

Safety Guidelines

- ◆ **No one is to be present in the NMR Facility unless they have read and signed this form AND present with the knowledge and explicit approval of Director of NMR Facility.**
- ◆ **NMR labs are accessible only to authorized personnel. No children are allowed to enter the NMR lab at any time. Staff members must be notified in advance if guest visitors would like to tour the facility. You are liable for safety of your guests and any potential damage when safety policy is not being followed.**
- ◆ Each of the NMRs has a very strong superconducting magnet maintained at liquid helium temperatures. You must observe the following guidelines in order to protect yourself from it, and to avoid damage to it. All superconducting NMR instruments are expensive to purchase and maintain. The standard behavior in this room must be serious and professional.

Responsibilities, Risks and Liabilities Agreement:

1. Individuals with medical devices (e.g. cardiac pacemakers and metal implants) must remain outside the 5-gauss perimeter (approximately one meter from the edge of the magnets). The NMR spectrometers generate strong magnetic fields that can affect the operation of some pacemakers and harm implanted or attached devices, such as prosthetic parts and metal blood vessel clips. Persons with these types of medical concerns should contact their physicians about the possible health risks before entering the Facility.
2. Floppy disks, tapes, cards with magnetic strips, cellular phones, laptops and mechanical watches should remain outside the 5-gauss perimeter. Strong magnetic fields surrounding the NMR spectrometers can damage the strip of magnetic media found on credit cards, ATM cards, driver's licenses, and other kinds of cards. Floppy disks, tapes, cellular phones, and laptop computers are also susceptible to damage inside this perimeter. Mechanical wrist and pocket watches will also malfunction and be permanently damaged when exposed to a strong magnetic field.
3. Metal objects must remain outside the 5-gauss perimeter. Strong magnetic fields surrounding the NMR spectrometers attract objects containing steel, iron, and other ferromagnetic materials. This includes most ordinary tools, electronic equipment, compressed gas cylinders, steel chairs, and steel carts. Unless restrained, such objects can suddenly fly toward the magnet which can cause personal injury and extensive damage to the probe, dewar, and superconducting solenoid. The greater the mass of the object, the more strongly it is attracted by the magnet. Only non-ferromagnetic materials should be used near the instruments.
4. Do not exceed the boiling or freezing points of your sample. A sample subjected to a temperature change can build up excessive pressure which can break the tube. Broken glass, projectiles and hot or toxic chemicals can cause injury. To avoid this hazard, establish the freezing and boiling points of a sample before doing a variable temperature experiment, and never rapidly heat or cool a sample. Always wear safety glasses near the magnet when performing variable temperature experiments.

5. Be very careful with sample tubes as they are fragile and break easily. The top of the sample tube can break off when the probe is removed. The sample should be ejected before removing the probe from the magnet. Use extreme caution when removing the probe if the sample cannot be ejected.
6. Follow laboratory safety policies and future updates included, both from Virginia Commonwealth University and from the NMR facilities.

Magnet Quench In the event of a "magnet quench," leave the room immediately and contact the NMR Facility Director

During "magnet quench," a cryogenic liquid purge within the NMR facility may create an oxygen deficient atmosphere due to rapid evaporation of liquid cryogenic gases from the NMR instruments. Rapid evaporation and the high expansion ratios of liquid cryogenics can quickly displace all the breathable air in the facility and create an asphyxiation hazard. A purge of liquid cryogenics will be very fast and may only take a few seconds. A loud hissing sound will occur and gaseous nitrogen and/or helium will be observed exiting the top of the equipment. The visible cloud is condensed water vapor from humidity in the air due to the cold gasses escaping the instrument.

PERSONNEL MUST LEAVE THE AREA IMMEDIATELY! Do not re-enter the lab or allow anyone else to enter the laboratory until the purge has ceased and fresh air has been introduced to the lab. Under no circumstances are personnel to re-enter the laboratory until the purge is complete and fresh air has been provided. The NMR director or other authorized personnel will let you know when it is safe to enter the room. The continued presence of an oxygen deficient atmosphere in the laboratory is a life-threatening condition.

I have read the above mentioned responsibilities, risks and liabilities, and fully understand the potential danger, implication and risks described. I, with signature signed declare that NMR facility, Department of Chemistry at Virginia Commonwealth University, are not responsible or liable for any possible mishaps caused by these working conditions. I will follow all the proper procedures as described in this form and the published NMR facility policy of the Department. I will be held responsible for any mishap due to my negligence or violation of the safety policy of the NMR facility. In addition reading to this document, I confirm that I have received safety training as a part of the general NMR facility training course.

Keep one copy for your record and return one for your application.

PRINT NAME

Department

SIGNATURE

DATE

SIGNATURE & DATE by Dr. Yun Qu, Director of NMR Facility