

MATERIAL SAFETY DATA SHEET

NITRIC ACID, 50 TO 70 % (35 TO 42 BAUME, TOWER GRADE)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Terralink Horticulture Inc.
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(604) 864-9044

WHMIS Number: 00060521
Index: GCD0032/05A

Website: www.store.tlhort.com

EMERGENCY TELEPHONE NUMBERS (FOR EMERGENCIES INVOLVING CHEMICAL SPILLS OR RELEASE)

CEDA Emergency Response Team 24 Hours: 604-540-4100 Chemical Spills: 1-800-663-3456

PRODUCT IDENTIFICATION

Product Name: Nitric Acid, 50 to 70 %, (35 to 42 Baume, Tower Grade).
Chemical Name: Nitric Acid.
Synonyms: Azotic acid; Engravers Acid; Aqua Fortis; Hydrogen Nitrate.
Chemical Family: Aqueous mixture of Inorganic Acid. Mineral Acid.
Molecular Formula: HNO₃.
Product Use: Chemical intermediate. Oxidizing agent.
CAS #: 7697-37-2.
WHMIS Classification / Symbol: C: Oxidizer, D-1A: Very Toxic (acute effects), E: Corrosive.



READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Corrosive! Toxic! Toxic effects are principally related to its corrosive properties. May be fatal if inhaled or swallowed. Causes severe skin and eye burns. Vapours are extremely irritating to eyes and respiratory tract. Strong, offensive odor. See "Other Health Effects" Section. Prolonged or repeated exposure may cause discoloration and erosion of teeth. Can decompose at high temperatures forming toxic gases. Oxidizing material. Contact with other combustible material can cause fire. Drying on clothing or other combustible material may cause fire. Reacts with water. Contents may develop pressure on prolonged exposure to heat.

POTENTIAL HEALTH EFFECTS

- . Inhalation: Corrosive! Toxic! Product may cause severe irritation of the nose, throat and respiratory tract. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary oedema (fluid build-up in lungs), and reduction of pulmonary function. Can cause injury to entire respiratory tract. See "Other Health Effects" Section.
- . Skin Contact: Corrosive! Burns (chemical) can occur if not promptly removed. Prolonged, confined (especially under the finger nails, under rings or watch bands) or repeated exposure may cause skin irritation and possibly lead to (chemical) burns. Prolonged and

repeated contact may lead to dermatitis. Toxic effects may be delayed.

- . Skin Absorption: Not likely to be absorbed through the skin. Skin absorption is a secondary concern to the continual destruction of tissue while the product is in contact with the skin. Burns (chemical) can occur if not promptly removed.
- . Eye Contact: Extremely corrosive! This product causes corneal scarring and clouding. Glaucoma, cataracts and permanent blindness may occur.
- . Ingestion: Corrosive! This product causes severe burning and pain in the mouth, throat and abdomen. Vomiting, diarrhea and perforation of the esophagus and stomach lining may occur. Swallowing this material causes severe burns to the mouth, throat and stomach, death may result. Severe scarring of the throat may occur. (3)

Other Health Effects: Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential.

May cause methemoglobinemia, metabolic acidosis, staining, chemical pneumonitis, pulmonary oedema, shock, coma and death. Initial manifestation of methemoglobinemia is cyanosis, characterized by navy blue, almost black lips, tongue, and mucous membranes, with skin colour being slate gray. Further manifestation is characterized by vomiting, headache, blurring of vision, ataxia, weakness, dizziness, stupor, rapid heartbeat, syncope, dyspnea, respiratory distress and death due to anoxia. Metabolic acidosis is a condition that describes a decreased pH and bicarbonate concentration in the body fluids. Pulmonary oedema is the build-up of fluid in the lungs that might be fatal. Symptoms of pulmonary oedema, such as shortness of breath, may not appear until several hours after exposure and are aggravated by physical exertion. (4)

Nitric Acid: This material is corrosive to all body tissues. Inhalation of Nitric Acid mist or fumes at 2 to 25 ppm, over an 8 hour period may cause pulmonary irritation and symptoms of lung damage. The onset of symptoms may be delayed for several hours. Concentrations over 200 ppm can cause severe pulmonary damage and may be fatal (in 5 - 10 hours) after several minutes of exposure. Eye or skin contact will produce immediate burns, with a yellow skin discolouration; eyes may be permanently damaged. Ingestion will produce burns of the digestive tract. (3)

If ingested, Nitrates may be reduced to nitrites by bacteria in the digestive tract. Signs and symptoms of nitrite poisoning include cyanosis (due to methemoglobin formation), nausea, dizziness and increased heart rate.

3. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

<u>Hazardous Ingredients</u>	<u>CAS No.</u>	<u>ACGIH TLV</u>	<u>%</u>
Nitric Acid	007697-37-2	2 ppm	50 - 70

4. FIRST AID MEASURES

FIRST AID PROCEDURES

General Guidelines: Prompt removal of the material and obtaining medical attention are essential for all contact. Remove all contaminated clothing and immediately wash the exposed areas with copious amounts of water. Continue the flushing during transportation to the emergency department. Corrosive effects may be delayed (up to 72 hours), and damage may occur without the sensation or onset of pain. Contact local poison control centre for further guidance.

- . Inhalation: Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Oxygen administration may be beneficial in this situation but should only be administered by personnel trained in its use. Obtain medical attention IMMEDIATELY.
- . Skin Contact: Prompt removal of the material from the skin is essential. Remove all contaminated clothing and immediately wash the exposed areas with copious amounts of water for a minimum of 30 minutes or up to 60 minutes for critical body areas. Obtain medical

attention IMMEDIATELY.

- . Eye Contact: Immediately flush eyes with running water for a minimum of 30 minutes, preferably up to 60 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.
- . Ingestion: Do not attempt to give anything by mouth to an unconscious person. IMMEDIATELY contact local Poison Control Centre. If victim is alert and not convulsing, rinse mouth out and give 1 to 2 glasses of milk. Water may be used if milk is not available but it is not as effective. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more milk or water. IMMEDIATELY transport victim to an emergency facility.

Note to Physicians: Immediate consultation with the local Poison Control Centre should be initiated. Severe and sometimes delayed (up to 72 hours) local and systemic reactions can occur.

Nitric Acid: Inhalation: Treat pulmonary oedema. Nebulized bronchodilators may be used for laryngospasm or bronchospasm. Corticosteroids are of no proven value in altering the course of poisoning from irritant gases. Administer antibiotics only if infection is present. (6)

Treatment for corrosive chemical contact with skin:

1. Immerse the exposed part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is not possible.
2. Remove anything that is constrictive, such as rings, bracelets or footwear, before swelling begins.
3. Cover the exposed part with a clean, preferably sterile, lint-free dressing.
4. For severe exposure, immediately seek medical attention and monitor breathing and treat for shock.

Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications. (3) Mucosal injury following ingestion of this corrosive material may contraindicate the induction of vomiting in the treatment of possible intoxication. Similarly, if gastric lavage is performed, intubation should be done with great care. If oral burns are present or a corrosive ingestion is suspected by the patient's history, perform esophagoscopy as soon as possible. Scope should not be passed beyond the first burn because of the risk of perforation.

This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed.

Medical conditions that may be aggravated by exposure to this product include diseases of the skin, eyes or respiratory tract.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flammability Class (WHMIS): Not regulated.

Flash Point (TCC, Deg. Celsius): Does not flash.

Autoignition Temperature (Deg. Celsius): Not applicable.

Flammability Limits in Air (%): LEL: Not applicable. UEL: Not applicable.

Hazardous Combustion Products: Thermal decomposition products are toxic and may include oxides of nitrogen.

Unusual Fire or Explosion Hazards: Avoid direct contact of this product with water as this can cause a violent exothermic reaction. Closed containers exposed to heat may explode. Reacts with most metals to produce hydrogen gas which could make an explosive mixture with

air.

Solutions non-flammable by themselves, but are strong oxidizers which can cause ignition of combustible or oxidizable materials. May decompose violently on contact with metals, or their salts, dusts or other contaminants. Damp material may decompose exothermically and may cause combustion of organic material. Oxygen release due to exothermic decomposition may support combustion.

Sensitivity to Mechanical Impact: Not expected to be sensitive to mechanical impact.
Rate of Burning: Not available. Explosive Power: Not available. Sensitivity to Static Discharge: Not expected to be sensitive to static discharge.

EXTINGUISHING MEDIA

Fire Extinguishing Media: Not normally a fire hazard. Water content of product prevents ignition. The product can support combustion if water evaporates. Use media appropriate for surrounding fire and/or materials. Use water to dilute and absorb the liberated oxides of nitrogen.

