SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MG INDUSTRIES
3 GREAT VALLEY PARKWAY
MALVERN, PENNSYLVANIA 19355
PHONE: 610-695-7400
FAX: 610-695-7596

EMERGENCY CONTACT:
CHEMTREC:
1-800-424-9300

SUBSTANCE: QUAD BLENDS
TRADE NAMES/SYNONYMS:
MGI68276
CREATION DATE: Feb 12 1997
REVISION DATE: Dec 15 2003

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: NITROGEN, COMPRESSED GAS
CAS NUMBER: 7727-37-9
EC NUMBER (EINECS): 231-783-9
PERCENTAGE: 75.12-95.49
COMPONENT: CARBON DIOXIDE, GAS
CAS NUMBER: 124-38-9
EC NUMBER (EINECS): 204-696-9
PERCENTAGE: 4-16
COMPONENT: CARBON MONOXIDE
CAS NUMBER: 630-08-0
EC NUMBER (EINECS): 211-128-3
PERCENTAGE: 0.48-8.24
COMPONENT: PROPANE
CAS NUMBER: 74-98-6
EC NUMBER (EINECS): 200-827-9
PERCENTAGE: 0.01940-0.32960
COMPONENT: NITRIC OXIDE
CAS NUMBER: 10102-43-9
EC NUMBER (EINECS): 233-271-0
PERCENTAGE: 0.01000-0.30900

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0
EMERGENCY OVERVIEW:
PHYSICAL DESCRIPTION: gas

MAJOR HEALTH HAZARDS: blood damage, difficulty breathing, suffocation
PHYSICAL HAZARDS: Containers may rupture or explode if exposed to heat.
POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: sensitivity to light, changes in body temperatur changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, sleep disturbances, emotional disturbances, hallucina tingling sensation, pain in extremities, tremors, muscle cramps, loss

coordination, hearing loss, visual disturbances, eye damage, suffocat
blood disorders, convulsions, unconsciousness, coma
LONG TERM EXPOSURE: changes in body temperature, changes in blood pre
nausea, vomiting, loss of appetite, chest pain, difficulty breathing,
irregular heartbeat, headache, drowsiness, dizziness, disorientation,
hallucinations, pain in extremities, tremors, loss of coordination, h
loss, visual disturbances, eye damage, suffocation, blood disorders,
damage, nerve damage, birth defects, brain damage
SKIN CONTACT:
SHORT TERM EXPOSURE: no information on significant adverse effects
LONG TERM EXPOSURE: no information on significant adverse effects
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: no information on significant adverse effects
INGESTION:
SHORT TERM EXPOSURE: ingestion of a gas is unlikely
LONG TERM EXPOSURE: ingestion of a gas is unlikely
CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Ge
medical attention.
SKIN CONTACT: Wash exposed skin with soap and water.
EYE CONTACT: Flush eyes with plenty of water.
INGESTION: If a large amount is swallowed, get medical attention.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard.
EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical
FIRE FIGHTING: Move container from fire area if it can be done without
Cool containers with water spray until well after the fire is out. Av

inhalation of material or combustion by-products.

SECTION 6 ACCIDENTAL RELEASE MEASURES

WATER RELEASE:
Subject to California Safe Drinking Water and Toxic Enforcement Act of
(Proposition 65). Keep out of water supplies and sewers.
OCCUPATIONAL RELEASE:
Stop leak if possible without personal risk. Notify Local Emergency Pla
Committee and State Emergency Response Commission for release greater t
equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and
reportable under CERCLA Section 103, notify the National Response Cente
(800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations an
standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. S
original container for storage recommendations. Keep separated from
incompatible substances.
Cylinder temperature should not exceed 125 F (52 C).
29 CFR Subpart "H"-Hazardous Materials.

