Nitric Acid

Chemical and Physical Properties

Nitric acid is a colorless, yellow, or red, fuming liquid with an acrid, suffocating odor. Nitric acid is a strong oxidant that decomposes on warming to produce nitrogen oxides. It reacts violently with combustibles, reducing materials, and organic solvents to cause fires and explosion hazards. It is a strong acid, reacts violently with bases and is corrosive to metals. Fuming nitric acid is concentrated nitric acid that contains dissolved nitrogen dioxide.

Health Hazards

Acute Health Effects

The following **acute (short-term)** health effect may occur immediately or shortly after exposure to nitric acid:

- Contact can severely irritate and burn the skin and eyes with possible eye damage.
- Exposure to nitric acid can irritate the nose and throat.
- Inhalation can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- Nausea, vomiting, diarrhea, and abdominal pain

Chronic Effects

The following **chronic (long-term)** health effects can occur at some time after exposure to nitric acid and can last for months or years:

- Prolonged or repeated contact can cause a skin rash, pain, redness, and ulceration.
- Repeated inhalation exposure may cause bronchitis to develop with coughing, phlegm, and/or shortness of breath.
- Exposure to the high concentrations may cause erosion of the teeth.

Safe Work Practices

- Whenever possible, substitute nitric acid for a less hazardous alternative.
- 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. **Contact HSRM for additional information.**
- Gloves (butyl rubber or neoprene), chemical splash goggles, and a face shield should be worn when handling high concentrations or large quantities (greater than 4 L) of nitric acid.
- When diluting nitric acid, **add the acid to water slowly.**
- Do not store nitric acid near materials it might react with. Nitric acid must be store in a compatible containment tray and **away from organic chemicals and bases**.

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Accidental Exposure

Any accidental exposure requires medical attention. Call 911 for medical assistance.

- **Inhalation:** If nitric acid mist or vapors are inhaled, immediately move to fresh air.
- **Skin Contact:** Immediately remove contaminated clothing and rinse profusely with water.
- **Eye Contact:** Using eyewash, flush eyes while holding eyelids open. Ensure contact lenses (if worn) have been removed.
- **Accidental ingestion:** Do not induce vomiting. Never give anything by mouth to an unconscious person.

Spill Response

Please review the Chemical Spills Fact Sheet for details regarding emergency and non-emergency spill cleanup. Review this fact sheet prior to work with chemicals in the lab and annually thereafter.

If there is a non-emergency spill within your capability to clean up, be sure not to use organic absorbing material, such as paper towels or sawdust, as a fire could result. After the initial cleanup, neutralize the area with a sodium carbonate solution and rinse with copious amounts of water.

Waste Disposal

Dispose of nitric acid in unused waste containers or containers that have previously held nitric acid solution. **DO NOT re-use containers** that previously contained incompatible materials, such as organic solvents.

Additional Information

For general information regarding the safe use of nitric acid, please contact Health, Safety, and Risk Management (HSRM) at hsrm@umn.edu or (612) 626-6002.

Resources

Prudent Practices Lab Safety Summary—Nitric Acid

Pub Chem Nitric Acid Laboratory Chemical Safety Summary (LCSS)

Video of the reaction between ethanol and nitric acid