M4 SOLUTIONS
CONNECTED CHEMISTRY

Nitric Acid

Fact Sheet

Nitric acid (HNO_3) is a highly corrosive mineral acid with significant industrial and laboratory applications.

Chemical Properties

- Formula: HNO_3
- Appearance: Colorless liquid that can become yellowish with age (due to nitrogen dioxide formation)
- Molar mass: 63.01 g/mol
- Odor: Pungent
- Density: 1.51 g/cm³
- Boiling point: 83°C (181°F)
- Acidity (pKa): -1.4 (strong acid)
- Solubility: Completely miscible with water

Production

Nitric acid is primarily produced industrially via the Ostwald process:
Ammonia oxidation: $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$
Nitrogen oxide oxidation: $2NO + O_2 \rightarrow 2NO_2$
Absorption in water: $3NO_2 + H_2O \rightarrow 2HNO_3 + NO$

Applications

Industrial Uses:
Fertilizer production: Primary use is manufacturing ammonium nitrate fertilizers
Explosives: Component in manufacturing TNT, nitroglycerin, and other explosives
Metal processing: Used for metal etching, cleaning, and passivation
Chemical synthesis: Precursor for many organic compounds through nitration reactions
Laboratory Uses:

- Oxidizing agent in various chemical reactions
- Sample digestion for analytical chemistry
- Cleaning laboratory glassware

Product Name & Identification
Chemical Name: Nitric Acid
Alternate Names: Aqua Fortis, Hydrogen Nitrate
CAS #: 7697-37-2

Composition:
Typically 68% concentration in water.

Hazard Identification and Classification:
Classification: Corrosive (H314), Oxidizing Liquid (H271)
Hazards: Causes severe burns and eye damage.

Precautionary Statements:
P280: Wear protective gloves and clothing.
P301+P330+P331: If swallowed, rinse mouth. Do NOT induce vomiting.

Handling and Storage:
Store in acid-resistant containers in a cool, ventilated area away from bases and organic materials.

Safety Considerations

- Corrosivity: Causes severe burns to skin, eyes, and mucous membranes
- Oxidizer: Can intensify fires when in contact with combustible materials
- Toxic fumes: Releases nitrogen oxides when heated or decomposed
- Reactivity: Reacts violently with bases and many organic compounds

Transport Information:
UN Number: 2031
Class: 8 (Corrosive substances)