



**MSDS FOR SARA REPORTS**

**Nitric Acid**  
**CAS# 7697-37-2**

<b>Health</b>	<b>4</b>
<b>Flammability</b>	<b>0</b>
<b>Reactivity</b>	<b>1</b>
<b>Special</b>	

```

* * * * *
*                               C H E M I N F O                               *
*                               *                                           *
* Canadian Centre for Occupational Health and Safety *
* * * * * Issue : 2000-4 (November, 2000) *
    
```

\*\*\* SECTION 1. CHEMICAL IDENTIFICATION \*\*\*

```

CHEMINFO RECORD NUMBER      : 292
CCOHS CHEMICAL NAME         : Nitric acid
SYNONYMS :
* Acide nitrique
* Aqua fortis
* Azotic acid
* Hydrogen nitrate
CAS REGISTRY NUMBER         : 7697-37-2
UN/NA NUMBER(S)            : 2031, 2032
RTECS NUMBER(S)            : QU5775000
EU EINECS/ELINCS NUMBER    : 231-714-2
CHEMICAL FAMILY             : Inorganic acid; nitrate
MOLECULAR FORMULA          : H-N-O3
STRUCTURAL FORMULA         : H-O-N(O)=O
    
```

STATUS :

The CHEMINFO record for this chemical is complete. The full format ("TOTAL") provides a detailed evaluation of health, fire and reactivity hazards, as well as recommendations on topics such as handling and storage, personal protective equipment, accidental release and first aid.

\*\*\* SECTION 2. DESCRIPTION \*\*\*

APPEARANCE AND ODOUR :

Clear, colourless or yellowish liquid with an acrid, choking odour. Hygroscopic (absorbs moisture from the air).

ODOUR THRESHOLD :

0.75 to 2.5 mg/m3 (detection) (2)

WARNING PROPERTIES :

NOT RELIABLE - odour threshold about the same magnitude as TLV. Irritation reported at 155 mg/m3 (30 times greater than TLV).(2)

COMPOSITION/PURITY :

"Concentrated" nitric acid is commercially available at concentrations ranging from 50 to 70% (wt/wt), with limited amounts (0.5%) of chlorides, sulfate, arsenic, heavy metals and iron. Very low levels (below 0.1%) of

nitrogen oxides may also be present.

This document will deal primarily with the hazards and safe handling of concentrated nitric acid. This document will not deal with the hazards of concentrated "fuming" nitric acid. "Fuming" acids are usually greater than 85 percent nitric acid, and contain significant amounts of nitrogen oxides.(1)

USES AND OCCURRENCES :

Used in manufacture of ammonium nitrate for fertilizer and explosives; organic chemicals such as dyes, explosives, nitrates, nylon; for etching and cleaning metals and photoengraving.(1)

\*\*\* SECTION 3. HAZARDS IDENTIFICATION \*\*\*

\*\* POTENTIAL HEALTH EFFECTS \*\*

EFFECTS OF SHORT-TERM (ACUTE) EXPOSURE :

INHALATION :

Nitrogen oxide gases such as nitrogen dioxide present at low levels in nitric acid contribute significantly to toxic effects of inhaling vapours and mists. Severity of effects are dependent on the concentration of acid and nitrogen oxides, particularly nitrogen dioxide, and the duration of exposure.

Vapour or mist may cause the sensation of a choking, burning throat or cause coughing, chest pain and difficult breathing. These symptoms may be very mild or may be delayed several hours. Other more serious symptoms may develop without prior warning. Within 24 hours, symptoms of moderate to severe breathing difficulties and bluish-coloured skin (cyanosis) may progress very rapidly to cause death, by swelling of lung tissues (bronchopneumonia) or fluid in the lungs (pulmonary edema).(5,7)

SKIN CONTACT :

Contact with dilute solutions may cause mild irritation and stain the skin a yellowish to brownish colour. The skin may harden without being damaged. Concentrated nitric acid causes severe pain and skin burns. The affected area (deeply stained) may become ulcerated with the damaged skin shedding off. Permanent skin damage (scarring) may result. Contact with large areas of skin can be fatal if the acid is not washed away immediately.(7)

EYE CONTACT :

Vapour can cause irritation and tearing of the eyes. Mists can probably cause severe irritation or injury if exposure is prolonged. Contact with concentrated nitric acid liquid can cause immediate and severe tissue damage resulting in blindness, which may be irreversible.(10)

INGESTION :

Nitric acid can cause severe pain and corrosive burns to mouth, throat and stomach, abdominal pain, nausea, vomiting and shock. Death may occur within hours of severe poisoning, or may be delayed for days or weeks.(7) Small doses (less than 10 mL) may be fatal.(4,13) Aspiration of acid ("breathing" of liquid into lungs) during ingestion or vomiting may cause severe and fatal lung damage. The symptoms of lung damage, such as breathing difficulties may be delayed for several hours.

