

Nitric Acid

Safe Handling Guideline

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URL: <http://www-group.slac.stanford.edu/esh/eshmanual/references/chemsafetyGuideNitricAcid.pdf>

Synonyms

Aqua fortis, engraver's acid, hydrogen nitrate, red fuming nitric acid (RFNA), white fuming nitric acid (WFNA)

Reactivity and Physical Concerns

Incompatible with many organic materials, combustible materials, metallic powders, hydrogen sulfide, carbides, alcohols; reacts with water to produce heat; corrosive to metals. May generate hydrogen gas on contact with certain metals (e.g., aluminum). Not combustible but enhances combustion of other substances. May give off poisonous oxides of nitrogen and acid fumes when heated in fires. The substance decomposes on warming producing nitrogen oxides. The substance is a strong oxidant and reacts violently with combustible and reducing materials (e.g., turpentine, charcoal, alcohol). The substance is a strong acid: it reacts violently with bases. Reacts very violently with organic chemicals (e.g., acetone, acetic acid, acetic anhydride), causing fire and explosion hazard. Attacks some plastics. **Reacts explosively with metallic powders, carbides, cyanides, sulfides, alkalis, and turpentine.**

Exposure Hazards

Routes of Exposure

Inhalation may result in a burning sensation, cough, labored breathing, chemical pneumonia, unconsciousness, and death. Symptoms may be delayed. Skin contact may result in serious skin burns, pain, and yellow discoloration. Eye contact may result in redness, pain, and severe deep burns. Ingestion may result in abdominal pain, burning sensation, and shock.

Chronic Exposure

Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

First Aid

If exposed through inhalation, bring victim out into fresh air, keep in a half-upright position, do not allow to lay flat (fluid may accumulate in lungs), provide oxygen if needed. Artificial respiration may be needed. Obtain medical attention. **If skin contact occurs**, remove contaminated clothes. Flush skin with (cool or tepid) water or shower for 15 minutes. Obtain medical attention. **If eye contact occurs**, flush with cool or tepid water for at least 15 minutes (remove contact lenses if easily possible). Obtain medical attention. **If ingested, do not induce vomiting**. Give plenty of water to drink. Rest. Obtain medical attention. (See [Chemical Safety: Accidental Exposure Requirements](#) [SLAC-I-730-0A09S-041].)

Exposure Limits

- Permissible exposure limit: 5 mg/m³; 2 ppm (OSHA TWA)
- NIOSH recommended exposure limit: 5 mg/m³; 2 ppm (TWA)
- Immediately dangerous to life and health: 25 ppm

Exposure Controls

Engineering Controls

Local exhaust ventilation or breathing protection is required. Secondary containment of all storage and use is required if an exposure risk to employees or the environment is present.

Administrative Controls

Procedures should be developed for the safe use and handling of nitric acid in all applications. ESHQ can provide information and guidance. Depending upon quantities, certain regulatory permits and/or registrations may be required. Personnel working with the materials must receive detailed training on the hazards, safe use, and emergency procedures.

Personal Protective Equipment

Avoid all contact with substance. Prevent skin/eye contact through the use of impervious gloves, clothing, boots, apron, eye goggles and full face shield. If the airborne exposure limit may be exceeded and engineering controls are not feasible, wear appropriate respiratory protection.

Disposal

Material is disposed of as hazardous waste. Contact the Waste Management Group for specific disposal requirements and procedures. Containers and other materials that are contaminated with nitric acid must also be treated as hazardous waste.

Medical Monitoring (if applicable)

NIOSH recommends that workers subject to chronic nitric acid exposure have comprehensive pre-placement and annual medical examinations including a 14"X17" posterior-anterior chest x-ray, pulmonary function tests, and a visual examination of the teeth for evidence of dental erosion.

Emergency Response

In the event of a spill that poses a threat to health and/or the environment, immediately evacuate the area and call 911. Then call SLAC Site Security (ext. 5555 or 650-926-5555 from a cell phone) and notify your supervisor.

For other spills, notify your supervisor then SLAC Site Security; these may be cleaned up with appropriate spill response supplies by trained personnel who have been authorized via work planning and control. (See [Spills: Response, Cleanup, and Reporting Procedure](#) [SLAC-I-750-0A16C-006].)

Standards and Regulations

- OSHA. PEL: [29 CFR 1910.1000 Table Z-1](#); Respiratory Protection: [29 CFR 1910.134](#)
- EPA. Release: [40 CFR 355.40](#); Waste: [40 CFR 261.21-261.24](#)
- *California Fire Code*, Chapters 27 through 41 ([24 CCR Part 9](#))

Other References

- NLM. [TOXNET: Toxicology Data Network](#)
- NIOSH. *NIOSH Pocket Guide to Chemical Hazards* (NIOSH 2005-151), "[Nitric Acid](#)"
- NIOSH. International Chemical Safety Card: Nitric Acid ([ICSC 0183](#))