

Liquid nitrogen exposure in food preparation

What is the potential risk?

Liquid nitrogen (LN₂) is being used increasingly in restaurants as a method for instantly freezing food and drinks, and in creating theatrical clouds of vapour or fog when exposed to air.

Because of the extremely low temperature of LN₂ (i.e., -196°C), the primary risk to workers who handle it is the potential for cryogenic or cold burns. Contact with the eyes is a significant risk, because it freezes the fluid normally found in the eye. Small amounts of LN₂ that come into contact with the skin may pose a less serious risk because it evaporates so quickly, however, serious cold burns may occur if allowed to pool or absorb into clothing.

LN₂ has a large expansion ratio on evaporation — one litre of LN₂ can result in about 700 litres of gas. Tremendous forces can be created if LN₂ is allowed to rapidly vaporize in an enclosed space. A canister of LN₂ with a failed pressure valve can be propelled with enough force to shatter a reinforced concrete beam. When LN₂ evaporates, it displaces oxygen and has the potential to produce an oxygen-deficient atmosphere and the risk of asphyxiation.

Workers in restaurants, ice cream parlours, and other food service industries may be at risk if LN₂ is used in their establishments.

What industries may be at risk?

- Restaurants or other dining establishments
- Ice cream parlours
- Catering services
- Pubs, bars, night clubs, or lounges
- Other food concessions

How can I reduce the risk in my workplace?

As an employer, you need to know if there is the potential for the risk identified in this advisory to be present in your workplace. It's your responsibility to regularly inspect your workplace, and to ensure that your safety procedures and practices control the risk. The following information highlights some of the sections of the Occupational Health and Safety (OHS) Regulation and Guidelines that are most relevant to this risk.

Section 5.2 of the OHS Regulation requires that if a worker is or may be exposed to a chemical agent, the employer must ensure that:

- (a) The identity of the chemical agent or biological agent, its possible effects on worker health and safety and any precautions required to protect the health and safety of the worker are clearly indicated by labels, SDSs, or other similar means,

- (b) The information required by paragraph (a) is clearly communicated to the worker,
- (c) Written procedures are prepared and implemented to eliminate or minimize a risk of exposure to a chemical agent or biological agent by any route that could cause an adverse health effect, and to address emergency and cleanup procedures in the event of a spill or release of a chemical agent or biological agent, and
- (d) The supervisor and the worker are trained in and follow the measures required in this Part and Part 6 of this Regulation for the safe handling, use, storage and disposal of the chemical agent or biological agent, including emergency and spill cleanup procedures.

Liquid nitrogen safety data sheets, written safe work procedures for storing, decanting, and using liquid nitrogen, along with worker and supervisor training and instruction will help reduce the risk when using LN₂.

Because of the extremely low temperatures and high pressures that are generated when LN₂ is stored, it's critical that LN₂ is stored safely. Section 5.20 of the Regulation requires that containers are designed, constructed and maintained to securely contain a chemical agent.

Liquid nitrogen when accidentally released in sufficient quantities can displace oxygen. Section 5.56 of the Regulation requires that the airborne concentration of any gas or vapour must be controlled so that a worker is not exposed to an oxygen-deficient atmosphere. Adequate continuous general dilution ventilation (specified in section 5.64(2)) and oxygen monitors will help ensure that workers do not encounter an oxygen-deficient atmosphere.

While handling and using LN₂, workers are at risk of harmful contact to their eyes and skin. Protective clothing and eye protection are needed to minimize the risk of contact with LN₂, as specified in sections 8.10(1) and 8.14(1).

For more information on how we identified this risk, visit worksafebc.com and search "emerging risks".