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1. CHEMICAL PRODUCT

PRODUCT NAME: NITRIC OXIDE

SYNONYMS: Nitrogen oxide, nitrogen monoxide

2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS #	Concentration	Exposure Limits (PPM)			
				ACGIH TLV	OSHA PEL	MAC	Other STEL
NITRIC OXIDE	NO	10102-43-9	99+%	25	25	25	NE

Note: NE = NONE ESTABLISHED

S/A = SIMPLE ASPHYXIANT

3. HAZARD IDENTIFICATION

***** EMERGENCY OVERVIEW *****

Poisonous gas under pressure.

May be fatal if inhaled.

Can cause severe lung damage.

May cause eye and skin burns.

Symptoms may be delayed.

Vigorously accelerates combustion.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Skin

ACUTE EFFECTS: Forms acids in the lungs which are irritants that cause congestion of the throat, bronchi and edema of the lungs, headache, lowering of blood pressure, dizziness, dyspnea, development of cyanosis and loss of consciousness. May cause irritation of the eyes and mucous membranes.

CHRONIC EFFECTS: Continued exposure to low concentrations of fumes is said to result in chronic irritation of the respiratory tract with, headache, loss of appetite, dyspnea, corrosion of teeth and gradual loss of strength.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Respiratory problems.

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY (US ONLY):

NTP - No

IARC MONOGRAPHS - No

OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Summon physician at once. Give victim 100% oxygen if breathing has not stopped; give 100% oxygen with artificial respiration if breathing has stopped. Keep victim quiet. Lay victim with head and chest lower than hips to improve drainage of fluids from the lungs.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes. Seek medical attention as soon as possible.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: None

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable

AUTOIGNITION TEMPERATURE: N/Ap

FLAMMABLE LIMITS: Nonflammable

LOWER:

UPPER:

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Nitric oxide in contact with air forms highly toxic fumes of NO_x. Nitric oxide is nonflammable but will vigorously support combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Remove leaking cylinder to exhaust hood or safe outdoor area. Attach stainless steel regulator with long piece of flexible hose. Flow gas into an adequate amount of alkaline solution such as potassium permanganate. Leaks are detected when nitric oxide reacts with oxygen to form reddish-brown NO₂. Small leaks may be identified by wet blue litmus paper.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentration below exposure limits.

EYE / FACE PROTECTION: Safety glasses or Goggles.. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Protective gloves.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sharp, sweet odor

PHYSICAL PRESSURE: Gas

VAPOR PRESSURE: N/Ap

VAPOR DENSITY (AIR=1): 1.04

BOILING POINT (C): -152

SOLUBILITY IN WATER: @25 deg.C: 0.073

SPECIFIC GRAVITY (H2O=1): Gas

EVAPORATION RATE: Gas

ODOR THRESHOLD: .3 -1.0 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.

MATERIALS TO AVOID: In the presence of moisture forms nitric and nitrous acids.Avoid oxidizing agent.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: When heated to decomposition or reacted with water, may emit toxic fumes of carbon monoxide and oxides of nitrogen.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 115 ppm, rat 1 hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Nitric oxide, compressed

HAZARD CLASS: 2.3 (poison) Hazard Zone A

IDENTIFICATION NUMBER: UN1660

REPORTABLE QUANTITIES: 10 lb.

LABELING: POISON GAS, OXIDIZER, CORROSIVE

ADR / RID (EU Only): Class 2, 1toc

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for this material is 100 lb.

EU NUMBER: 233-271-0

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: N/Av

S: N/Av

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Av - Not Applicable, N/Av - Not Available, NE - None Established

Use proper connections; do not use adapters. Do not force fit!!

DISCLAIMER

The information and recommendations in this Material Safety Data Sheet relate only to the specific material mentioned herein and do not relate to use otherwise ie.in combination with any other material or in any process.

The information and recommendations herein are taken from our extensive experiences and the data contained in recognized references and believed by us to be true. Refrigeration group of companies make no warranties either expressed or implied with respect there to and assume no liability in connection with the use of such information and recommendation.