kept in the immediate work area where nitric acid is used. The SDS, along with this Guideline, should be used for training employees on the hazards of nitric acid. EH&S is also available for providing assistance with training (412-624-9505).
- 2.2 Work with nitric acid should always be performed inside a certified chemical fume hood. Care should be taken to clear the hood of organics, flammables, and other incompatible substances.
- 2.3 Chemical goggles along with a face shield are recommended when handling nitric acid. Due to nitric acid’s corrosive properties, safety glasses with side shields may not provide adequate eye protection.
- 2.4 A lab coat and a chemical splash apron (made of neoprene, viton, or other material which cannot be permeated or degraded by nitric acid) are recommended when handling nitric acid. Consult EH&S for additional recommendations. Strict adherence to the University’s Lab Attire Guidelines (EH&S Guideline # 03-001) is necessary

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when handling nitric acid. Never wear shorts, skirts above the knee or open-toed shoes when handling nitric acid or other corrosive chemicals.

- 2.5 Neoprene and/or barrier gloves should be worn when working with nitric acid. Always consult the manufacturer's glove selection guide when choosing hand protection for nitric acid. If you have any questions about which glove to choose, contact EH&S. If gloves become contaminated with nitric acid, remove them immediately, thoroughly wash your hands, and check your hands for any sign of contamination.
- 2.6 An eyewash and safety shower must be nearby and accessible when manipulating nitric acid. The eyewash must be tested weekly to ensure it will operate when needed. If exposure to nitric acid occurs, immediately rinse the exposed area for at least 15 minutes. A follow-up medical evaluation is required immediately after the water rinse. Call Pitt Police at 412-624-2121 if emergency medical attention is required.
- 2.7 Nitric acid usage is not permitted in a laboratory when personnel are working alone per University Guidelines (EH&S Guideline # 03-020).

3. Spill Response and Storage

- 3.1 Small spills of nitric acid (less than 10 ml of >50% nitric acid, or less than 100 ml of dilute nitric acid) should be absorbed by lab staff with a noncombustible material, and then placed into a sealed container for disposal through the Chemical Waste Program. Neutralize remaining liquid with sodium bicarbonate or other suitable mild caustic material.
- 3.2 If a large spill occurs, evacuate the area, close the doors, and notify appropriate chemical spill response personnel by calling Pitt Police at 412-624-2121.
- 3.3 Store nitric acid in tightly closed containers, in a well-ventilated area away from organic substances, caustic materials, and combustible materials. Containers of nitric acid should be stored in secondary containment.

4. Waste Disposal

- 4.1 Nitric acid waste should never be combined with incompatible chemicals such as combustibles, acetone, organics, metals, ammonia, sulfides, alcohols, acids, bases or other oxidizing agents. Contact with incompatible chemicals will cause the rapid generation of toxic, corrosive gas and the potential for explosion.
- 4.2 Nitric acid waste should be collected in a chemically-compatible container with a sealed lid and labeled with a completed orange WASTE CHEMICALS label.
 - 4.2.1 Waste nitric acid in concentrations of >50% should be collected in a glass container manufactured specifically for the storage of acids.

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4.2.2 If generating nitric acid waste in concentrations of 50% or less, contact EH&S at 412-624-9505 for container recommendations and additional guidance.

4.2.3 In addition to a completed WASTE CHEMICALS label, EH&S has made available a “NITRIC ACID WASTE ONLY – NO ORGANICS” label that can also be affixed to the nitric acid waste container to minimize the potential for incidents. Contact EH&S to request these labels.

4.3 Contact EH&S with any questions regarding the disposal of nitric acid wastes.

EMERGENCY PROCEDURES FOR NITRIC ACID EXPOSURES

Individuals that are exposed to nitric acid should receive immediate first aid and a medical evaluation.

Skin contact

1. Immediately proceed to the nearest eyewash/shower and wash affected area for a minimum of 15 minutes.
2. While washing the affected area, have someone call for emergency medical assistance – **PITT POLICE 412-624-2121**.
3. Remove all contaminated clothing.
4. After 15 minute rinse, immediately obtain emergency medical attention.

Eye contact

1. Immediately proceed to the nearest eyewash station.
2. Wash eyes with water for at least 15 minutes while holding eyelids open.
3. While washing eyes, have someone call for emergency medical assistance – **PITT POLICE 412-624-2121**.
4. After 15 minute rinse, immediately obtain emergency medical attention.