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School Materials Safety Manual:

No. 3 Ferric Nitrate Issued 2/87 Revision A, 6/92

♦ SECTION 1 INTRODUCTION

Material Ferric nitrate, ca 100%

Synonyms iron nitrate; iron (III) nitrate, anhydrous; iron trinitrate; nitric acid, iron (3⁺) salt.

Chemical Formula $\text{Fe}(\text{NO}_3)_3$

CAS Number 10421-48-4

DOT Classification Oxidizer, UN1466, listed as a Hazardous Material for Transportation (49 CFR 172.101)

EPA Classification Listed as a CERCLA Hazardous Substance (40 CFR 302.4)

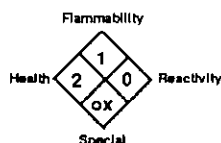
Not listed as a RCRA Hazardous Waste (40 CFR 261.33), a SARA Extremely Hazardous Substance (40 CFR 355), or a SARA Toxic Chemical (40 CFR 372.65)

OSHA Classification Listed as (iron salts, soluble, as Fe) an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

NFPA Hazard Rating Not found

Genium Hazard Rating

4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Minimum
ox = Oxidizer



HMIS

H 2
F 1
R 0

Description Deliquescent (absorbs moisture readily), pale violet or grayish-white crystals. Derived by adding concentrated nitric acid to scrap iron or iron oxide and then crystallizing. Used in analytical chemistry, tanning, dyeing (mordant for buffs and blacks), and weighting silks; and as a corrosion inhibitor.

Overview Ferric nitrate is irritating to eyes, nose, and throat and is moderately toxic by ingestion. It is a strong oxidizer that is a dangerous fire hazard, especially in contact with combustible materials (e.g., wood, paper, oil). The most common area of use in the school is in the chemistry laboratory. Wear chemical "splash- and dust-proof" safety goggles and chemically protective gloves when handling ferric nitrate.

Manufacturer Always request an up-to-date MSDS from your chemical supplier. That sheet should include the manufacturers and their emergency phone numbers. This *Manual's* Resources/Manufacturers Index lists some larger manufacturers and available emergency phone numbers.

♦ SECTION 2 USE AND STORAGE DATA

Preliminary Planning Considerations Plan and provide for safe disposal of all school-generated chemical waste. Check applicable regulations prior to use. Investigate the feasibility of microscale chemistry experiments to reduce the quantity required and disposal concerns. Whenever possible, substitute less hazardous materials. Provide adequate ventilation or restrict use to fume hood to avoid exceeding the OSHA PEL (Sec. 4). Avoid generating dust. Contact lens use when handling chemical materials is controversial. In some cases, soft lenses can actually protect eyes from chemicals. In other cases, chemical entrapment is presumed a possible hazard. Particles adhering to contact lens surfaces can cause corneal damage. For safety, wear safety glasses or goggles and appropriate protective clothing (e.g.,

gloves, lab coats) to work with ferric nitrate. Employees and students should know the location of eyewash and shower facilities near chemical use areas. Check and document that eyewash stations and safety showers are working properly. **Usage Precautions and Procedure** Before using, read this material's container label and follow all precautions. Do not smoke in usage or storage areas. Practice good housekeeping to avoid unintentionally mixing incompatibles. Do not allow chemical residue or dust buildup in lab or work areas. Keep ferric nitrate away from notebooks, textbooks, and personal belongings to avoid transporting chemical residues from the lab/work area. After working with chemical materials, and before eating, drinking, or smoking, always wash hands and face. Remove and launder contaminated clothing before reusing.

Additional Data Ferric nitrate is stable at room temperature under normal handling and storage conditions. It does not polymerize. Its incompatibilities include aluminum, cyanides, phosphorus, and acetylene gas; and reacts violently with reducing materials such as stannous chloride, thiocyanates, sodium hypophosphite, potassium ferrocyanide, tin, and magnesium.

Preferred Storage Location and Methods Store in tightly closed and properly labeled containers in a cool, dry, well-ventilated area out of direct sunlight and away from incompatibles. Do not store on wooden floors. Avoid storage of aqueous solutions in metal containers because ferric nitrate corrodes metals. To separate incompatible chemicals, store by chemical family, not by alphabetical name. Protect all chemical containers from physical damage. Prohibit smoking in chemical storage areas. Purchase amounts sufficient for one year's use or less.

♦ SECTION 3 SPILL/DISPOSAL PROCEDURES

If Spilled Ventilate spill area, remove heat and ignition sources, and evacuate all unnecessary personnel. Promptly and thoroughly clean up spilled material. Keep combustibles away from spilled material. Cleanup personnel should protect against dust inhalation and skin or eye contact. For liquid (solution) spills, neutralize with sodium bicarbonate or soda ash solution, cover with an inert solid absorbent (vermiculite, dry sand, etc.), and scoop into appropriate containers (with secure lid) for disposal in accordance with existing regulations. As needed, dike spill area with inert absorbent material to contain spill. For dry spills, carefully collect spilled material and scoop into secure disposal or reclamation containers. Avoid creating airborne dust conditions. Vacuum (with appropriate filter) or wet mop to minimize dust dispersion.