National Fire Protection Association publication #55, "Standard for the Storage, Use and Handling of Compressed and Liquified Gases in Portable Cylinders".
Compressed Gas Association publication P-1, "Safe Handling of Compresse in Containers".
Store and handle in accordance with current regulations and standards: OSHA 29 CFR 1910.101
HANDLING: Subject to handling regulations: U.S. OSHA 29 CFR 1910.119.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
NITROGEN, COMPRESSED GAS:
NITROGEN:
ACGIH (simple asphyxiant)
UK OES (simple asphyxiant)
CARBON DIOXIDE, GAS:
CARBON DIOXIDE:
5000 ppm (9000 mg/m3) OSHA TWA
10000 ppm (18000 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30,
30000 ppm (54000 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30,
5000 ppm ACGIH TWA
30000 ppm ACGIH STEL

5000 ppm (9000 mg/m3) NIOSH recommended TWA 10 hour(s)
30000 ppm (54000 mg/m3) NIOSH recommended STEL
9100 mg/m3 (5000 ml/m3) DFG MAK (peak limitation category - II, wit excursion factor of 2)
9000 mg/m3 (5000 ml/m3) EC OEL
5000 ppm (9150 mg/m3) UK OES TWA
15000 ppm (27400 mg/m3) UK OES STEL
MEASUREMENT METHOD: Gas collection bag; Gas chromatography with the conductivity detection; NIOSH IV # 6603
CARBON MONOXIDE:
50 ppm (55 mg/m3) OSHA TWA
35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30,
25 ppm ACGIH TWA
35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s)
200 ppm (229 mg/m3) NIOSH recommended ceiling
35 mg/m3 (30 ml/m3) DFG MAK (peak limitation category - II, with ex factor of 1)
30 ppm (35 mg/m3) UK OES TWA
200 ppm (232 mg/m3) UK OES STEL
MEASUREMENT METHOD: Gas collection bag; Sensor; NIOSH IV # 6604
VENTILATION: Provide local exhaust ventilation system. Ensure complianc applicable exposure limits.
EYE PROTECTION: Eye protection not required under normal conditions.
CLOTHING: Protective clothing is not required under normal conditions.
GLOVES: Protective gloves are not required under normal conditions.
RESPIRATOR: No respirator is required under normal conditions of use. U conditions of frequent use or heavy exposure, respiratory protection needed.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
ODOR: Not available
BOILING POINT: Not available

FREEZING POINT: Not available
VAPOR PRESSURE: Not available
VAPOR DENSITY: Not available
DENSITY: Not available
WATER SOLUBILITY: Not available
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.
CONDITIONS TO AVOID: Protect from physical damage and heat. Containers rupture or explode if exposed to heat.
INCOMPATIBILITIES: No data available.
NITROGEN:
LITHIUM: May ignite in the gas.
MAGNESIUM: Violent reaction with the liquid on ignition.
NEODYMIUM: Vigorous reaction.
OZONE: Mixtures of the gases may be explosive.
TITANIUM: Will burn in nitrogen atmosphere.
CARBON DIOXIDE:
ACRYLALDEHYDE: Exothermic polymerization.
BARIUM PEROXIDE: Incandescent reaction.
CESIUM OXIDE: Ignition.
DIETHYL MAGNESIUM: Ignition.
ETHYLENEIMINE: Explosive polymerization.
HYDRAZINE: Decomposition.
METAL ACETYLIDES: Ignition or incandescence.
METAL HYDRIDES: Reduction reaction.
METALS: Dusts of many metals suspended in carbon dioxide atmospheres ignitable and explosive; some bulk metals will burn in the gas at ele temperatures.
POTASSIUM: Mixtures of the solids are impact-sensitive.
POTASSIUM-SODIUM ALLOY: Mixtures of the solids are impact-sensitive.
SODIUM: Mixtures of the solids are impact-sensitive.
SODIUM PEROXIDE: Highly exothermic reaction; may be explosive in the presence of metals.
CARBON MONOXIDE:
BARIUM PEROXIDE: Violent reaction.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Explosion hazard.
CESIUM MONOXIDE: Ignites in the presence of moisture or when heated.
CHLORINE: Violent reaction.
CHLORINE DIOXIDE: Explodes.
CHLORINE TRIFLUORIDE: Explosive reaction.
COPPER (POWDER) + WATER: Explosive complex.
COPPER(II) PERCHLORATE + WATER: Explosive complex.
DINITROGEN OXIDE: Fire and explosion hazard.
FLUORINE + OXYGEN: May explode above 30 C.
IODINE HEPTAFLUORIDE: Ignition.
IRON(III) OXIDE: Possible explosion hazard.
LITHIUM: Forms compound which detonates violently on contact with wat
NITROGEN TRIFLUORIDE: Explosive reaction upon ignition.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN (LIQUID): Forms explosive mixture.

