# Standard Operating Procedure

**Chemical name and concentration:** Click here to enter text.

*This is an SOP template. It is not complete until:*

1. *Lab specific information is entered into the box below.*
2. *Lab specific protocol and procedure is added to the protocol and procedure section.*
3. *SOP has been signed and dated by the PI and relevant lab personnel.*
4. *All italicized/red text has been removed/replaced with information specific to the chemical.*

Print a copy and insert into your **Laboratory Safety Manual and Chemical Hygiene Plan**. Refer to instructions for assistance.

|  |  |
| --- | --- |
| **School and department:** | Click here to enter text. |
| **SOP preparation date:** | Click here to enter a date. | **SOP approval date:** | Click here to enter a date. |
| **Principal investigator:** | Click here to enter text. |
| **Lab manager name:** | Click here to enter text. |
| **Laboratory phone:** | Click here to enter text. | **Office phone:** | Click here to enter text. |
| **Emergency contact:** | Click here to enter text. | **Contact phone:** | Click here to enter text. |
|  |  |  |  |
| **Laboratory locations covered by this SOP – building and room number** |
| Click here to enter text. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of SOP** |[ ]  Process |[ ]  Hazardous chemical |[ ]  Hazardous class |

# Hazards Identification

## **GHS Classification**

*Copy chemical-specific information from the SDS section 2.*

## **GHS Label Information**

*Copy chemical-specific information from the SDS section 2.*

### **Pictogram**



*Select as needed from the following:*

****

### **Signal Word**

### **Hazard Statement(s)**

*Copy chemical-specific information from the SDS section 2.*

### **Precautionary Statement(s)**

*Some of these statements (i.e. “If inhaled…”) belong under “First Aid Procedures” below. Place them according to relevance.*

# Physical and Chemical Properties

*Get these from the SDS sections 1 & 9.*

|  |  |  |  |
| --- | --- | --- | --- |
| CAS | Click here to enter text. | Melting Point/Range | Click here to enter text. |
| Molecular Formula | Click here to enter text. | Boiling Point/Range | Click here to enter text. |
| Molecular Weight |  | Flash Point |  |
| Physical State, Color | Click here to enter text. | Upper flammability/ explosion limit | Click here to enter text. |
| Odor | Click here to enter text. | Lower flammability/ explosion limit | Click here to enter text. |
| Odor Threshold | Click here to enter text. | Autoignition Temp. | Click here to enter text. |
| Evaporation Rate | Click here to enter text. | Decomposition Temp | Click here to enter text. |

# First Aid Procedures

*Get gas-specific info from the SDS sections 2 and 4.*

**If inhaled,** move to fresh air. If the person is not breathing, give artificial respiration. Avoid mouth to mouth contact. Call 911. Then call EHS at 480-965-1823.

**In case of skin contact,** check for aerosol burns (frostbite burns caused by the rapid cooling from adiabatic gas expansion). Remove clothing around the injury and flush affected area for 15 minutes. Call 911. Then call EHS at 480-965-1823.

**In case of eye contact,** use nearest emergency eyewash immediately. Call 911. Then call EHS at 480-965-1823.

**If swallowed,** do not induce vomiting. Never give anything by mouth to an unconscious person. Call 911. Then call EHS at 480-965-1823.

*Preceding information may change based on specific guidance for the hazardous material.*

# Leak and Accident Procedure

## **Personal precautions**

* Do not breathe gas. Ensure adequate ventilation.
* If the leak poses a respiratory threat, evacuate the lab and call EHS (480-965-1823).
* Do not attempt to stop leaks without appropriate respiratory protection (see PPE & Engineering Controls below).

## **Environmental precautions**

Shut off the gas flow, if safe to do so.

## **Methods and materials for containment**

* If an aerosol burn injury has occurred or if the lab was evacuated due to unsafe atmosphere, a fellow lab worker shall call 9-1-1, and then EH&S at (480) 965-1823.
* Follow posted ASU Emergency Response Guide procedures for hazardous materials incidents. Do not attempt to fix leaks unless the atmosphere in the room is safe to breathe.
* Wear appropriate PPE if not already being worn.
* Shut off the gas flow at the cylinder.
* Repairs on gas systems should only be performed by knowledgeable and qualified personnel.

