



STANFORD UNIVERSITY

ENVIRONMENTAL HEALTH & SAFETY

Important Safety and Health Information on Nitrous Oxide Used for Laboratory Fume Hood Testing at Stanford University

Nitrous oxide is used at Stanford University as a tracer gas for conducting one-time testing of certain laboratory fume hoods that have the capability of operating at a reduced flow rate when laboratory personnel are not in the vicinity.

Safety Precautions

It is important to be aware of the reactivity and incompatibility of nitrous oxide with other chemicals (see next page) and take appropriate safety precautions prior to testing, which include:

- Ensuring that all chemicals in the fume hood are securely capped or removed from lab fume hood.
- Ensuring that all heat sources and ignition sources are removed from lab fume hood.

No Significant Health Risk to Lab Personnel

The National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL) for nitrous oxide is 25 parts per million (ppm) as an 8-hour time-weighted average. However, any potential exposure to laboratory personnel will be well below this for the following reasons:

- Prior to using the tracer gas, the hood must pass an airflow visualization test using a smoke tube.
- A detector with a detection limit of less than 0.1 ppm is located in the immediate vicinity of the fume hood.
- Personnel and equipment are positioned to be able to shut off the nitrous oxide quickly should an audible alarm, which is set to 5 parts per million, be activated.

Although there is no significant risk to lab personnel during the tracer gas testing, lab personnel must be aware of all potential hazards in the laboratory. (See next page for a summary of health hazard information.)

For Further Information

For safety and health questions or concerns, please contact the Occupational Health and Safety Program of the Department of Environmental Health and Safety (EH&S) at 723-0448.

Nitrous Oxide – Safety and Health Summary

Incompatibility and Reactivity of Nitrous Oxide.

- Contact of nitrous oxide with aluminum, boron, hydrazine, lithium, lithium hydride, phenyllithium, sodium, phosphine, tungsten carbide, hydrogen, hydrogen sulfide, organic peroxides, ammonia, or carbon monoxide may cause violent reactions to occur.
- Oxidizing agent. May accelerate combustion. Contact with combustible materials such as oil, grease, and other hydrocarbon products, especially in the presence of ignition sources such as flames, sparks, heaters, electrical equipment, and static discharges, may cause fire or explosion.
- Other incompatible materials include ethers, alcohols, acids, aldehydes, and asphalt.
- Nitrous oxide is a strong oxidizer above 300°C.
- Nitrous oxide decomposes explosively at 650°C. In the presence of catalytic surfaces such as silver, platinum, cobalt, and copper or nickel oxides, this reaction occurs at lower temperatures.

Health Effects – Acute

The following acute (short-term) health effects may occur immediately or shortly after exposure to nitrous oxide:

- Nitrous oxide acts as a simple asphyxiant by displacing air necessary for life. Symptoms include rapid respiration, muscular incoordination, fatigue, dizziness, nausea, vomiting, unconsciousness, and death. Inhalation of small amounts of nitrous oxide may produce feelings of euphoria which may disguise sleepiness or loss of coordination associated with lack of oxygen. May cause anesthetic effects.
- Eye or skin contact with rapidly expanding gas near the point of release may cause frostbite. Pressure drop through valves and piping may cause extreme cold and frostbite on contact.

Health Effects – Chronic

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

- May cause reproductive toxicity in humans.
- Repeated exposure over time may affect the liver, kidneys, nervous system, and blood.