OXYGEN DIFLUORIDE: Explodes when sparked.
PEROXODISULFURYL DIFLUORIDE: Explosive reaction above 20 C.
POTASSIUM: Forms explosive compound.
SILVER(I) OXIDE: Extremely exothermic reaction.
SODIUM: Forms explosive, shock-sensitive compound.
POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

CARBON DIOXIDE, GAS:
TOXICITY DATA:
9 pph/5 minute(s) inhalation-human LCLo; 90000 ppm/5 minute(s) inhalation-mammal LCLo; 20 pph inhalation-mouse TCLo; 21 pph/1 hour(s inhalation-rat TCLo; 11 pph/2 hour(s) inhalation-mammal TCLo; 70 pph inhalation-mammal TCLo; 5 pph/5 hour(s) inhalation-rabbit TCLo; 3 pph day(s) inhalation-rabbit TCLo; 5 pph inhalation-dog TCLo; 10 pph inhalation-dog TCLo; 11 pph inhalation-human LCLo; 0.25 pph inhalatic TCLo; 2.5 pph inhalation-human TCLo; 7 pph inhalation-human TCLo; 0.1 minute(s) inhalation-rabbit TCLo; 10000 ppm/24 hour(s)-30 day(s) cont inhalation-rat TCLo; 27000 ppm/24 hour(s)-30 day(s) continuous inhalation-rabbit TCLo
ACUTE TOXICITY LEVEL: Insufficient Data.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: heart or cardiovascular disc respiratory disorders
REPRODUCTIVE EFFECTS DATA:
6 pph inhalation-rat TCLo/24 hour(s) 10 day(s) pregnant female contir pph inhalation-rat TCLo/24 hour(s) 10 day(s) pregnant female continuc pph inhalation-mouse TCLo/2 hour(s) 3 day(s) male; 55 pph inhalation-TCLo/4 hour(s) 6 day(s) male; 2 pph inhalation-mouse TCLo/8 hour(s) 1 day(s) pregnant female continuous; 13 pph inhalation-rabbit TCLo/4 hc 9-12 day(s) pregnant female continuous
CARBON MONOXIDE:
TOXICITY DATA:
4 mg/m3/12 hour(s) inhalation-human LCLo; 600 mg/m3/10 minute(s) inhalation-human TCLo; 4000 ppm/30 minute(s) inhalation-man LCLo; 65(minute(s) inhalation-man TCLo; 5000 ppm/5 minute(s) inhalation-human 1807 ppm/4 hour(s) inhalation-rat LC50; 2444 ppm/4 hour(s) inhalatior LC50; 4000 ppm/46 minute(s) inhalation-dog LCLo; 4000 ppm inhalation-LCLo; 5718 ppm/4 hour(s) inhalation-guinea pig LC50; 5000 ppm/5 minut inhalation-mammal LCLo; 1334 ppm inhalation-wild bird LC50; 1 percent minute(s) inhalation-domestic animal TCLo; 1 percent/65 minute(s) inhalation-domestic animal TCLo; 1 percent/95 minute(s) inhalation-dc animal TCLo; 1 percent/100 minute(s) inhalation-domestic animal TCLo; percent/120 minute(s) inhalation-domestic animal TCLo; 1 percent/150 minute(s) inhalation-domestic animal TCLo; 35 ml/kg intraperitoneal-r TDLo; 2230 mg/m3/2 hour(s) inhalation-mouse LC50; 1900 mg/m3/2 hour(s inhalation-mouse LC; 5200 mg/m3/1 hour(s) inhalation-rat LC; 40 mg/m3 hour(s) inhalation-rat TCLo; 88 mg/m3/20 minute(s) inhalation-rat TCI mg/m3/20 minute(s) inhalation-rat TCLo; 800 mg/m3/4 hour(s) inhalatic TCLo; 1900 mg/m3/4 hour(s) inhalation-rat LC50; 2000 mg/m3/11 minute(inhalation-rat TCLo; 13500 mg/m3/15 minute(s) inhalation-rat LC50; 5(