FIRE FIGHTING INSTRUCTIONS

Instructions to the Fire Fighters: Isolate materials that are not involved in the fire and protect personnel. The heat from a fire can cause a build-up of pressure inside the containers which may explode. No part of a container should be exposed to temperatures above 50 Degrees Celsius. Cool containers with flooding quantities of water until well after the fire is out. (4) Do not use solid water streams near ruptured tanks or spills. Reacts violently with water and can splatter onto personnel. (3) Use water spray to cool fire-exposed containers or structures. Use water spray to disperse vapours. Spilled acid may cause floors and contact surfaces to become slippery.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and protective clothing. Protective clothing for skin and eye protection should be worn to protect against corrosive materials.

6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: See Section 13, "Deactivating Chemicals".

Protective clothing for skin and eye protection should be worn to protect against corrosive materials. Do not use combustible materials such as sawdust as an absorbent. Spilled acid may cause floors and contact surfaces to become slippery. Collect product for recovery or disposal. For release to land, or storm water runoff, contain discharge by constructing dykes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination. Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment. Replace damaged containers immediately to avoid loss of material and contamination of surrounding atmosphere.

7. HANDLING AND STORAGE

HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices. Containers exposed to heat may be under internal pressure. These should be cooled and carefully vented before opening. A face shield and apron should be worn. Vent container frequently, and more often in warm weather, to relieve pressure.

Ventilation Requirements: Use with proper ventilation: exhaust hoods should maintain a minimum face velocity of 100 CFM. Gaseous oxides are heavier than air; and downdraught exhaust systems should be used where general ventilation is inadequate. Exhaust ducts

should be fiberglass or other resistant materials. (3)

Other Precautions: Use only with adequate ventilation and avoid breathing aerosols (vapours or mists). Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use. Do not use cutting or welding torches on empty drums that contained this material/product.

Corrosive residue is most likely to be deposited at process vents or storage tanks, especially during filling operations. The use of compressed air to force corrosive materials from delivery trucks is of special concern. Scrubbing the exhaust of these vents is highly recommended. Jurisdictional regulations should be consulted to determine required practices.

STORAGE

Storage Temperature (Deg Celsius): Store below 29 Degrees Celsius. Do not freeze.

Ventilation Requirements: Ventilation should be corrosion proof.

Storage Requirements: Storage tanks should be in a contained area to control any spills or leaks. Storage area should be equipped with corrosion-resistant floors, sumps and should have controlled drainage to a recovery tank. Protect from direct sunlight. Protect against physical damage. Do not store or transport with food or feed.

Special Materials to be Used for Packaging or Containers: Materials of construction for storing the product include: stainless steel or plastics.

Reacts with most metals to produce hydrogen gas which could make an explosive mixture with air. Equipment for storage, handling or transportation should NOT be made of: carbon steel, mild steel, tin, galvanized materials, aluminum and its alloys, zinc and its alloys, copper and its alloys. Attacks some types of rubber, plastics and coatings. Confirm suitability of any material before using.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

ENGINEERING CONTROLS

Engineering Controls: Local exhaust ventilation required. Ventilation should be corrosion proof. Vapours should be collected and neutralized in a suitable scrubbing system. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect.

For personnel entry into confined spaces (i.e. bulk storage tanks) a proper procedure must be followed. It must include consideration of, among other things, ventilation, testing of tank atmosphere, provision and maintenance of SCBA, and emergency rescue. Use the "buddy" system. The second person should be in view and trained and equipped to execute a rescue. (4)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Contact with skin, eyes and mucous membranes can contribute to the overall exposure and may invalidate the TLV. Consider measures to prevent absorption by these routes.

Eye Protection: Use full face-shield and chemical safety goggles when there is potential for contact. Approved acid-resistant monogoggles are required. (3) Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from viton, butyl rubber, neoprene or polyethylene should be impervious under conditions of use. Do not use gloves or protective clothing made from polyvinyl alcohol (PVA), nitrile rubber or natural rubber. Discard contaminated gloves.

Respiratory Protection: No specific guidelines available. DO NOT USE chemical cartridge respirators with oxidizable sorbents (charcoal). A NIOSH/MSHA-approved full face piece air-purifying respirator equipped with acid gas, dust, mist, fume cartridges for concentrations up to 20 ppm Nitric Acid. An air-supplied respirator if concentrations are higher or unknown.

If while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full face piece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (4)

Nitric Acid: Immediately Dangerous to Life and Health (IDLH) value: 25 ppm. 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 equipment. In the event of failure of respiratory protective equipment, every effort should be made to exit immediately. (4)

Other Personal Protective Equipment: Wear an impermeable apron and boots. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact.

