

Principal Investigator: _____

Date Approved: _____

This document covers basic chemical safety information for acutely toxic flammable gases. The use of any acutely toxic flammable gas is subject to pre-approval by the Principal Investigator (PI) and/or Supervisor. DO NOT USE ANY ACUTELY TOXIC FLAMMABLE GAS UNTIL YOU HAVE OBTAINED THE NECESSARY PRE-APPROVAL.

Acutely Toxic Flammable Gases

Acutely toxic gases include any gas with a median lethal concentration (LC₅₀) of 500 ppm or less. Acutely toxic flammable gases are also ignitable at a concentration in air of $\leq 13\%$ (v/v), or have a flammable range in air of at least 12 percentage points regardless of the lower flammable limit, at 20 °C and 1 atm.

Examples of acutely toxic flammable gases include arsine, germane, hydrogen sulfide, and dichlorosilane.



Personal Protective Equipment & Personnel Monitoring



Lab Coat

Flame-resistant lab coat.



Gloves

For proper glove selection, review the chemical safety data sheet and consult glove manufacturer recommendations with your PI or supervisor.



Eye Protection

ANSI Z87.1-compliant safety glasses or safety goggles.

Labeling & Storage

Acutely toxic flammable gases must be stored in a toxic gas cabinet or exhausted enclosure away from combustible materials, oxidizing substances, and ignition sources.

NFPA 55 requires that flammable cylinders in storage be separated from oxidizing gas cylinders by a minimum distance of 20 feet or by a noncombustible barrier at least five feet high and with a fire resistance rating of at least one-half hour. Section 2703.9.8 of the IFC requires the barrier to be at not less than 18 inches above and to the sides of the stored material.

Acutely toxic flammable compressed gas cylinders should be secured to the inner wall of the toxic gas cabinet or a stable structure within an exhausted enclosure. The chain/strap should be 1/3 from the top of the cylinder. Compressed gas cylinders in use with a regulator attached should be secured individually so that no slippage or sliding occurs that could damage or alter the regulator. Alternatively, use a cylindrical casing to secure the cylinder within the exhausted enclosure next to your experimental setup. Refer to American Society of Mechanical Engineers code for Process Piping, ASME B31.3, to select compliant piping.

What not to do: Do not use table/bench clamps for securing cylinders. Never store cylinders on transportation carts. Remove regulators from cylinders when not in use and replace with the safety cap. Never use a cylinder without a regulator. Never permit the gas to enter the regulator suddenly. Never try to stop a leak between a cylinder

and regulator by tightening the union nut unless the cylinder valve has been closed first. Never strike an electric arc on the cylinder.

Engineering Controls, Equipment & Materials

Fume Hood

If you have any reason to believe that your protocol may generate fugitive toxic flammable gases (e.g., an open system which terminates outside of a fume hood or other exhausted enclosure), contact the Department of Environmental Health, Safety and Sustainability (EHSS) to determine whether alternative engineering controls (e.g., a burn box) and/or additional respiratory protection is warranted.

First Aid & Emergencies

Releases

Immediately notify others in the area of the release and evacuate the location where the release occurred. Notify your PI/Responsible Safety Person and call Vanderbilt University Public Safety (VUPS) at 615-421-1911 or use the VandySafe app on your smart phone. Report any exposure through Risk and Insurance Management's Origami portal and mark that it occurred in research when prompted. Both VUPS and the Origami system will notify EHSS of the incident. Remain on site at a safe distance to provide detailed information to first responders.

Skin or Eye Contact

Without putting yourself at risk, move person into fresh air. Remove contaminated clothing and accessories; flush affected area with water for at least 15 minutes. Get medical attention immediately.

Inhalation

Without putting yourself at risk, move person into fresh air. Get medical attention immediately.

