



Transport of Chemicals, Cryogenics, and Gas Cylinders Between Laboratories on Campus

Transporting Hazardous Materials in a Motor Vehicle

The hazardous materials regulations apply to the transportations of hazardous materials in commerce, which includes transport by motor vehicle. Hazardous materials include chemicals (e.g., flammable liquids or solids, oxidizing/corrosive/toxic substances), cryogenics, gas cylinders, infectious substances, radioactive materials, and other materials capable of posing a risk to health, safety, and property when being transported. University faculty, staff, and students must never transport hazardous materials in their personal vehicle or using public transportation (e.g., UofSC shuttles) for work-related activities. Hazardous materials must be transported in a motor vehicle by only an authorized carrier.

Anyone needing to transport hazardous materials from one university building to another in a motor vehicle or on public roads must consult with EH&S Research Safety for guidance:

- Hazardous Chemicals – contact Jocelyn Locke, the UofSC Chemical Hygiene Officer, at 777-7650 or jlocke@mailbox.sc.edu
- Potentially Infectious Materials – contact Sherika Smith, the UofSC Biological Safety Officer, at 777-1625 or smiths69@mailbox.sc.edu
- Radioactive Materials – contact Bryan Bagg, the UofSC Radiation Safety Officer, at 777-7530 or bagg@mailbox.sc.edu

The transport of hazardous materials can create significant regulatory, financial, health/safety, and environmental risks. Special precautions must be taken to avoid accidents. The following requirements and best practices are intended to mitigate these risks when moving chemicals between campus labs.

Transporting Small Quantities of Chemicals, Cryogenics & Gas Cylinders Between Labs

- A. Laboratory personnel may move small quantities (less than 20 liters) of chemicals by walking, only when chemicals are moved between laboratory:
- rooms within the same building, and
 - between two adjacent buildings if you will never be walking on a public road.

Note: Hazardous chemicals should never be transported by walking on public roads.

- B. Laboratory personnel must adhere to the following guidelines when moving chemicals short distances by walking:

1. At least two persons must be present when moving hazardous chemicals. These lab personnel should be familiar with the specific hazards of the chemicals being transported and proper safety precautions described in the Safety Data Sheets. Only move hazardous chemicals during normal business hours (assistance may be needed if an accident occurs).
2. Contact the UofSC Chemical Hygiene Officer at 777-7650, Assistant Chemical Hygiene Officer at 777-6457, or Hazardous Waste Manager at 777-1935 for guidance before moving chemicals that are reactive, explosive, acutely toxic, or may become unstable when taken out of recommended storage conditions.
3. Never move chemicals such as expired peroxide-formers (e.g., ethers), chemicals in containers that are corroded or cracked, chemicals in containers with missing lids, or any unknown/unlabeled containers. These chemicals should be disposed as hazardous waste.
4. Wear appropriate Personal Protective Equipment (PPE) such as safety glasses, lab coats, and chemical resistant gloves. Minimum attire should include clothing that provides maximum skin coverage (e.g., long pants, closed-toed and non-slip shoes).
5. Ensure the chemicals being moved are accompanied by the following safety information and equipment:
 - Safety data sheets
 - Chemical spill kit appropriate for the material being transported (this is not necessary when moving chemicals between adjacent rooms or across the hallway on the same floor where there is immediate access to a spill kit)
 - Spill clean-up procedure
 - Procedure for responding to personnel exposure
6. Ensure chemicals being moved are always attended. Never leave hazardous chemicals in corridors, offices, or other non-laboratory areas. If a spill occurs, you must be prepared to take immediate actions. Call 911 and notify anyone in the immediate area that a chemical spill has occurred to ensure their safety. If the chemical is spilled near a storm drain, you must protect the storm drain using materials in your spill kit and notify EH&S. Also, always notify your supervisor if a spill occurs when moving chemicals between laboratories. Do not attempt to clean up a spill without assistance if you are unsure of proper procedures.
7. Use puncture-resistant or break-resistant, approved secondary containers. Approved secondary containers are:
 - commercially available bottle carriers made of rubber, metal, or plastic, with a carrying handle,
 - resistant to the chemical being transported and,
 - large enough to hold the contents of the chemical container in the event of breakage.