mg/m3/60 minute(s) inhalation-cat TCLo; 2000 mg/m3/20 minute(s) inhalation-cat TCLo; 500 mg/m3/30 minute(s) inhalation-cat LCLo; 344(mg/m3/3 minute(s) inhalation-cat LCLo; 2000 mg/m3/30 minute(s) inhalation-dog TCLo; 23000 mg/m3/20 minute(s) inhalation-dog LCLo; 2(mg/m3/30 minute(s) inhalation-guinea pig TCLo; 4600 mg/m3/2 hour(s) inhalation-guinea pig LCLo; 10300 mg/m3/60 minute(s) inhalation-guine

LCLo; 100 mg/m3/2 hour(s) inhalation-rabbit TCLo; 6600 mg/m3/10 minut
inhalation-rabbit TCLo; 17200 mg/m3/40 minute(s) inhalation-rabbit LC
20000 mg/m3/60 minute(s) inhalation-rabbit LCLo; 1145 mg/m3/30 minute
inhalation-monkey TCLo; 6 mg/m3/25 minute(s) inhalation-human TCLo; 1
mg/m3/5 hour(s) inhalation-human TCLo; 31 mg/m3/3 hour(s) inhalation-
TCLo; 33 mg/m3/6 hour(s) inhalation-human TCLo; 50 mg/m3/2 hour(s)
inhalation-human TCLo; 50 mg/m3/5 hour(s) inhalation-human TCLo; 55 m
hour(s) inhalation-human TCLo; 60 mg/m3/6 hour(s) inhalation-human TC
mg/m3/3 hour(s) inhalation-human TCLo; 220 mg/m3/1 hour(s) inhalation
TCLo; 220 mg/m3/3 hour(s) inhalation-human TCLo; 230 mg/m3/6 hour(s)
inhalation-human TCLo; 440 mg/m3/4 hour(s) inhalation-human TCLo; 44C
mg/m3/1 hour(s) inhalation-human TCLo; 460 mg/m3/4 hour(s) inhalation
TCLo; 660 mg/m3/2 hour(s) inhalation-human TCLo; 660 mg/m3/4 hour(s)
inhalation-human TCLo; 800 mg/m3/5 minute(s) inhalation-human TCLo; 8
mg/m3/20 minute(s) inhalation-human TCLo; 800 mg/m3/3 hour(s)
inhalation-human TCLo; 880 mg/m3/2 hour(s) inhalation-human TCLo; 88C
mg/m3/4 hour(s) inhalation-human LCLo; 1260 mg/m3/90 minute(s)
inhalation-human TCLo; 1300 mg/m3/2 hour(s) inhalation-human TCLo; 13
mg/m3/33 minute(s) inhalation-human TCLo; 1760 mg/m3/20 minute(s)
inhalation-human TCLo; 1760 mg/m3/2 hour(s) inhalation-human TCLo; 18
mg/m3/1 hour(s) inhalation-human LCLo; 2000 mg/m3/12 minute(s)
inhalation-human TCLo; 3000 mg/m3/1 hour(s) inhalation-human LCLo; 23
mg/m3/30 minute(s) inhalation-human LCLo; 3520 mg/m3/5 minute(s)
inhalation-human TCLo; 3520 mg/m3/30 minute(s) inhalation-human TCLo;
mg/m3/20 minute(s) inhalation-human LCLo; 5000 mg/m3/17 minute(s)
inhalation-human TCLo; 5700 mg/m3/2 minute(s) inhalation-human LCLo;
mg/m3/1 minute(s) inhalation-human LCLo; 1800 ppm/1 hour(s)-14 day(s)
intermittent inhalation-rat TCLo; 30 mg/m3/8 hour(s)-10 week(s) inter
inhalation-rat TCLo; 96 ppm/24 hour(s)-90 day(s) continuous inhalatic
TCLo; 250 ppm/5 hour(s)-20 day(s) intermittent inhalation-rat TCLo; 3
mg/m3/5 hour(s)-20 week(s) intermittent inhalation-rat TCLo; 5983 mg/
week(s) intermittent subcutaneous-rat TDLo; 50 ppm/30 day(s) intermit
inhalation-mouse TCLo; 200 ppm/24 hour(s)-90 day(s) continuous
inhalation-monkey TCLo; 200 mg/m3/3 hour(s)-13 week(s) intermittent
inhalation-rabbit TCLo; 50 ppm/24 hour(s)-8 week(s) continuous
inhalation-rabbit TCLo; 200 mg/m3/5 hour(s)-4 week(s) intermittent
inhalation-guinea pig TCLo; 200 mg/m3/5 hour(s)-30 week(s) intermitte
inhalation-guinea pig TCLo; 200 ppm/24 hour(s)-90 day(s) continuous
inhalation-guinea pig TCLo; 105 ppm/7 day(s) continuous inhalation-ra
315 ppm/21 day(s) continuous inhalation-rat TCLo; 110 mg/m3/1 year(s)
intermittent inhalation-rabbit TCLo; 170 mg/m3/45 day(s) intermittent
inhalation-rabbit TCLo; 10 mg/m3/4 hour(s)-10 week(s) intermittent
inhalation-rat TCLo; 10 mg/m3/4 hour(s)-10 week(s) intermittent
inhalation-mouse TCLo; 53 mg/m3/30 day(s) continuous inhalation-rat T
100 mg/m3/1 week(s) continuous inhalation-rat TCLo; 110 mg/m3/90 day(
intermittent inhalation-monkey TCLo; 100 mg/m3/10 week(s) continuous
inhalation-guinea pig TCLo; 16 pph/48 hour(s) continuous inhalation-g
pig TCLo; 4.5 pph/13 day(s) continuous inhalation-rabbit TCLo; 2 pph/
day(s) intermittent inhalation-man TCLo; 700 ml/kg/7 day(s) intermitt