Disposal of Small Quantities Handle emptied containers carefully since residues may remain. Always check regulations before disposal. Investigate recycling or reclamation rather than landfill disposal. If these methods are not practical, feasible, or in accord with existing regulations, contact your supplier or a licensed disposal contractor for specific treatment/disposal procedures.

Disposal of Larger Amounts Contact your supplier or a licensed disposal company.

Follow all applicable local, state, and Federal regulations for all waste disposal.

◆ SECTION 4 HEALTH HAZARDS

Ferric nitrate dust may cause eye, nose, throat, and upper respiratory tract irritation. Skin or eye contact may cause severe irritation or burns, especially on prolonged contact. Ingestion of ferric nitrate may cause irritation or corrosive damage to the gastrointestinal tract.

1991-92 ACGIH TLV 8-hr TWA: 1 mg/m³ (Iron salts, soluble, as Fe)

1990 NIOSH REL 10-hr TWA: 1 mg/m³ (Iron salts, soluble, as Fe)

1991 OSHA PEL 8-hr TWA: 1 mg/m³ (Iron salts, soluble, as Fe)

1985-6 Toxicity Data Rat, oral, LD₅₀: 3250 mg/kg

Carcinogenicity Not listed by the IARC, NTP, or OSHA

Acute Effects Dust inhalation causes mucous membrane irritation of the eyes, nose, and throat. Excessive dust inhalation may result in pneumonitis (lung irritation) or pulmonary edema (fluid in lung). Symptoms may or may not be delayed. Direct skin and eye contact with ferric nitrate can cause irritation which tends to ease after removal from exposure. Ingestion may cause severe gastritis and gastroenteritis (inflammation of stomach and intestine) with abdominal pain, prolonged (sometimes bloody) vomiting, diarrhea, watery and later tarry feces, dehydration, headache, tiredness, shock (pale and clammy skin; rapid, weak, pulse; low blood pressure, and shallow breath), liver injury (usually reversible bleeding and death of local tissue), and possible death from shock. Recovery is usually complete for victims who survive the shock. With toxic ingestions, the initial symptom complex may be followed by a brief period of improvement prior to deterioration.

Chronic Effects Repeated high exposures may damage the liver or cause chronic obstructive pulmonary disease (small airway disease).

◆ SECTION 5 FIRST AID PROCEDURES

Eye Contact Promptly flush eyes with plenty of running water for at least 15 min, including under eyelids. Get prompt medical attention.

Skin Contact After flushing with large amounts of water, wash exposed areas with soap and water.

Inhalation Remove victim from area of exposure to fresh air and support breathing as necessary. Observe exposed patient carefully as delayed pulmonary edema can be fatal.

Ingestion Get *prompt* medical attention. Contact a poison control center*. Never give anything by mouth to an unconscious or convulsing person. Unless the poison control center advises otherwise, have that conscious and alert person drink 1 to 2 glasses of water, then induce vomiting.

Get proper in-school, paramedic, or community medical attention and support.

* See listings on pages 2-8 of *Resources/Manufacturers Index*.

◆ SECTION 6 FIRE PROCEDURES AND DATA

Fire Hazards Ferric nitrate can ignite other combustibles (wood, paper, oil) and accelerates burning when involved in fire. For major fires, or for fires involving large quantities, firefighters should wear appropriate protective clothing and respirators. Structural firefighters' protective clothing is permeable. Because fire may produce toxic thermal decomposition products, a self-contained breathing apparatus (SCBA) is recommended.

Flash Point and Method None reported

Autoignition Temperature None reported

Flammability Limits in Air (vol. %) None reported

Hazardous Decomposition Products Thermal oxidative decomposition of ferric nitrate can produce toxic nitrogen oxides (NO_x) and nitric acid vapors.

Extinguishing Media *Fight fires with water only!* Do not use dry chemical, carbon dioxide (CO₂), Halon, fog, or foam. For large fires, flood area with water from as far away as possible.

◆ SECTION 7 PHYSICAL DATA

Boiling Point Decomposes at 257 °F (125 °C)

Melting Point 117 °F (47.2 °C)

Solubility in Water Soluble, 150 g/100 cc in cold water; soluble in all proportions in hot water.

Other Solubilities Very soluble in alcohol and acetone; slightly soluble in cold concentrated nitric acid.

pH Solutions (nonahydrate) are corrosive to most metals

Molecular Weight 241.88

Density 1.684 at 77 °F (25 °C)

References 124, 127, 132, 136, 153, 163, 168; Genium's *Material Safety Data Sheets Collection*, No. 142 (11/91)

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