

School Policy for Use of Flammable and/or Toxic Gases in FRNY Building

This policy applies to the handling, storage and use of gas cylinders containing pure flammable gases, flammable gas mixtures, and toxic gases/gas mixtures within the Purdue Davidson School of Chemical Engineering, FRNY Building.



Figure 1. GHS pictogram
(Flammable Material)

ISO 10156:2017 defines the international standard for determining the flammability of gases or gas mixtures. Examples of flammable gases include pure hydrogen and some hydrogen gas mixtures, methane, propane, acetylene, propylene, etc. Flammable gas cylinders are labeled with the GHS “flame” pictogram for easy identification.

Examples of toxic gases include carbon monoxide, hydrogen sulfide, ammonia, chlorine, etc.

1. All research groups must develop a Standard Operating Procedure (SOP) for the handling, moving, storage, and use of compressed gas cylinders; the SOP should also describe protocols for leak checking and calibrating gas monitors. In addition to the SOP training, all users must receive documented hands-on training for the handling and use of compressed gas cylinders from the safety officer of the group. Training records must be kept on file by the lab manager/safety officer of each research group.
2. Gas cylinders containing toxic and/or flammable gases, including gas mixtures should preferably be stored outdoors in the gas cylinder storage cages (NW side of FRNY building). Inside FRNY labs the cylinders must be stored in well-ventilated areas, away from oxidizers (by at least 20 feet) and ignition sources (e.g.: open flames and direct heat sources), and secured to a sturdy structure. Every effort should be made to reduce the number of toxic/flammable gas cylinders stored inside FRNY laboratories. Ideally, only gas cylinders in use should be kept in laboratories.
3. Experiments that use toxic or flammable gases (including gas mixtures) should be conducted in functioning fume hoods or in ventilated enclosures.
4. Instruments that use flammable gases for their normal operation should be installed and operated according to the instrument manual and manufacturer’s recommendations.
5. Experimental units using toxic/flammable gases should include local toxic/flammable gas monitors (as applicable) with audible alarms. Additionally, **units that can be used unattended must be equipped with a gas detector and automatic shut-off system** to allow for automatic shutdown of the gas flow when a gas leak is detected. In the event of an alarm, immediately cease all work, evacuate the laboratory, and notify the designated safety officer. Only re-enter the laboratory when the alarm stopped sounding.

Other considerations when using toxic and/or flammable gases (including gas mixtures):

- Gas transfer lines should be constructed using stainless steel tubing with a minimum number of fittings to minimize the potential for leaks. Polymeric tubing should not be used.
- Stainless steel convoluted hoses can be used if the pressure rating exceeds the maximum system pressure and the inner plastic tubing is rated for use with the respective gas/gas mixture.
- Compatible gas monitors should be located near the unit using the flammable/toxic gas and should be calibrated regularly in accordance with the manufacturer's recommendations.
- It is recommended that an appropriately rated excess flow shutoff device is installed immediately downstream of the regulator.
- It is recommended that a pressure relief valve rated below the maximum allowable operating pressure is installed upstream of the unit.