intraperitoneal-mouse TDLo; 700 ml/kg/7 day(s) intermittent
intraperitoneal-mouse TDLo

ACUTE TOXICITY LEVEL:
Toxic: inhalation

TARGET ORGANS: blood

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: blood system disorders, hear
cardiovascular disorders, hormonal disorders, respiratory disorders

MUTAGENIC DATA:
micronucleus test - mouse inhalation 1500 ppm 10 minute(s); sister ch

exchange - mouse inhalation 2500 ppm 10 minute(s)

REPRODUCTIVE EFFECTS DATA:

75 ppm inhalation-rat TCLo/24 hour(s) 0-20 day(s) pregnant female continuous; 150 ppm inhalation-rat TCLo/24 hour(s) 1-22 day(s) pregna female continuous; 150 ppm inhalation-rat TCLo/24 hour(s) 1-22 day(s) pregnant female continuous; 1 mg/m3 inhalation-rat TCLo/24 hour(s) 72 pre pregnancy continuous; 150 ppm inhalation-rat TCLo/24 hour(s) 0-2C pregnant female continuous; 75 ppm inhalation-rat TCLo/24 hour(s) 0-2 day(s) pregnant female continuous; 150 ppm inhalation-rat TCLo 0-20 d pregnant female continuous; 65 ppm inhalation-mouse TCLo/24 hour(s) 7 day(s) pregnant female continuous; 250 ppm inhalation-mouse TCLo/7 hc 6-15 day(s) pregnant female continuous; 125 ppm inhalation-mouse TCLc hour(s) 7-18 day(s) pregnant female continuous; 8 pph inhalation-mous TCLo/1 hour(s) 8 day(s) pregnant female continuous; 8 pph inhalation-TCLo/1 hour(s) 8 day(s) pregnant female continuous; 180 ppm inhalation-rabbit TCLo/24 hour(s) 1-30 day(s) pregnant female continu 200 ppm inhalation-guinea pig TCLo/10 hour(s) 23-61 day(s) pregnant f continuous; 103 mg/m3 inhalation-rat TCLo 1-22 day(s) pregnant female continuous; 103 mg/m3 inhalation-mouse TCLo 1-21 day(s) pregnant fema continuous; 550 mg/m3 inhalation-guinea pig TCLo 20-40 day(s) pregnar female continuous; 480 mg/m3 inhalation-guinea pig TCLo 20-50 day(s) pregnant female continuous; 100 mg/m3 inhalation-guinea pig TCLo 10 w pre pregnancy continuous; 100 mg/m3 inhalation-guinea pig TCLo 10 wee pre pregnancy continuous; 150 ppm inhalation-rat TCLo 1-20 day(s) pre female continuous