➤ Note: concentrated acids and other highly hazardous chemicals should not be carried long distances without a cart and secondary containment.

8. Place incompatible chemicals in separate secondary containment to avoid unintended reactions should the containers break or leak during transport. It is best to avoid moving incompatible chemicals at the same time. Make sure all containers are securely closed. Special precautions may be needed when transporting smelly chemicals (i.e., mercaptans, etc.) like double containment to prevent the spread of odors in corridors and other areas.
9. Use a sturdy handcart to move multiple, large, or heavy containers. Carts used for secondary containment must have a liquid-tight tray with lips on four sides. The total amount of liquid in all containers must be limited to 20 liters or less (e.g., five 4-L bottles). Place heavier containers on lower shelf of the cart and never stack chemicals on the cart. Never carry trays containing hazardous chemicals by hand due to the higher risk of spills.
10. Consider packing glass bottles with absorbent materials (e.g., vermiculite), and cushioning to prevent contact and/or breakage of multiple primary containers during transport.
11. Manufacturer's primary container label is sufficient for transporting single containers. Secondary containment that obscures a primary container's label must be labeled with the material's chemical name and its hazards (e.g., "Acetone DANGER—Flammable").
12. To move chemicals between floors, use a freight elevator. If a freight elevator is not available, use a passenger elevator. If crowded, wait for an elevator that is unoccupied. Stairs should be used only if elevators are not available. Lab personnel must carefully consider the risks of moving some chemicals such as solvents that are toxic in an elevator since a release in this confined space may create a hazardous environment.
13. Update your laboratory chemical inventory to reflect the relocation of chemicals. Dispose of any expired, outdated, or unwanted chemicals using the Hazardous Waste pick-up request.

C. Laboratory personnel must adhere to the following guidelines when transporting cryogenics:

1. Move cryogenics (liquid nitrogen, liquid helium, liquid argon, others) only in approved dewar flasks with a pressure relief mechanism.
2. To move cryogenics between floors, two people must coordinate to move the container unaccompanied in the elevator. Gaseous form of the cryogen is an asphyxiant due to the displacement of oxygen in small spaces such as an elevator with no air exchange.
 - a. Attach a large sign "CRYOGEN DANGER, Do not ride this elevator" to the container. Ensure that the sign is visible to any person facing the elevator door.
 - b. The first person (sender) stays with cryogen on the starting floor.
 - c. The second person (receiver) goes up or down to the receiving floor.
 - d. The sender places the container in the elevator, holds the door open, presses the floor number of the receiving floor and exits the elevator.

- e. The receiver waits for the elevator that carries the material and retrieves the cryogen container.

D. Laboratory personnel must adhere to the following guidelines when transporting gas cylinders:

1. Minimize the need for transporting gas cylinders by requesting for commercial movers or representatives from gas cylinder vendors to deliver cylinders directly to your laboratory.
2. Move compressed gas cylinders only with the protective valve covers/caps screwed on and the cylinder securely strapped or chained to a compressed gas cylinder dolly or hand truck designed for that purpose. Never move a cylinder with the regulator connected! Never move a cylinder by rolling it across the floor even a short distance. Smaller cylinders (i.e., weighing less than 25 lbs.) do not require a dolly for moving. Report all suspected gas leaks immediately to EH&S. If a small bottle is leaking, it should be placed inside the fume hood.
3. Cylinders of toxic, corrosive, and pyrophoric gases must be stored in ventilated storage cabinets according to EH&S policies. This should be considered before the move.
4. Some cylinders and lecture bottles are not equipped with valve protection covers, so they should be moved in the original DOT-approved packaging or equivalent containers.