EFFECTS OF LONG-TERM (CHRONIC) EXPOSURE :

Long-term exposure is unlikely to result in significant absorption by any route because of nitric acid's acute corrosive effects.

INHALATION: Repeated exposure to nitric acid vapour and mist may cause lung damage such as swelling of lung tissues and air passages (chronic pneumonitis and bronchitis).(9)

DENTAL EROSION: Repeated exposures to nitric acid vapour and mist may cause the breakdown of tooth enamel. Most studies describe exposure to both sulfuric and nitric acid. However, one study reported that 3 of 32 workers exposed to nitric acid alone had "active dental erosion".(7)

CARCINOGENICITY :

Information not available

TERATOGENICITY AND EMBRYOTOXICITY :

No information is available.

REPRODUCTIVE TOXICITY :

No information is available

MUTAGENICITY :

No human information is available. One in-vitro mammalian cell test was negative.(7)

TOXICOLOGICALLY SYNERGISTIC MATERIALS :

No information available

POTENTIAL FOR ACCUMULATION :  
Not expected to accumulate

\*\*\* SECTION 4. FIRST AID MEASURES \*\*\*

INHALATION :

Take proper precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment, use the "buddy" system). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by a trained personnel, preferably on a doctor's advice. Do not allow victim to move about unnecessarily. Symptoms of lung damage can be delayed up to 48 hours after exposure. Immediately transport victim to an emergency care facility.

SKIN CONTACT :

Avoid direct contact with this chemical. Wear chemical protective clothing, if necessary. As quickly as possible, flush contaminated area with lukewarm, gently running water for at least 20-30 minutes, by the clock. DO NOT INTERRUPT FLUSHING. If necessary, keep emergency vehicle waiting. Under running water, remove contaminated clothing, shoes, and leather goods (e.g., watchbands, belts). Obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before reuse or discard.

EYE CONTACT :

Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 20-30 minutes, by the clock, holding the eyelid(s) open. Neutral saline may be used as soon as it is available. DO NOT INTERRUPT FLUSHING. If necessary, keep emergency vehicle waiting. Take care not to rinse contaminated water into the unaffected eye or onto the face. If irritation persists, repeat flushing. Quickly transport victim to an emergency care facility.

INGESTION :

Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 mL (8 to 10 oz.) of water. If milk is available, it may be administered after the water has been given. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat administration of water. Quickly transport victim to an emergency facility.

FIRST AID COMMENTS :

Provide general supportive measures (comfort, warmth, rest). Consult a physician and/or the nearest Poison Control Centre for all exposures except minor instances of inhalation or skin contact. Some recommendations in the above sections may be considered medical acts in some jurisdictions. These recommendations should be reviewed with a physician and appropriate delegation of authority obtained, as required. All first aid procedures should be periodically reviewed by a physician familiar with the material and its conditions of use in the workplace.

\*\*\* SECTION 5. FIRE FIGHTING MEASURES \*\*\*

FLASH POINT :

Noncombustible. Does not burn.

LOWER FLAMMABLE (EXPLOSIVE) LIMIT (LFL/LEL) :

Not applicable

UPPER FLAMMABLE (EXPLOSIVE) LIMIT (UFL/UEL) :

Not applicable

AUTOIGNITION (IGNITION) TEMPERATURE :

Not applicable

EXPLOSION DATA - SENSITIVITY TO MECHANICAL IMPACT :

Probably not sensitive. Normally stable.

EXPLOSION DATA - SENSITIVITY TO STATIC CHARGE :

Not sensitive. Does not burn when heated.