ADDITIONAL DATA: Alcohol may enhance the toxic effects. May cross the placenta. Smoking may enhance the toxic effects.

HEALTH EFFECTS:

INHALATION:

NITROGEN: Nitrogen inhaled under increased atmospheric pressure, (>1. atmospheres), may dissolve in the fat-containing brain cells, and act anesthetic, causing narcosis. Persons who have been exposed to increa pressure for a time and who are suddenly released from the pressure m develop decompression sickness. Repeated exposure, without complete decompression, may result in decompression sickness. See information simple asphyxiants.

ACUTE EXPOSURE:

SIMPLE ASPHYXIANTS: The symptoms of asphyxia depend on the rapidity which the oxygen deficiency develops and how long it continues. In acute asphyxia, unconsciousness may be immediate. With slow develop there may be rapid respiration and pulse, air hunger, dizziness, re awareness, tightness in the head, tingling sensations, incoordinati faulty judgement, emotional instability, and rapid fatigue. As the asphyxia progresses, nausea, vomiting, collapse, unconsciousness,

convulsions, deep coma and death are possible.

CARBON DIOXIDE: In the solid or liquid form carbon dioxide is very volatile, readily releasing the gas. At concentrations from 2-10% i cause acidic taste, dyspnea, headache, vertigo, nausea, labored bre weakness, drowsiness, mental confusion, and increase in blood press pulse, and respiratory rate. Exposure to 10% for a few minutes has reported to cause visual disturbances, tinnitus, tremors, profuse perspiration, restlessness, paresthesias, general feeling of discon loss of consciousness, and coma. Concentrations of 25-30% may cause and convulsions within one minute. Tachycardia and arrhythmias are possible. Concentrations of 50% may cause symptoms of hypocalcemia including carpopedal spasms. Excessive carbon dioxide for a time pe not more than 5 minutes was reported to cause effects on vision wit constriction of visual fields, enlargement of blind spots, photophc

loss of convergence and accommodation, and deficient dark adaptatic
well as headache, insomnia, and personality changes, largely depres
and irritability. Even when there is sufficient oxygen present to p
simple asphyxiation by carbon dioxide, high concentrations may caus
adverse effects by interfering with its normal elimination from the
Initially, exposure to increased carbon dioxide concentrations resu
a compensatory increase in both rate and depth of ventilation. Beyc
certain point, however, this may reverse to hypoventilation resulti
respiratory acidosis. Death from asphyxia may occur if the concentr
and duration of exposure are sufficient. Reproductive effects have
reported in animals.

