MATERIAL SAFETY DATA SHEET: Carbon Monoxide

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

GAS INNOVATIONS
18005 E. Hwy 225
La Porte, TX 77571
INFORMATION CONTACT:
281-417-2200

EMERGENCY CONTACT: USA
3 E COMPANY 866-303-2640
International Emergency Contact:
Infotrac: 1-352-323-3500

SUBSTANCE: Carbon Monoxide

TRADE NAMES/SYNONYMS: Carbon Oxide; Carbonic Oxide; UN1016 Flue gas

CHEMICAL FAMILY: Inorganic, gas
REVISION DATE: July 12, 2010

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: Carbon Monoxide
CAS NUMBER: 630-08-0
PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=4 REACTIVITY=0
EMERGENCY OVERVIEW:

COLOR: colorless
PHYSICAL FORM: gas
ODOR: Odorless
MAJOR HEALTH HAZARDS: difficulty breathing, harmful if inhaled, blood damage
PHYSICAL HAZARDS: Flammable gas. May cause flash fire.

POTENTIAL HEALTH EFFECTS:

INHALATION:
SHORT TERM EXPOSURE:
LONG TERM EXPOSURE:

SKIN CONTACT:
SHORT TERM EXPOSURE: frostbite, blisters
LONG TERM EXPOSURE: no information is available

EYE CONTACT:
SHORT TERM EXPOSURE: frostbite, blurred vision
LONG TERM EXPOSURE: no information is available

INGESTION:
SHORT TERM EXPOSURE: ingestion of a gas is unlikely
LONG TERM EXPOSURE: ingestion of a gas is unlikely

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Severe explosion hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical, water spray, alcohol resistant foam.
Large fires: Flood with fine water spray & regular foam.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in
GAS INNOVATIONS

cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Stop flow of gas.

FLASH POINT: Flammable gas
LOWER FLAMMABLE LIMIT: 12.5% by volume
UPPER FLAMMABLE LIMIT: 74% by volume
AUTOIGNITION: 700°C

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

7. HANDLING AND STORAGE


8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Component Analysis
CARBON MONOXIDE (630-09-0)
ACGIH: 25 ppm TWA
OSHA (final): 50 ppm TWA; 55mg/m³ TWA
OSHA (vacated): 35 ppm TWA; 40mg/m³ TWA
200 ppm Ceiling; 229 mg/m³ Ceiling
NIOSH: 35 ppm TWA; 40 mg/m³ TWA
200 ppm Ceiling; 229 mg/m³ Ceiling

Component Biological Limit Values
CARBON MONOXIDE (630-08-0)
ACGIH: 3.5% of hemoglobin Medium: blood Time: end of shift Parameter. Carboxyhemoglobin (background, nonspecific)

IDLH
1200 ppm
VENTILATION
Ventilation equipment should be explosion-resistant if explosive concentration of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eyes/Face
For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing
For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

Glove Recommendations
For the gas: Wear appropriate chemical resistant gloves. For the liquid: Wear insulated gloves.

Respiratory Protection
The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

350 ppm
Any supplied-air respirator.

875 ppm
Any supplied-air respirator operated in a continuous-flow mode.

1200 ppm
Any air-purifying full-face piece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern. End of service life indicator required (ESLI).
Any self-contained breathing apparatus with a full face piece.
Any supplied-air respirator with a full face piece.
Emergency or planned entry into unknown concentrations or IDLH conditions – Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full face piece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape –
Any air-purifying full face piece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister
End of service life indicator required (ESLI).
Any appropriate escape-type, self-contained breathing apparatus.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
COLOR: colorless
ODOR: MOLECULAR WEIGHT: 28.01
MOLECULAR FORMULA: C-0
BOILING POINT: -191.5°C
FREEZING POINT: -205°C
VAPOR PRESSURE: 760 mm Hg @ -191°C
VAPOR DENSITY (air=1): 0.968
SPECIFIC GRAVITY: Not applicable
DENSITY: 1.250g/L@0°C
WATER SOLUBILITY: 2.3% @ 20°C
PH: Not applicable
VOLATILITY: 100%
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
VISCOSITY: 0.00852cP@0°C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable
SOLVENT SOLUBILITY:
Soluble: acetic acid, alcohol, ethyl acetate, chloroform, cuprous chloride solutions
Slightly Soluble: acetone

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.
CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition.
Minimize contact with material. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.
INCOMPATIBILITIES: oxidizing materials, halogens, lithium, metal oxides, metals
HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of carbon

POLYMERIZATION: Will not polymerize.
11. TOXICOLOGICAL INFORMATION

Component Analysis – LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:
CARBON MONOXIDE (630-08-0)

Acute Toxicity Level
CARBON MONOXIDE (630-08-0)
Toxic: inhalation

Component Carcinogenicity
None of this product’s components are listed by ACGIH, IARC, NTP, OSHA or DFG.

Target Organs
CARBON MONOXIDE (630-08-0)
blood

Medical Conditions Aggravated by Exposure
blood system disorders, heart or cardiovascular disorders, hormonal disorders, respiratory disorders

Additional Data
Alcohol may enhance the toxic effects. May cross the placenta. Smoking may enhance the toxic effects.

12. ECOLOGICAL INFORMATION

Component Analysis – Aquatic Toxicity
No LOLI ecotoxicity data are available for this product’s components.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product’s components.
14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Carbon Monoxide, compressed
ID NUMBER: UN1016
HAZARD CLASS OR DIVISION: 2.3
LABELING REQUIREMENTS: 2.3, 2.1 Additional information – Toxic Inhalation Hazard Zone D.
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: 25kg
CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Carbon Monoxide, compressed
UN NUMBER: UN1016
CLASS: 2.3

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.
SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE PRESSURE: Yes
U.S. STATE REGULATIONS:
The following components appear on one or more of the following state hazardous substances listed:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>630-08-0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):
WARNING! This product contains a chemical known to the state of California to cause productive/developmental effects.

Canada WHMIS
The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List
CARBON MONOXIDE (630-08-0) 0.1%

Component Analysis – Inventory

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>US</th>
<th>CA</th>
<th>EU</th>
<th>AU</th>
<th>PH</th>
<th>JP</th>
<th>KR</th>
<th>CN</th>
<th>NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>630-08-0</td>
<td>Yes</td>
<td>DSL</td>
<td>EIN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

THE INFORMATION, RECOMMENDATIONS, AND SUGGESTIONS HEREIN WERE COMPILED FROM REFERENCE MATERIAL AND OTHER SOURCES BELIEVED TO BE RELIABLE. HOWEVER, THE MSDS'S ACCURACY OR COMPLETENESS IS NOT GUARANTEED BY GAS INNOVATIONS OR ITS AFFILIATES, NOR IS ANY RESPONSIBILITY ASSUMED OR IMPLIED FOR ANY LOSS OR DAMAGE RESULTING FROM INACCURACIES OR OMISSIONS. SINCE CONDITIONS OF USE ARE BEYOND OUR CONTROL, NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSED OR IMPLIED. THIS MSDS IS NOT INTENDED AS A LICENSE TO OPERATE UNDER, OR RECOMMENDATION TO INFRINGE ON, ANY PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.