COMBUSTION AND THERMAL DECOMPOSITION PRODUCTS :

Liquid decomposes to a limited extent when heated, producing nitrogen oxides.(3)

FIRE HAZARD COMMENTS :

Concentrated nitric acid is a strong oxidizer and its heat of reaction with reducing agents or combustible organic materials may cause ignition or explosion.

EXTINGUISHING MEDIA :

Does not burn. Use fire extinguishers appropriate for surrounding fire.

FIRE FIGHTING INSTRUCTIONS :

Use water spray as a fog to cool nearby containers and structures exposed to fire.

\*\* NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD INDEX \*\*

NFPA - HEALTH : 4 - Very short exposure could cause death or major residual injury (Nitric acid fuming, Nitric acid above 40%); 3 - Short exposure could cause serious injury or residual injury (Nitric acid less than or equal to 40%)  
NFPA - FLAMMABILITY : 0 - Will not burn (Nitric acid fuming; greater than 40% nitric acid and less than or equal to 40% nitric acid)  
NFPA - REACTIVITY : 1 - Normally stable but can become unstable at elevated temperatures and pressures, or may react non-violently with water (Nitric acid fuming); 0 - Normally stable under fire conditions and not reactive with water (Nitric acid greater than 40% or Nitric acid less than or equal to 40%)  
NFPA - SPECIFIC HAZARDS : OXIDIZING MATERIAL (Nitric acid, fuming or greater than 40% nitric acid)

\*\*\* SECTION 6. ACCIDENTAL RELEASE MEASURES \*\*\*

PRECAUTIONS :

Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Dangerous levels of nitrogen oxides may form during spills of nitric acid.(7) Consider evacuation of downwind areas. Wear adequate personal protective equipment. Ventilate area. Extinguish or remove all ignition sources. Remove or isolate flammable and combustible materials. Notify government occupational health and safety and environmental authorities.

CLEAN-UP :

Do not touch spilled material. Prevent material from entering sewers, waterways or confined spaces. Keep materials which can burn away from spilled material. Stop or reduce leak if safe to do so. Contain spill with earth, sand, or absorbent material which does not react with spilled material. Do not use sawdust or other organic materials, which will react with nitric acid creating a fire or health hazard. Small spills: Soak up spill with absorbent material which does not react with spilled chemical. Put material in suitable, covered, labelled containers. Flush area with large quantities of water. Contaminated absorbent material will pose the same hazards as the spilled product. Only trained personnel should attempt to neutralize spills. Neutralizing spill with sodium bicarbonate, sodium carbonate or calcium carbonate will produce large amounts of carbon dioxide gas. Ensure adequate ventilation. Large spills: Evacuate area. Contact fire and emergency services and supplier for advice.

\*\*\* SECTION 7. HANDLING AND STORAGE \*\*\*

HANDLING :

Prevent release of vapours or mists into workplace air. Always ensure adequate ventilation in handling areas since nitric acid is a direct fire hazard (as an oxidizing agent). When diluting or preparing solutions, slowly add acid to water and ensure there is adequate ventilation. Use smallest possible amounts in designated areas with adequate ventilation. Have emergency equipment (for fires, spills, leaks, etc.)

readily available.

Label containers. Keep containers closed when not in use. Empty containers contain residues which are hazardous.

STORAGE :

Store in a cool, dry, well-ventilated area, out of direct sunlight and away from sources of heat.

Store away from incompatible materials such as flammable materials, oxidizing materials, reducing materials, strong bases.

Use corrosion-resistant structural materials and lighting and ventilation systems in the storage area.

Wood and other organic/combustible materials should not be used on floors, structural materials and ventilation systems in the storage area. See Reference 13 for additional advice regarding suitable materials of construction.

Use airtight containers, kept well sealed, securely labelled and protected from damage.

Use suitable, approved storage cabinets, tanks, rooms and buildings.

Suitable storage may include glass bottles and carboys.

Storage tanks should be above ground and surrounded with dikes capable of holding entire contents.

Limit quantity of material in storage. Restrict access to storage area.

Post warning signs when appropriate. Keep storage area separate from populated work areas. Inspect periodically for deficiencies such as damage or leaks.

Have appropriate fire extinguishers available in and near the storage area.

\*\*\* SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION \*\*\*

NOTE : Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on the extent of exposure. This general information can be used to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire, and other applicable regulations.