CARBON MONOXIDE: Carbon monoxide is not detectable by odor and heac
should be taken as a warning that a dangerous concentration is beir
inhaled. In sudden exposures to high concentrations, weakness and
dizziness may be the only symptoms preceding collapse. The amount c
carboxyhemoglobin formed in the blood is dependent on concentration
duration of exposure, ambient temperature, physical exertion, healt
individual metabolism. Symptoms are usually not noticeable until th
carboxyhemoglobin level reaches 10%. At 10-40%, symptoms may incluc
increasingly severe headache, dyspnea on exertion, decreased manual
dexterity, impaired judgement and memory, irritability, emotional
instability, dizziness, fatigue, drowsiness, confusion, nausea, vom
palpitations, and impaired vision and hearing. With continuing expc
there is a progressive worsening of all symptoms. At 40-60%, angina
incoordination, hallucinations, lethargy, syncope and collapse, and
increased respiration and pulse may occur. At 60-80% there may be
decreased respiration, blood pressure and pulse, and deepening coma
intermittent convulsions and incontinence of urine and feces. Rarel
there may be a pink or red skin discoloration, but cyanosis or pall
more common. Other reported signs and symptoms include increased
temperature, dilated pupils, perspiration, muscle spasms, hyperrefl
aching limbs, and retinal hemorrhage or venous engorgement. Above 7
rapid death from respiratory or cardiac arrest usually occurs. Deat
also be caused by myocardial or cerebral infarction. Cerebral edema
also occur. In non-fatal cases or when death is not immediate, prin
secondary effects of tissue hypoxia and some atypical reactions may
develop. There may be myocarditis, pulmonary edema, bronchopneumoni
pancreatitis, hepatomegaly, liver and kidney damage, albuminuria,
glycosuria, and oliguria. Hemolytic anemia, thrombocytopenic purpur

polycythemia and leukocytosis have been reported. Rhabdomyolysis wi
myoglobinuria and acute renal failure are possible, especially with
pressure injury. Erythema, edema and blisters may develop, especial
pressure areas. Eye effects may include retrobulbar neuritis with
neuroretinal edema and partial or complete, temporary or permanent
blindness. Temporary or permanent hearing loss may also occur. Comp
recovery is the usual course. However, signs and symptoms of nerve
brain injury with neuropathies and various motor and mental defects
of which resemble multiple sclerosis or parkinsonism, may develop s
days to weeks after apparent recovery, especially from prolonged hy
coma. The onset may be sudden with numerous possible effects, inclu
dementia, deterioration of neurological status and sometimes slowly
resolving or permanent disability or death. A study of 63 patients
after carbon monoxide poisoning indicated that 13% showed gross
neuropsychiatric damage; 33% showed deterioration of personality; a
reported memory impairment. Carbon monoxide readily crosses the pla
barrier. Acute non-lethal intoxication may result in miscarriage or
permanent neurologic sequelae such, as cerebral palsy, in the newbc

CHRONIC EXPOSURE:

SIMPLE ASPHYXIANTS: No data available.

CARBON DIOXIDE: It has been reported that persons may tolerate 1.5% inhaled air for prolonged periods without adverse effects, but calc phosphorus metabolism may be affected with serum levels of calcium urinary phosphorus progressively falling. At 2% concentration, deep respiration may occur. At 3% impairment of performance has been not has, however, been demonstrated that the development of tolerance m occur during prolonged exposure to low levels. Reproductive effects been reported in animals.

CARBON MONOXIDE: Although carbon monoxide is not a cumulative poisc chronic exposure to low to moderate levels may result in repeated h oxygen deprivation and resultant effects including cardiovascular c central nervous system damage. Reported signs and symptoms include polycythemia, lassitude, malaise, anorexia, nausea, vomiting, headа dizziness, ataxia, syncope, glycosuria, weakness of the limbs, join neuromuscular pain, muscle spasm, loss of sensation in the fingers, positive Romberg's sign, auditory and visual disturbances and impai vigilance. Irritability, personality changes, impaired memory and difficulty concentrating are also possible. The development of atherosclerosis may be facilitated. The development of congestive h failure may be indicated by dyspnea, anginal pain and cardiac irregularities. Relatively long and severe exposure may cause cereb congestion and edema resulting in long-lasting mental or nervous da During pregnancy, prolonged exposure to low levels, as in smoking, been associated with smaller babies and increased neonatal mortalit Rats exposed prenatally to low levels had offspring that exhibited of functional deficit in the central nervous system; minor skeletal anomalies were noted in mice. Other reproductive effects have been reported in animals.

SKIN CONTACT:

ACUTE EXPOSURE:

NITROGEN: No adverse effect have been reported from the gas.

CARBON DIOXIDE: No adverse effects have been reported from exposure gas. Due to rapid evaporation, the liquid or solid may cause frostb with redness, tingling and pain or numbness. In more severe cases, skin may become hard and white and develop blisters.