*Preceding information may change based on specific guidance for the hazardous material.*

# Personal protective equipment (PPE) & Engineering Controls

*Get gas-specific info from the SDS section 8.*

## **Respiratory protection**

*Guidance:*

*All toxic and flammable gases require ventilation. Small lecture bottle cylinders may be affixed to the inside of a fume hood, while larger cylinders require vented gas cabinets. Use this section to show (with photos/diagrams & text) which respiratory controls your lab has, and how to properly use and maintain those controls.*

*The point of use for any toxic or flammable gas must have ventilation (direct-piped exhaust for furnaces, reactors, GC/MS, and other contained-space lab equipment; fume hoods or snorkels for more open experimental setups).*

## **Gas Sensors**

*Toxic and flammable gases require the use of sensors to detect any leaks in the lab space. If your lab has either wall-mounted or personal sensors, list the following:*

* *what limit(s) that the sensor is set to*
* *what action is required when the alarm goes off*
	+ *for example:*

If the sensor registers more than \_\_\_\_ ppm, immediately exit the laboratory. Press the Emergency Gas Shut Off button on the way out, if it safe to do so.

* *how to tell when it’s time to change the sensor cartridge*
* *instructions for performing maintenance on the sensors*

*If the gas is toxic, a medical protocol may be required. Sensor data records from personal/wearable sensors must be saved and maintained.*

## **Eye, Skin, & Hand protection – During Gas Use**

When compressed gases expand to ambient pressure (adiabatic expansion), they can become cold enough to cause frostbite burns.

* Wear chemical splash goggles or safety glasses to protect from aerosol burns & leaks.
* *If any parts of the apparatus will release expanding gas that is not covered by a physical guard or exhaust port, anyone working with or near the equipment must be protected by thermal gloves, a face shield, and/or thermal clothing.*
* *If using oxygen or another oxidizing gas:*

*Wear new nitrile gloves. Make sure they are clean, to avoid any contact of combustible materials with the oxidizing gas.*

*Preceding information may change based on the specific guidance for the gas.*

## **Eye, Skin, & Hand protection – During Gas Cylinder Changes**

When compressed gases expand to ambient pressure (adiabatic expansion), they can become cold enough to cause frostbite burns.

* Wear chemical splash goggles or safety glasses to protect from aerosol burns & leaks.
* *If the gas is flammable, flame-resistant (FR-rated) PPE is strongly recommended.*
* *If the gas is pyrophoric, flame-resistant (FR-rated) PPE is* required*.*
* *If gas cylinder changes are performed infrequently and the gas is toxic or flammable, FSE Safety strongly recommends having cylinder changes performed by the FDM FM KE Facilities Services Team (contact your lab manager or FSE Safety).*

## **Hygiene measures**

Avoid contact with skin, eyes, and clothing. Wash hands before breaks and immediately after handling the product.

*Preceding information may change based on specific guidance for the hazardous material.*

# Storage

*Get these from the SDS sections 7 and 10.*

* All gas cylinders must be kept upright.
* All gas cylinders must be strapped securely in place.
* If the gas cylinder is not in use, secure the threaded cylinder cap.
* *List any chemical compatibilities (i.e., do not store with oxidizers) here – see SDS sections 7 & 10*

# Handling Requirements

*Get these from the SDS section 7, and add any additional precautions recommended by your PI, Lab Manager, or Safety Staff (recommendations may be based on the SDS sections 2, 10, & 11).*

* The lab where the material is being handled must have an approved / certified emergency eyewash and safety shower. *Consult FSE Safety if your lab is missing either the shower or the eyewash.*
* Ensure you are wearing the required PPE and using appropriate engineering controls as stated above.
* Lab emergency contact information must be readily posted. Easy access to a cellular phone or land line is readily available.
* *Specify any additional handling concerns (i.e. no metal tools, no ground-glass joints in the glassware, special plastic vs. glass vessels, etc.)*

*Preceding information may change based on specific guidance for the hazardous material.*

# Apparatus

*Include photos and/or diagrams of the apparatus that the gas will be used with. Clearly show which parts of the apparatus feed into building exhaust. Include any waste gas scrubbers/abatement.*

# Protocol and procedure

## ***Laboratory-specific procedures***

*Add your lab’s specific procedures in this section. Write out separate steps in a list format for easy reading. Please include photos whenever possible. Be descriptive – future generations of researchers in your lab may need to learn the procedure from this document.*

 Click here to enter text.

**Important note:** Any deviation from this SOP requires advance PI approval.

# Cleanup and Waste Disposal Procedure

* Tear the “full” tab off of the gas cylinder label.
* Schedule the FDM FM KE Facilities Services Team to safely perform the cylinder change at the gas cabinet.
* With the empty gas cylinder capped, return the cylinder to Gas Services.
* Contact ASU EH&S at (480) 965-1823 with questions.

*Preceding information may change based on specific guidance for the hazardous material.*

# Documentation of training

* Prior to conducting any work with this material, Principal Investigator or designee must provide to his or her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the Safety Data Sheet or SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate/required laboratory safety training or refresher training within the last one year.

**I have read and understand the content of this SOP.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Employee name** | **ASU affiliate no.** | **Signature** | **Date** |
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