SAMPLING AND ANALYSIS :

Use appropriate instrumentation and sampling strategy (location, timing, duration, frequency, and number of samples). Interpretation of the sampling results is related to these variables and the analytical method. Sampling should be carried out by trained personnel.

OSHA METHOD - OSHA CD ROM (OSHA A95-3). US Department of Labour, June 1995. Partially validated method. Collection on treated silica gel sorbent tube. Analysis by ion chromatography (IC). (OSHA Method ID165SG. For details, contact the Salt Lake Technical Centre at (801) 487-0267).

NIOSH METHOD 7903 - NIOSH Manual of Analytical Methods. 4th ed. Vol. 1. Fully evaluated method for Acids, Inorganic including Nitric acid. Collection on washed silica gel sorbent tube. Desorption with 1.7 mM Sodium bicarbonate/1.8 mM Sodium carbonate. Analysis by ion chromatography (IC). Estimated detection limit of 0.7 ug.

COLORIMETRIC - INDICATING (DETECTOR) TUBES: Commercially available.

ENGINEERING CONTROLS :

Engineering methods to control hazardous conditions are preferred. Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification (e.g., substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required.

Because of the high potential hazard associated with this substance, stringent control measures such as enclosure or isolation may be necessary. Use a corrosion-resistant local exhaust ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside. Supply sufficient replacement air to make up for air removed by exhaust system.

Treatment of exhaust emissions to prevent environmental contamination may be required.

NOTE: Do not use organic or combustible materials such as wood in the

construction of ventilation or control systems.

See reference 13 for advice regarding suitable materials of construction.

PERSONAL PROTECTIVE EQUIPMENT :

If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer to the CSA Standard Z94.4-93, "Selection, Use and Care of Respirators," available from the Canadian Standards Association, Rexdale, Ontario, M9W 1R3.

RESPIRATORY PROTECTION GUIDELINES :

NIOSH/OSHA RECOMMENDATIONS FOR NITRIC ACID CONCENTRATIONS IN AIR (11):

.  
UP TO 25 ppm: SAR operated in a continuous-flow mode\*; or full-facepiece chemical cartridge respirator with cartridge(s) to protect against nitric acid\*\*; or gas mask with canister to protect against nitric acid\*\*; or full-facepiece SCBA; or full-facepiece SAR.

.  
EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATION OR IDLH CONDITIONS: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

.  
ESCAPE: Gas mask with canister to protect against nitric acid\*\*; or escape-type SCBA.

.  
\*NOTE: Substance reported to cause eye irritation or damage; may require eye protection.

.  
\*\*NOTE: Only non-oxidizable sorbents are allowed (not charcoal).

.  
NOTE: The IDLH concentration for nitric acid is 25 ppm.

NOTE: The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory protection equipment. In the event of failure of respiratory protective equipment every effort should be made to exit immediately.

.  
ABBREVIATIONS: SAR = supplied-air respirator; SCBA = self-contained breathing apparatus. IDLH = Immediately Dangerous to Life or Health.

.  
Recommendations apply only to NIOSH approved respirators.

EYE/FACE PROTECTION :

Chemical safety goggles. A face shield may also be necessary.

SKIN PROTECTION :

Chemical protective gloves, coveralls, boots, and/or other resistant protective clothing to prevent all possible contact.  
Have a safety shower/eye-wash fountain readily available in the immediate work area.

RESISTANCE OF MATERIALS FOR PROTECTIVE CLOTHING :

Guidelines for Nitric acid, red fuming (12):

RECOMMENDED (resistance to breakthrough longer than 8 hours): Teflon(TM), CPF 3(TM), Tychem 10000(TM).

RECOMMENDED (estimated resistance to breakthrough longer than 4 hours): Responder(TM).

NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour): Natural rubber, Neoprene, Nitrile rubber, Polyethylene, Polyvinyl alcohol, Polyvinyl chloride, Viton(TM).

.  
Guidelines for Nitric acid above 70 percent (12):

CAUTION, use for short periods only (resistance to breakthrough within 1 to 4 hours): Saranex(TM), 4H(TM) (polyethylene/ethylene vinyl alcohol).

NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour): Nitrile rubber, Polyethylene, Polyvinyl alcohol.

