

# Liquid Nitrogen Safety Information

You **MUST** read this information carefully and sign at the bottom before being able to check out liquid nitrogen (LN<sub>2</sub>) and a dewar from the LSU Chemistry Department.

**Liquid Nitrogen:** LN<sub>2</sub> may look like water, but is extremely cold with a temperature of 77K, -196°C, and -321°F. More than a few seconds of contact can cause severe frostbite burns. Pouring some on unprotected skin is actually less dangerous than on clothing in contact with skin. Your skin is so hot relative to LN<sub>2</sub> that there is an initial shielding effect called the **Leidenfrost Barrier** that offers short-term protection against the freezing effects of LN<sub>2</sub>. You will notice this if you pour some on a non-carpeted floor. The LN<sub>2</sub> rolls around as if it is a little hover-craft. This is actually the case as the floor temperature is so hot relative to the very cold LN<sub>2</sub> that as the LN<sub>2</sub> comes in contact with the floor the vaporization of LN<sub>2</sub> to gaseous N<sub>2</sub> causes an insulating layer of N<sub>2</sub> gas to form between the LN<sub>2</sub> and the floor. This cushions the LN<sub>2</sub> and allows it to “float” above the hot floor. The same effect will briefly protect your skin from contact with LN<sub>2</sub>. Thus you can quickly dip your fingers/hand into the LN<sub>2</sub> with no ill effect (aside from it feeling a little cold). **Keeping skin in contact with LN<sub>2</sub> for more than a few seconds, however, will cause enough heat to be drained away to minimize the Leidenfrost Barrier effect and allow the LN<sub>2</sub> to come in direct contact and cause extremely serious frostbite burns.** Pouring LN<sub>2</sub> onto your skin from a height (over 1 foot) minimizes the Leidenfrost barrier effect and increases the frostbite burn quickness. **Always wear safety glasses, which we provide, when doing the experiment.**

**Liquid Nitrogen Dewar:** The container that the LN<sub>2</sub> comes in is called a dewar. This is an aluminum container with two layers and a vacuum in-between. Vacuum is the best insulator for keeping the LN<sub>2</sub> from evaporating too quickly. **IMPORTANT NOTE:** the LN<sub>2</sub> in the dewar is boiling slowly and releasing gaseous N<sub>2</sub> gas continually. The dewar has a loose “lid” which is a Styrofoam rod shown in the photo. This allows the N<sub>2</sub> gas boiling slowly off of the LN<sub>2</sub> to escape the dewar. It is **NOT** meant to be air-tight or prevent the LN<sub>2</sub> from spilling out of the dewar if you tip the dewar over. Please do **NOT** lose this foam lid or try to seal up the dewar. The filled dewar needs to be kept upright when transporting it.



**Transporting a Filled LN<sub>2</sub> Dewar:** When transporting a filled LN<sub>2</sub> dewar in your car it is **VERY IMPORTANT** to secure it properly. If it tips over, the LN<sub>2</sub> will spill out. So it is important to seat belt it into a seat in your car (usually the back seat). The photos show a dewar properly seat belted into a car. Make sure you wrap the seat belt through and around the handle of the dewar, similar to that shown in the photos. Since the dewar is evaporating N<sub>2</sub> gas constantly at a low rate, it is also important to have fresh air flowing through your car. Most newer cars do flow fresh air conditioned air from the front to back of your vehicle, but occasionally when it is really hot cars with automatic temperature controls will shift to recirculated air to more quickly cool the car. If you aren't sure of your car's air flow, open a window partially while driving with a filled dewar of LN<sub>2</sub>.



If you are transporting one of the larger 10 liter dewars, you may be able to place it on the floor behind the passenger front seat, for example, and push that seat back so it wedges the larger dewar between the front and back seat. This usually works well for the larger dewar, but won't work for the smaller 5 liter dewars.

**Returning the Dewar:** You should dump out any left over LN<sub>2</sub> outside after the event before putting it back in your car. You can gather attendees at the event to witness this if appropriate. Keep any spectators back away from where you initially pour the LN<sub>2</sub>, which can be safely dumped on pavement, sidewalks, or dirt/gravel. If you dump LN<sub>2</sub> on grass or plants it could kill them, so please avoid doing that. The dewar and Styrofoam containers should be returned as soon as possible to Choppin 133. We have a limited number of dewars for these events so it is important to return it as soon as possible. Dewars cost \$300 to \$500 each and students not returning one in a reasonable amount of time will be charged for it.

**Your signature below indicates that you have read, understand, and agree to follow these instructions:**

Name (printed): \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_