

CLIP, Chemical Laboratory Information Profile

"Only when you know the hazards, can you take the necessary precautionary measures."

Nitrogen, liquid



CAS No.: 7727-37-9

Physical Properties

Exposure Limits

Extremely cold, colorless liquid that evaporates rapidly producing cold gaseous nitrogen, a denser-than-air asphyxiant that accumulates in nearby low areas.
Vapor pressure at -195.8 °C: 760 Torr
Boiling point: -195.8 °C

OSHA PEL: NE
ACGIH TLV: "Simple asphyxiant"
See Additional Remarks, below

Hazardous Characteristics

Overall toxicity	Flammability	Destructive to skin/eye	Absorbed through skin?	Sensitizer?	Self-reactive?	Incompatible with:
0	0	3	No	No	No	Objects and substances at or above room temperature as well as those at temperatures between -195.8 °C and room temperature.*

0: None (or very low); 1: Slight; 2: Moderate; 3: High; 4: Severe.

*Reactivity Hazards

Liquid nitrogen is not chemically reactive, but under typical laboratory conditions it is at its normal boiling point. Consequently, if it comes in contact with any object or substance that is at a temperature greater than -195.8 °C, it will boil vigorously, more vigorously the greater the mass or the higher the temperature of the object or substance. For example, liquid nitrogen boils explosively if mixed with water. Dewar flasks made of glass can break (implode) if liquid nitrogen is poured over the rim. Use a siphon to empty a glass Dewar; often, the rim cannot withstand sudden temperature change. The boiling point of oxygen is -183 °C. Therefore, liquid nitrogen that is open to the air will condense oxygen as a liquid and the mixture of liquid oxygen and liquid nitrogen is a powerful oxidizing agent that reacts violently with most flammables, combustibles, and other reducing agents. See Bretherick's *Handbook of Reactive Chemical Hazards* for details and for other incompatibilities.

Cited as known to be or reasonably anticipated to be carcinogenic in NTP-10? No
Identified as a reproductive toxin in Frazier and Hage, *Reproductive Hazards of the Workplace*? No

Typical symptoms of acute exposures:

From contact with the liquid: frostbite. From inhalation of nitrogen-rich atmosphere: dizziness, coma, death.

Principal target organ(s) or system(s):

Skin, eyes.

Storage Requirements

For short-term (overnight) storage, use insulated containers designed for the purpose. For long-term storage, follow the recommendations of the supplier.

Additional Remarks

Nitrogen is rated as a "simple asphyxiant" by the ACGIH. Hence, when using or handling liquid nitrogen, make sure that the concentration of oxygen in the breathing air of all persons involved is at least 18% by volume (or that the partial pressure of O₂ is at least 135 Torr).

Notes

ReadMe

This Chemical Laboratory Information Profile is *not* a Material Safety Data Sheet. It is a brief summary for teachers and their students that describes some of the hazards of this chemical as it is typically used in laboratories. On the basis of your knowledge of these hazards and before using or handling this chemical, *you need to select the precautions and first-aid procedures to be followed*. For that information as well as for other useful information, refer to Material Safety Data Sheets, container labels, and references in the scientific literature that pertain to this chemical.

Reproductive Toxins

Some substances that in fact are reproductive toxins are not yet recognized as such. For the best readily available and up-to-date information, refer to "DART/ETIC". See the TOXNET home page at www.sis.nlm.nih.gov and click on "Toxicology search". *Note that some of the data in DART/ETIC have not been peer-reviewed*. See also Linda M. Frazier and Marvin L. Hage, *Reproductive Hazards of the Workplace*, Wiley, 1998; and T. H. Shepard, *Catalog of Teratogenic Agents*, 9th ed.; Johns Hopkins University Press, 1998.

Abbreviations

ACGIH TLV—American Conference of Governmental Industrial Hygienists—Threshold Limit Value. C—Ceiling. CAS—Chemical Abstracts Service. mg/m³—milligrams per cubic meter. NA—Not applicable. NE—Not established. NI—No information. NTP-10—National Toxicology Program, Tenth Annual Report on Carcinogens. OSHA PEL—Occupational Safety and Health Administration—Permissible Exposure Limit. ppm—parts per million. STEL/C—Short-term exposure limit and ceiling.

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