.  
Guidelines for Nitric acid 30-70 percent (12):

RECOMMENDED (resistance to breakthrough longer than 8 hours): Butyl rubber, Viton(TM), Saranex(TM), Barricade(TM), CPF 3(TM), Trellech HPS(TM), Tychem 10000(TM).

RECOMMENDED (resistance to breakthrough longer than 4 hours): Neoprene,

Polyethylene, 4H(TM)(polyethylene/ethylene vinyl alcohol), Responder(TM).  
CAUTION, use for short periods only (resistance to breakthrough within 1 to 4 hours): Polyvinylchloride.

NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour):  
Natural rubber, Nitrile rubber, Polyvinyl alcohol.

.  
Guidelines for Nitric acid less than 30 percent (12):  
RECOMMENDED (resistance to breakthrough longer than 8 hours): Butyl rubber, Natural rubber, Neoprene, Nitrile rubber, Polyvinyl chloride, Viton(TM), Saranex(TM), Barricade(TM), CPF 3(TM), Trellech HPS(TM), Tychem 10000(TM).  
RECOMMENDED (resistance to breakthrough longer than 4 hours):  
Polyethylene, 4H(TM)(polyethylene/ethylene vinyl alcohol), Responder(TM).  
NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour):  
Polyvinyl alcohol.

.  
There is evidence that this material (Nitric acid, red fuming and Nitric acid at concentrations above 30%) can cause serious skin injury (e.g., corrosion or absorption hazard).  
Recommendations are NOT valid for very thin natural rubber, neoprene, nitrile and pvc gloves (0.3 mm or less).  
Recommendations are valid for permeation rates reaching 0.1 ug/cm<sup>2</sup>/min or 1 mg/m<sup>2</sup>/min and over. Resistance of specific materials can vary from product to product. Breakthrough times are obtained under conditions of continuous contact, generally at room temperature. Evaluate resistance under conditions of use and maintain clothing carefully.

EXPOSURE CONTROLS/PERSONAL PROTECTION COMMENTS :

Remove contaminated clothing immediately. Keep contaminated clothing thoroughly wet or immersed in water in closed containers. Discard or launder before re-wearing. Inform laundry personnel of contaminant's hazards.

Do not eat or drink in work areas.  
Maintain good housekeeping.

\*\* EXPOSURE GUIDELINES \*\*

\* THRESHOLD LIMIT VALUES (TLVs) / AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) / 2000 \*

TIME-WEIGHTED AVERAGE (TLV-TWA) : 2 ppm (5.2 mg/m<sup>3</sup>)

SHORT-TERM EXPOSURE LIMIT (TLV-STEL) :

4 ppm (10 mg/m<sup>3</sup>)

TLV BASIS - CRITICAL EFFECT(S) : Irritation  
Corrosion  
Pulmonary edema (accumulation of fluid in the lungs)

TLV COMMENTS :

NOTE: In many jurisdictions, exposure limits are similar to the ACGIH TLVs. Since the manner in which exposure limits are established, interpreted, and implemented can vary, obtain detailed information from the appropriate government agency in each jurisdiction.

\* PERMISSIBLE EXPOSURE LIMITS (PELs) / FINAL RULE LIMITS / U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) \*

TIME WEIGHTED AVERAGE (PEL-TWA) : 2 ppm (5 mg/m<sup>3</sup>)

SHORT TERM EXPOSURE LIMIT (PEL-STEL) :

4 ppm (10 mg/m<sup>3</sup>)

NOTE: The OSHA PEL Final Rule Limits are currently non-enforceable due to a court decision. The OSHA PEL Transitional Limits are now in force.

\* PERMISSIBLE EXPOSURE LIMITS (PELs) / TRANSITIONAL LIMITS / U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) \*

TIME WEIGHTED AVERAGE (PEL-TWA) : 2 ppm (5 mg/m<sup>3</sup>)