CARBON MONOXIDE: No adverse effects have been reported from the gas

CHRONIC EXPOSURE:

NITROGEN: No adverse effects have been reported.

CARBON DIOXIDE: No adverse effects are expected from exposure at lc levels.

CARBON MONOXIDE: No data available.

EYE CONTACT:

ACUTE EXPOSURE:

NITROGEN: May cause irritation if sprayed directly into the eyes.

CARBON DIOXIDE: At high concentrations in air, carbon dioxide may c stinging sensation of the eyes. 200,000 ppm of the gas may cause irritation. Due to rapid evaporation, the liquid or solid may cause frostbite with redness, pain, and blurred vision.

CARBON MONOXIDE: No adverse effects have been reported from the gas

CHRONIC EXPOSURE:

NITROGEN: No adverse effects have been reported.

CARBON DIOXIDE: No adverse effects are expected from exposure to lc levels.

CARBON MONOXIDE: No data available.

INGESTION:

ACUTE EXPOSURE:

NITROGEN: Ingestion of a gas is unlikely.

CARBON DIOXIDE: Ingestion of a gas is unlikely. If the liquid or sc
swallowed, frostbite damage to the lips, mouth and mucous membranes
occur.
CARBON MONOXIDE: Ingestion of a gas is unlikely.
CHRONIC EXPOSURE:
NITROGEN: No data available.
CARBON DIOXIDE: No data available.
CARBON MONOXIDE: No data available.

SECTION 12 ECOLOGICAL INFORMATION

Not available

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Compressed gas, n.o.s.
ID NUMBER: UN1956
HAZARD CLASS OR DIVISION: 2.2
LABELING REQUIREMENTS: 2.2
CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.
LAND TRANSPORT ADR: No classification assigned.
LAND TRANSPORT RID:
PROPER SHIPPING NAME: Compressed gas, n.o.s.
UN NUMBER: UN1956
CLASS: 2
CLASSIFICATION CODE: 1A
LABELS: 2.2; (+13)
AIR TRANSPORT IATA:
PROPER SHIPPING NAME: Compressed gas, n.o.s.
UN/ID NUMBER: UN1956
CLASS OR DIVISION: 2.2
HAZARD LABELS: 2.2
AIR TRANSPORT ICAO:
PROPER SHIPPING NAME: Compressed gas, toxic, corrosive, n.o.s.
UN NUMBER: UN3304
CLASS OR DIVISION: 2.3
SUBSIDIARY RISK: 8
MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Compressed gas, n.o.s.
UN NUMBER: UN1956
CLASS OR DIVISION: 2.2

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
NITRIC OXIDE: 10 LBS RQ
SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355
Not regulated.
SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355
Not regulated.
SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370

ACUTE: Yes
CHRONIC: No
FIRE: No
REACTIVE: No
SUDDEN RELEASE: Yes
SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.
OSHA PROCESS SAFETY (29CFR1910.119):
NITRIC OXIDE: 250 LBS TQ
STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
Carbon monoxide
Developmental toxicity (Jul 01, 1989)
CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.
EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.
NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.
TSCA 12(b) EXPORT NOTIFICATION: Not listed.

SECTION 16 OTHER INFORMATION

MSDS SUMMARY OF CHANGES
SECTION 3 HAZARDS IDENTIFICATION
SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION
SECTION 11 TOXICOLOGICAL INFORMATION
SECTION 14 TRANSPORT INFORMATION

THIS MSDS IS SUPPLIED PURSUANT TO OSHA REGULATIONS. OTHER GOVERNMENT REGULATIONS MUST BE REVIEWED FOR APPLICABILITY TO THIS PRODUCT. WE BELI INFORMATION SOURCE IS RELIABLE AND THE INFORMATION IS ACCURATE AS OF TH HEREOF, HOWEVER, ACCURACY OR COMPLETENESS IS NOT GUARANTEED AND NO WARR ANY TYPE IS GRANTED. THE INFORMATION RELATES ONLY TO THIS SPECIFIC PROD

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