Material Safety Data Sheet
Nitric acid, red fuming

Section 1 - Chemical Product and Company Identification

MSDS Name: Nitric acid, red fuming
Catalog Numbers: AC611225000, A202-212, A202-500
Synonyms: RFNA; Red fuming nitric acid. (Fuming nitric acid is defined as concentrated nitric acid containing dissolved nitrogen dioxide.)

Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>&gt;90</td>
<td>231-714-2</td>
</tr>
<tr>
<td>10102-44-0</td>
<td>Nitrogen dioxide</td>
<td>&gt;6</td>
<td>233-272-6</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>&lt;5</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Appearance: yellow to brown-red liquid.
Danger: Causes severe eye and skin burns. Causes severe digestive and respiratory tract burns. Strong oxidizer. Contact with other material may cause a fire. May be fatal if inhaled. Acute pulmonary edema or chronic obstructive lung disease may occur from inhalation of the vapors of nitric acid. Check internal container upon receipt. Bottles should be vented periodically to relieve pressure.
Target Organs: Lungs, eyes, skin, mucous membranes.

Potential Health Effects
Eye: Causes severe eye burns. May cause irreversible eye injury.
Skin: Exposure of the skin to the liquid or concentrated vapor produces severe and penetrating burns. Concentrated nitric acid dyes human skin yellow on contact.
Ingestion: Causes gastrointestinal tract burns. May cause perforation of the digestive tract.
Inhalation: Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. May cause acute pulmonary edema, asphyxia, chemical pneumonitis, and upper airway obstruction caused by edema. Many human deaths from pulmonary edema, induced by the inhalation of high concentrations of nitrogen dioxide have been reported. There were at least 90 deaths prior to 1920 and over 60 between 1930 and 1956. The incidence of chronic effects from long exposures at low concentrations of NO2 is less well defined. (Doc of TLV)
Chronic: Exposure to high concentrations of nitric acid vapor may cause pneumonitis and pulmonary edema which may be fatal. Symptoms may or may not be delayed. Continued exposure to the vapor & mist of nitric acid may result in a chronic bronchitis, & more severe exposure results in a chemical pneumonitis. The vapor & mists of nitric acid may erode the teeth, particularly affecting the canines & incisors. Monkeys exposed to nitrogen dioxide at 10 ppm for 1 month or at 5 ppm for 2 months showed a marked decrease in resistance to infections. (Documentation of the TLVs, 7th edition)

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. Use water spray to keep fire-exposed containers cool. Vapors may accumulate in confined spaces. Contact with metals may evolve flammable hydrogen gas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out. 
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 0; Instability: 1; Special Hazard: OX

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind. Use water spray to cool and disperse vapors and protect personnel.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep from contact with clothing and other combustible materials. Discard contaminated shoes. Do not use with metal spatula or other metal items. Do not breathe vapor or mist. Use only with adequate ventilation or respiratory protection. Always add the acid to water, never the reverse.
Storage: Do not store near combustible materials. Do not store in direct sunlight. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Bottles should be vented periodically in order to overcome pressure buildup. Separate from organic materials. Avoid storage on wood floors. Shelves and floor material should be non-combustible and acid-resistant. Inspect periodically for damage or evidence of leaks or corrosion. This material may darken during storage due to photochemical reactions. Keep this bottle in a cool place and remove cap carefully to avoid spurting.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Nitrogen dioxide</td>
<td>3 ppm TWA; 5 ppm STEL</td>
<td>20 ppm IDLH</td>
<td>5 ppm Ceiling; 9 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Nitrogen dioxide: No OSHA Vacated PELs are listed for this chemical.
Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: yellow to brown-red
Odor: suffocating odor - strong odor - acrid odor
pH: Not available.
Vapor Pressure: 62 mm Hg @ 25 deg C
Vapor Density: 2.2 (air=1)
Evaporation Rate: Not available.
Viscosity: 0.761 cP 25 deg C
Boiling Point: 122 deg C
Freezing/Melting Point: -42 deg C
Decomposition Temperature: Not available.
Solubility: Freely Soluble.
Specific Gravity/Density: 1.5
Molecular Formula: HNO3 and NO2
Molecular Weight: 63.02

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. May decompose when exposed to light. Turns reddish-brown on exposure to light. Darkens on exposure to light.
Conditions to Avoid: Light, excess heat, confined spaces.
Incompatibilities with Other Materials: Incompatible with many substances, alcohols, aldehydes, combustible materials, cyanides,
metal powders, reducing agents, strong bases, organic solvents, turpentine, charcoal, Nitric acid reacts with over 150 chemicals. Reacts explosively with organic materials and combustible materials.

Hazardous Decomposition Products: Nitrogen oxides.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 10102-44-0: QW9800000
CAS# 7732-18-5: ZC0110000
LDS0/LC50:
CAS# 7697-37-2:
  Inhalation, rat: LC50 = 260 mg/m³/30M;
  Inhalation, rat: LC50 = 130 mg/m³/4H;
  Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

CAS# 10102-44-0:
  Inhalation, mouse: LC50 = 1000 ppm/10M;
  Inhalation, mouse: LC50 = 800 mg/m³/25M;
  Inhalation, mouse: LC50 = 900 mg/m³/2H;
  Inhalation, rabbit: LC50 = 315 ppm/15M;
  Inhalation, rabbit: LC50 = 60 mg/m³/15M;
  Inhalation, rabbit: LC50 = 12 mg/m³/15M;
  Inhalation, rat: LC50 = 88 ppm/4H;
  Inhalation, rat: LC50 = 220 mg/m³/1H;
  Inhalation, rat: LC50 = 310 mg/m³/30M;
  Inhalation, rat: LC50 = 790 mg/m³/5M;

CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10102-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: Nitric acid effects on newborn: biochemical and metabolic, Oral-rat TDLo=2345 mg/kg (female 18D post). Fetotoxicity: Stunted fetus, Oral-rat TDLo=21150 mg/kg (female 1-21D post).
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: CAS# 10102-44-0: waste number P078.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>Nitric Acid, Red Fuming</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td>8</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN2032</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>1</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7102-44-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ  CAS# 10102-44-0: 10 lb final RQ; 4.54 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
CAS# 7697-37-2: 1000 lb TPQ  CAS# 10102-44-0: 10 lb TPQ

**SARA Codes**
CAS# 7697-37-2: immediate, delayed, fire.

**Section 313**
This material contains Nitric acid (CAS# 7697-37-2, >90%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 10102-44-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
CAS# 7697-37-2 is considered highly hazardous by OSHA.  CAS# 10102-44-0 is considered highly hazardous by OSHA.

**STATE**
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 10102-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

**Risk Phrases:**
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.

**Safety Phrases:**
S 23 Do not inhale gas/fumes/vapour/spray.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**WGK (Water Danger/Protection)**
CAS# 7697-37-2: 1
CAS# 10102-44-0: 1
CAS# 7732-18-5: No information available.

**Canada - DSL/NDSL**
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 10102-44-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of E, C, D1A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 10102-44-0 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 8/10/1998
**Revision #8 Date:** 11/16/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.