\*\*\* SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES \*\*\*

MOLECULAR WEIGHT : 63.02  
 CONVERSION FACTOR :  
 1 ppm = 2.57 mg/m<sup>3</sup>; 1 mg/m<sup>3</sup> = 0.39 ppm at 25 deg C  
 MELTING POINT : -41 deg C (-42 deg F) (70% nitric acid) (3)  
 BOILING POINT : 122 deg C (250 deg F) (70% nitric acid) (3)  
 RELATIVE DENSITY (SPECIFIC GRAVITY) :  
 1.41 (70% nitric acid) (water = 1) (3)  
 SOLUBILITY IN WATER :  
 Completely miscible (soluble) in water  
 SOLUBILITY IN OTHER LIQUIDS :  
 Information not available. Reacts with many organic solvents (e.g.  
 ethanol, acetone).  
 VAPOUR DENSITY : 2.17 (HNO<sub>3</sub>); 2 to 3 (estimated) (air = 1) (6)  
 VAPOUR PRESSURE : 5.5 mm Hg (0.73 kPa) at 20 deg C (70% acid)  
 (3); 7.1 mm Hg (0.95 kPa) at  
 20 deg C (70% acid) (14)  
 SATURATION VAPOUR CONCENTRATION : 7200 ppm at 20 deg C; 9300 ppm at 20 deg C  
 (calculated)  
 EVAPORATION RATE : Information not available  
 pH VALUE : 1.0 (0.1 M solution); strongly acidic (pKa =  
 -1.4)  
 CRITICAL TEMPERATURE : Information not available  
 COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT) :  
 Not available  
 OTHER PHYSICAL PROPERTIES :  
 VISCOSITY - DYNAMIC: 2 centipoise (2 mPa.s) at 20 deg C; 0.9 centipoise  
 (0.9 mPa.s) at 20 deg C (100 percent acid)

\*\*\* SECTION 10. STABILITY AND REACTIVITY \*\*\*

STABILITY :

Normally stable. Liquid exposed to light decomposes slowly to produce nitrogen oxides, producing a yellowish colour.

HAZARDOUS POLYMERIZATION :

Does not occur

HAZARDOUS DECOMPOSITION PRODUCTS :

Nitrogen oxides

INCOMPATIBILITY - MATERIALS TO AVOID :

Nitric acid is an oxidizing agent and is very reactive. Nitric acid is the common chemical most frequently involved in reactive incidents.(17) References 8, 13 and 17 review hazardous reactions and incompatible materials.

.

MOST METALS, METAL OXIDES AND POWDERED METALS (e.g., antimony, bismuth, lithium, magnesium, manganese, titanium) - may react violently or explosively generating heat - may react to release nitrogen oxides.

.

ORGANIC CHEMICALS (e.g., anhydrides, ketones, alcohols, nitriles, amines, aldehydes, ethers, hydrocarbons, nitroaromatics, alkanes) - may react violently or explosively, igniting spontaneously.

.

ORGANIC SOLIDS (e.g., paper, clothing, charcoal, sawdust) - can react violently or explosively or ignite spontaneously, immediately or after delay.

.

VARIOUS SULFIDES, NON-METAL HYDRIDES AND CARBIDES - may react violently or explosively, igniting spontaneously or after delay.

.

REDUCING MATERIALS - react violently or explosively.

CORROSIVITY TO METALS :

Corrosive to almost all metals, except stainless steel, aluminum, gold and platinum-type metals.(3)

STABILITY AND REACTIVITY COMMENTS :

Mixing concentrated nitric acid with water generates heat which can cause splattering of liquid or bursting of containers.

\*\*\* SECTION 11. TOXICOLOGICAL INFORMATION \*\*\*

INHALATION: A single exposure to 63 mg/m<sup>3</sup> nitric acid mist (exposure duration not indicated) had no apparent effect on rats.(9)

.

INHALATION STUDIES: Dogs exposed (by intubation) to an aerosol of 1% nitric acid for 2 hours/day on alternate days for four weeks, showed tissue damage and inflammation in lungs and air passages (total volume inhaled: 240 mL). Lung function was reduced in the test animals.(15)

LONG-TERM INGESTION EFFECTS: The toxic effects of nitrates vary widely among different species. The most common major reported effect was methemoglobinemia (a reversible but potentially life-threatening condition affecting the ability of the blood to carry oxygen).(16)

MUTAGENICITY: Not mutagenic in an in-vitro mammalian cell test (transformation of Syrian Hamster Embryo cells).(4)

\*\*\* SECTION 12. ECOLOGICAL INFORMATION \*\*\*

NOTE : This section is subject to future development.

