
HEALTH HAZARDS

HEALTH HAZARDS - Nitric oxide (NO) is a highly toxic gas. The TLV-TWA is 25 ppm and the IDLH (Immediately Dangerous to Life and Health) concentration is 100 ppm. The diluent nitrogen is a simple asphyxiant. Animal experiments indicate NO diminishes the blood's ability to transport oxygen by changing blood hemoglobin to methoxy-hemoglobin, which leads to lack of oxygen in the body. Exposure of mice to 2500 ppm was lethal after 12 minutes and 5000 ppm was lethal in 6 to 8 minutes. LC_{Lo} mouse is reported to be 320 ppm. On release to air, Nitric oxide reacts with atmospheric oxygen to form nitrogen dioxide (NO₂). The rate of reaction depends on the concentration of Nitric oxide and is slow at 50 ppm. Gaseous nitrogen dioxide is a severe pulmonary irritant. Overexposure produces pulmonary edema, which may occur within one or two hours and may re-occur with increased severity sometime later. The TLV-TWA of nitrogen dioxide is 3 ppm and the IDLH concentration is 50 ppm.

Note: While Nitric oxide and nitrogen dioxide are highly toxic gases, the small quantity available from a calibration cylinder (58 liters of 50 ppm Nitric oxide in nitrogen or approx. 3.5 milligram Nitric oxide) is insufficient to sustain a material volume if accidentally released to ambient air. Content of one cylinder diluted by 1 cubic meter of air would yield 2.9 ppm Nitric oxide.

SIGNS AND SYMPTOMS OF EXPOSURE - Overexposure to nitrogen oxides can cause cough, difficult breathing, fatigue, nausea, chest congestion, irritation of eyes and respiratory tract, pulmonary edema and delayed pulmonary edema, and possibly methemoglobinemia. The following effects are reportedly expected for a 60-minute exposure to nitrogen dioxide:

100 ppm - pulmonary edema and death

50 ppm - pulmonary edema and possible lesions in lungs. 50 ppm is reportedly moderately irritating to eyes and nose.

25 ppm - respiratory irritation and chest pain.

25 ppm - is reportedly irritating to some people.

PRIMARY ROUTES OF ENTRY - inhalation, eyes

TARGET ORGANS - lungs, eyes, blood

MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE - No information

EXPOSURE LIMITS - ACGIH 2001 TLV-TWA Nitric oxide 25 ppm. ACGIH 2001 TLV-TWA nitrogen dioxide 3 ppm; STEL 5 ppm

CARCINOGENICITY DATA - NIOSH, IARC, NTP or OSHA does not list component gases.

MUTATION DATA - References in RTECS

REPRODUCTIVE EFFECTS DATA - References in RTECS

EMERGENCY AND FIRST AID PROCEDURES - Overexposure to nitric oxide/nitrogen dioxide is not indicated with intended product use due to the limited quantity of nitric oxide contained in an individual cylinder of P/N 812144 (3.5 milligram nitric oxide). Nevertheless, first aid procedure for nitric oxide/nitrogen dioxide vapor is presented should overexposure somehow occur.

FIRST AID - Remove the victim to fresh air. Apply artificial respiration if the victim is not breathing. Give oxygen if breathing is difficult. Get medical attention immediately, even if the victim is not complaining of discomfort. Immediate medical attention is advisable in all cases where appreciable inhalation of nitric oxide/nitrogen dioxide is believed to have occurred, as pulmonary edema may develop.

SAFE HANDLING AND USE

HYGIENIC PRACTICES - Avoid Breathing Gas

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE OF CONTAMINATED EQUIPMENT - N/A

PROCEDURES FOR SPILL OR LEAK CLEANUP - Ventilate area. Avoid breathing gas

WASTE DISPOSAL - Do not puncture or incinerate cylinder. Before discarding cylinder, slowly release contents to a safe exhaust. Dispose of cylinder in accordance with local, state, and federal regulations.

STORAGE - Store in a cool, dry, well-ventilated area. Do not exceed 120°F.

CONTROL MEASURES

PERSONAL PROTECTIVE EQUIPMENT - Due to the limited amount of gas in the cylinder, and the low release rate employed in instrument calibration, respiratory protection is not indicated under conditions of intended use.

ENGINEERING CONTROLS - Mechanical ventilation is suitable

WORK PRACTICES - Avoid breathing gas. Use in well-ventilated areas. Follow the calibration procedure detailed in the MSA instruction manual provided with the instrument under calibration.

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WARNING: This is a hazardous chemical product. By following the directions and warnings provided with this product, the hazards associated with the use of this product can be greatly reduced but never entirely eliminated. Mine Safety Appliances Company makes no warranties, expressed or implied, with respect to this product and EXPRESSLY DISCLAIMS THE WARRANTY OF MERCHANTABILITY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Users assume all risks in handling, using or storing this product.