

Nitric Acid

Nitric Acid is a highly corrosive and powerful oxidizing mineral acid. It is one of the most important industrial acids, primarily used in the production of fertilizers and explosives.

1. Chemical Formula: HNO_3

2. Physical Properties

- **Appearance:** Pure nitric acid is a colorless volatile liquid. However, it often turns **yellow or reddish-brown** over time due to decomposition into nitrogen dioxide and water.
- **Odor:** It has a sharp, suffocating, and acid smell.
- **Concentrations:**
 - **Concentrated Nitric Acid:** Usually refers to a 68% solution.
 - **Fuming Nitric Acid:** Solutions containing 86% or more, which release white or red fumes.

3. Chemical Properties

- **Strong Acid:** It ionizes completely in water.
- **Powerful Oxidizer:** It reacts aggressively with metals, non-metals, and organic materials. Unlike many other acids, when reacting with metals (like Copper), it typically releases **nitrogen oxide** instead of hydrogen gas.
- **Instability:** It is sensitive to light and heat, which is why it is often stored in **amber-colored glass bottles** to prevent decomposition.

4. Key Applications

- **Fertilizers:** The vast majority of global production goes into making **Ammonium Nitrate**.
- **Explosives:** Essential for synthesizing TNT, Nitrocellulose, and Nitroglycerin.
- **Industrial Chemistry:** Used to produce adipic acid (for **Nylon**), dyes, and pharmaceuticals.
- **Electronics:** Essential for cleaning silicon wafers and etching circuits in semiconductor manufacturing.
- **Metalworking:** Used for **pickling** (removing impurities from stainless steel), etching, and "passivation" to prevent corrosion.
- **Rocketry:** Used as an oxidizer in liquid-fueled rockets.

5. Safety and Hazards

- **Health Hazards:** It causes severe **chemical burns** and permanent tissue damage. When it contacts skin, it turns the skin yellow due to the **xanthoproteic reaction**.
 - **Inhalation:** Breathing in vapors can cause severe respiratory irritation and pulmonary edema.
 - **Storage:** Must be kept away from organic solvents (like alcohols) and reducing agents to avoid violent reactions or explosions.
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