EXPOSURE GUIDELINES

	ACGIH TLV	OSHA PEL		NIOSH REL	
	(STEL)	(TWA)	(STEL)	(TWA)	(STEL)
Nitric Acid	4 ppm	2 ppm	----	2 ppm	4 ppm

9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)

Physical State: Liquid.

Appearance and Odour: Water-white to slightly yellow liquid with characteristic NO₂ odour.

Darkens to brownish colour on aging and exposure to light.

Odour Threshold (ppm): 0.75 to 2.5 mg /M³ (Detection).

Boiling Range (Deg Celsius): 83 to 122.

Melting/Freezing Point (Deg Celsius): -44 to -22.

Vapour Pressure (mm Hg at 20 Deg. Celsius): 5.5 to 7.1 (70 %). (4)

Vapour Density (Air = 1.0): Greater than 1.

Relative Density (g/cc) : 1.330 to 1.420.

Bulk Density: 1,330 to 1,420 Kg/M³.

Viscosity: Not available.

Evaporation Rate (Butyl Acetate = 1.0): Not available.

Solubility: Soluble in water. Hygroscopic (readily absorbs water).

% Volatile by Volume: 100.

pH: 1.0 (0.1 M).

Coefficient of Water/Oil Distribution: Not available.

Volatile Organic Compounds (VOC): Not applicable.

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY

Under Normal Conditions: Stable.

Under Fire Conditions: Not flammable.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: High temperatures, sparks, open flames and all other sources of ignition. Do not distill to dryness. Avoid excessive temperature or prolonged reflux, such as in batch distillation. Damp material may decompose exothermically and may cause combustion of organic material. Oxygen release due to exothermic decomposition may support combustion.

waste with normal garbage, or to sewer systems.

Safe Handling of Residues: See "Waste Disposal Methods".

Disposal of Packaging: See above, "Deactivating Chemicals". Empty containers retain product residue (liquid and/or vapour) and can be dangerous. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. Do not expose such containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. Do not dispose of package until thoroughly washed out. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations.

14. TRANSPORTATION INFORMATION

Please consult the North American Emergency Guidebook, via the UN#, for guidance on addressing spills.

CANADIAN TDG ACT SHIPPING DESCRIPTION:

Nitric Acid, Class 8, UN2031, Pk Gp II.
 Label(s)/Placard(s): Corrosive.
 ERAP Index: Not applicable.
 Exemptions: Not available.

US DOT CLASSIFICATION (49CFR 172.101, 172.102):

Nitric Acid, Class 8, UN2031, Pk Gp II.
 Label(s)/Placard(s): Corrosive.
 Reportable Quantity (CERCLA-RQ) : Nitric Acid: 1,000 lbs. / 454 Kg.
 Exemptions: Not available.

15. REGULATORY INFORMATION

CANADA

CEPA - NSNR: All constituents of this product are included on the DSL.
 CEPA - NPRI: Nitric Acid.
 Controlled Products Regulations Classification (WHMIS): C: Oxidizer, D-1A: Very Toxic (acute effects), E: Corrosive.

USA

Environmental Protection Act: All constituents of this product are included on the TSCA inventory.
 OSHA Hazard Communication (29CFR 1910.1200) Classification: Oxidizer, Highly Toxic, Corrosive.

NFPA: 4 Health, 0 Fire, 0 Reactivity. (3)

INTERNATIONAL: The following component or components of this product appear on the European Inventory of Existing Commercial Chemical Substances: Nitric Acid.

16. OTHER INFORMATION

ADDITIONAL INFORMATION AND SOURCES USED

The Baume Scale:

% HNO ₃	Specific Gravity at 15 Degrees Celsius	Degrees Baume (3)
52.30	1.3303	36
56.52	1.3551	38
61.38	1.3810	40
67.18	1.4078	42
70.33	1.4216	43
80.04	1.4610	45.75

85.70	1.4786	47
95.11	1.5026	48.50

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
 2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
 3. Supplier's Material Safety Data Sheet(s).
 4. "CHEMINFO", through "CCINFODisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
 5. Guide to Occupational Exposure Values, 2002, American Conference of Governmental Industrial Hygienists, Cincinnati, 2002.
 6. The British Columbia Drug and Poison Information Centre, Poison Managements Manual, Canadian Pharmaceutical Association, Ottawa, 1981.
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The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Terralink Horticulture Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

To obtain revised copies of this Material Safety Data Sheet, contact Terralink Horticulture Inc.

Prepared By: Regulatory Affairs, Terralink Horticulture Inc.