



New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **NITROUS OXIDE**

CAS Number: 10024-97-2

DOT Number: UN 1070 (Compressed)
UN 2201 (Refrigerated Liquid)

RTK Substance number: 1399

Date: March 1998 Revision: September 2004

HAZARD SUMMARY

- * **Nitrous Oxide** can affect you when breathed in.
- * **Nitrous Oxide** should be handled as a TERATOGEN-- WITH EXTREME CAUTION.
- * Contact with *liquefied Nitrous Oxide* may cause skin burns and/or frostbite.
- * Breathing **Nitrous Oxide** can irritate the eyes, nose and throat causing coughing and/or shortness of breath.
- * Exposure can cause you to feel lightheaded, giddy and sleepy. High levels can cause you to pass out and very high levels can cause death.
- * Repeated exposure may damage the nervous system causing numbness, "pins and needles," and weakness in the arms and legs.
- * **Nitrous Oxide** may damage the blood cells.
- * **Nitrous Oxide** may damage the liver and kidneys.

IDENTIFICATION

Nitrous Oxide (*laughing gas*) is a colorless gas with a slightly sweet odor and taste. **Nitrous Oxide** can be transported as a very low temperature (cryogenic) liquid. It is used as an anesthetic and a foaming agent for whipped cream.

REASON FOR CITATION

- * **Nitrous Oxide** is on the Hazardous Substance List because it is cited by ACGIH, DOT, NIOSH and IARC.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

NIOSH: The recommended airborne exposure limit is **25 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **50 ppm** averaged over an 8-hour workshift.

- * **Nitrous Oxide** may be a teratogen in humans. All contact with this chemical should be reduced to the lowest possible level.
- * Large amounts of **Nitrous Oxide** will decrease the amount of available *Oxygen*. *Oxygen* content should be routinely tested to ensure that it is at least 19% by volume.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * On skin contact with *liquefied Nitrous Oxide*, immediately submerge the affected body part in warm water.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Nitrous Oxide** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Nitrous Oxide**:

- * Contact with *liquefied Nitrous Oxide* may cause skin burns and/or frostbite.
- * Breathing **Nitrous Oxide** can irritate the eyes, nose and throat causing coughing and/or shortness of breath.
- * Exposure can cause you to feel lightheaded, giddy and sleepy. High levels can cause you to pass out and very high levels can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Nitrous Oxide** and can last for months or years:

Cancer Hazard

- * While **Nitrous Oxide** has been tested, it is not classifiable as to its potential to cause cancer.

Reproductive Hazard

- * **Nitrous Oxide** may be a TERATOGEN in humans since it has been shown to be a teratogen in animals.

Other Long-Term Effects

- * Repeated exposure may damage the nervous system causing numbness, "pins and needles," and weakness in the arms and legs.
- * **Nitrous Oxide** may damage the blood cells.
- * **Nitrous Oxide** may damage the liver and kidneys.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, for those with frequent or potentially high exposures, the following is recommended:

- * Exam of the nervous system.

If symptoms develop or overexposure is suspected, the following are recommended:

- * Complete blood count.
- * Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

- * Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by **Nitrous Oxide**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Before entering a confined space where **Nitrous Oxide** is present, check to make sure sufficient *Oxygen* (19%) exists.
- * Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Standard: 29 CFR 1910.101 for *Compressed gases*.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with **Nitrous Oxide**, immediately wash or shower to remove the chemical.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with **Nitrous Oxide**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * Where exposure to cold equipment, vapors, or liquid may occur, employees should be provided with special clothing designed to prevent the freezing of body tissues.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- * For exposure to cryogenic *liquefied Nitrous Oxide* wear splash-proof chemical goggles and face shield, unless full facepiece respiratory protection is worn.
- * Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS.

Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposure over **25 ppm**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- * Exposure to **Nitrous Oxide** is dangerous because it can replace *Oxygen* and lead to suffocation. Only NIOSH approved self-contained breathing apparatus with a full facepiece operated in the positive pressure mode should be used in *Oxygen* deficient environments.

HANDLING AND STORAGE

- * Prior to working with **Nitrous Oxide** you should be trained on its proper handling and storage.
- * **Nitrous Oxide** reacts violently with ALUMINUM; BORON; HYDRAZINE; LITHIUM COMPOUNDS; SODIUM; TUNGSTEN CARBIDE; PHOSPHINE; ACETYLENE; and HYDROGEN.
- * **Nitrous Oxide** is not compatible with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM

HYDROXIDE); METAL SALTS; METAL OXIDES; and PEROXIDES.

- * Cylinders of **Nitrous Oxide** should be stored in a cool, fire resistant area away from HEAT SOURCES and COMBUSTIBLES.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.
- Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
- A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.
- Q: Who is at the greatest risk from reproductive hazards?
- A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.
- Q: Should I be concerned if a chemical is a teratogen in animals?
- A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

CFR is the Code of Federal Regulations, which consists of the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

IRIS is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEL is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