\*\*\* SECTION 13. DISPOSAL CONSIDERATIONS \*\*\*

Review federal, provincial and local government requirements prior to disposal. Authorities may not permit disposal of waste nitric acid until certain neutralization standards have been achieved. Store material for disposal as indicated in Storage Conditions. Disposal by secure landfill may be acceptable.

\*\*\* SECTION 14. TRANSPORT INFORMATION \*\*\*

\*\* CANADIAN TRANSPORTATION OF DANGEROUS GOODS (TDG)  
SHIPPING INFORMATION \*\*

SHIPPING NAME AND DESCRIPTION: Nitric acid, other than red fuming  
PRODUCT IDENTIFICATION NUMBER (PIN): 2031  
CLASSIFICATION: 8 - Corrosive substance; 9.2 - Substance hazardous to the environment  
SPECIAL PROVISIONS: 109  
PACKING GROUP: II  
REGULATED LIMIT: 50 kg

SHIPPING NAME AND DESCRIPTION: Nitric acid, red fuming  
PRODUCT IDENTIFICATION NUMBER (PIN): 2032  
CLASSIFICATION: 8 - Corrosive substance; 5.1 - Oxidizing substance; 6.1 - Poisonous substance; 9.2 - Substance hazardous to the environment  
SPECIAL PROVISIONS: 102; 109  
PACKING GROUP: I  
REGULATED LIMIT: 50 kg

NOTE: This information incorporates Schedule No. 21 amendments to the Transportation of Dangerous Goods Act, 1992, effective December 13, 1995.

\*\* U.S. DEPARTMENT OF TRANSPORT (DOT) HAZARDOUS  
MATERIALS SHIPPING INFORMATION (49 CFR) \*\*

HAZARDOUS MATERIAL DESCRIPTION AND PROPER SHIPPING NAME: Nitric acid, other than red fuming, with more than 70 percent Nitric acid  
HAZARD CLASS OR DIVISION: 8  
IDENTIFICATION NUMBER: UN2031  
PACKING GROUP: I

HAZARDOUS MATERIAL DESCRIPTION AND PROPER SHIPPING NAME: Nitric acid, other than red fuming, with not more than 70 percent Nitric acid  
HAZARD CLASS OR DIVISION: 8  
IDENTIFICATION NUMBER: UN2031  
PACKING GROUP: II

HAZARDOUS MATERIAL DESCRIPTION AND PROPER SHIPPING NAME: Nitric acid, red fuming  
HAZARD CLASS OR DIVISION: 8  
IDENTIFICATION NUMBER: UN2032  
PACKING GROUP: I

NOTE : This information was taken from the U.S. Code of Federal

Regulations Title 49 - Transportation and is effective  
October 1, 1997.

\*\*\* SECTION 15. REGULATORY INFORMATION \*\*\*

\*\* CANADIAN WORKPLACE HAZARDOUS MATERIALS  
INFORMATION SYSTEM (WHMIS) \*\*

PROPOSED WHMIS CLASSIFICATION :

C - Oxidizing material  
E - Corrosive material

WHMIS HEALTH EFFECTS :

Corrosive to skin  
TDG class 8 - corrosive substance

WHMIS INGREDIENT DISCLOSURE LIST :

Included for disclosure at 1% or greater

DETAILED WHMIS CLASSIFICATION ACCORDING TO CRITERIA :

CLASS A - COMPRESSED GAS: Does not meet criteria  
CLASS B - FLAMMABLE & COMBUSTIBLE MATERIAL: Does not meet criteria  
CLASS C - OXIDIZING MATERIAL: Meets criteria; causes or contributes to the  
combustion of another material by yielding oxygen or other oxidizing  
substance.  
CLASS D - POISONOUS AND INFECTIOUS MATERIAL. DIVISION 1 - IMMEDIATE AND  
SERIOUS TOXIC EFFECTS: Insufficient information for classification  
Acute Lethality: Insufficient information  
CLASS D - POISONOUS AND INFECTIOUS MATERIAL. DIVISION 2 - OTHER TOXIC  
EFFECTS: Insufficient information for classification; see detailed  
evaluation below.  
CHRONIC TOXIC EFFECTS: Insufficient information  
CARCINOGENICITY: Insufficient information  
TERATOGENICITY AND EMBRYOTOXICITY: Insufficient information  
REPRODUCTIVE TOXICITY: Insufficient information  
MUTAGENICITY: Insufficient information