**SOP Template for Toxic Gases**

|  |
| --- |
| 1. **CONTACT INFORMATION**
 |
| **Procedure Title** | [Specify – All guidance text in brackets may be deleted] |
| **Procedure Author** | [Specify] |
| **Creation/Revision Date** | [Specify] |
| **Responsible Person**  | [Name of PI, Lab Supervisor, or Autonomous Researcher, as appropriate] |
| **Location of Procedure** | [Building and room number] |
| **Approval Signature** | [Signature of Responsible Person] |

|  |
| --- |
| 1. **PROCESS OR EXPERIMENT DESCRIPTION**
 |

[Provide a one or two-sentence description of your process or experiment, including its purpose here. Provide a detailed, sequential description in section VII of this template.]

Frequency:[ ]  one time [ ]  daily [ ]  weekly [ ]  monthly [ ]  other: [Specify]

Duration: [Specify the duration of the process or experiment in hours or minutes]

|  |
| --- |
| 1. **HAZARDS**
 |

1. **Compressed Gases**

[List amount, composition and concentration of each gas/gas mixture and associated health and safety hazards. Refer to Safety Data Sheets (SDSs) and other sources as needed.]

1. **Other Hazardous Substances**

[List other hazardous substances and their associated health and safety hazards. Refer to SDSs and other sources as needed.]

1. **Other Hazards**

[List nonchemical hazards, e.g., biological hazards, electrical hazards, mechanical hazards, nonionizing radiation, or ionizing radiation.]

1. **References**

[List all references you are using for the safe and effective design of your process or experiment, including safety literature, peer-reviewed journal articles, and reference books. Safety resources are available at https://ehs.stanford.edu/sop-guidance]

|  |
| --- |
| 1. **ENGINEERING CONTROLS**
 |

[List any engineering controls in place for toxic gas use. Examples include the following:

* Apparatus safety features (RFO size, excess flow valves, shutoff valves, etc.)
* Piping material/size
* Type of fittings
* Dedicated exhaust used for tool
* Details regarding cylinder installation (e.g., how it will be secured)
* Information regarding monitoring systems and alarms in place.
* Include and refer to photos, diagrams, or sketches, as appropriate.]

|  |
| --- |
| 1. **GENERAL WORK PRACTICE CONTROLS**
 |

* Read and follow [*General Use SOP for Compressed Gases*](https://ehs.stanford.edu/wp-content/uploads/sops/Compressed-Gasses.pdf).
* Leak test toxic gas cylinders immediately upon receipt.
* Immediately update ChemTracker inventory with all incoming and outgoing cylinders.
* Ensure proper labeling of cylinders and piping.
* When equipment is not in use, disconnect cylinder and return the cylinder valve protection cap to the cylinder.

|  |
| --- |
| 1. **STORAGE REQUIREMENTS**
 |

[Describe storage location for compressed gases and any special storage requirements for other hazardous chemicals used in the procedure, especially highly reactive/unstable materials, flammable materials, and corrosives.]

|  |
| --- |
| 1. **STEP-BY-STEP PROCEDURES FOR PROCESS OR EXPERIMENT**
 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [For each step’s description, include any step-specific hazard, personal protective equipment, engineering controls, and designated work areas in the left hand column.1. **Guidance on Engineering and Ventilation Controls – Review safety literature and peer-reviewed journal articles to determine appropriate engineering and ventilation controls for your process or experiment. Guidance is available from health and safety specialists at Stanford EH&S and online in the General Use SOPs and Laboratory Safety Sheets in the Laboratory Chemical Safety Toolkit (**<http://chemtoolkit.stanford.edu/>**)**
2. **Guidance on Personal Protective Equipment - To assist with your PPE selection, refer to** <http://chemtoolkit.stanford.edu/LabPPE>**. Respiratory protection is generally not required for lab research, provided the appropriate engineering controls are employed. For additional guidance on respiratory protection, consult with EH&S, 723-0448.**
3. **D*e***signated work area(s) - Required whenever carcinogens, highly acutely toxic materials, or reproductive toxins are used. The intent of a designated work area is to limit and minimize possible sources of exposure to these materials. The entire laboratory, a portion of the laboratory, or a laboratory fume hood or bench may be considered a designated area. See the Chemical Safety Toolkit for more information*.*

Describe the possible risks involved with failure to follow a step in the SOP in the right hand column.]

|  |  |
| --- | --- |
| **Step-by-Step Description of YourProcess or Experiment** | **Potential Risks if Step is Not Done or Done Incorrectly (if any)** |
| 1. Don personal protective equipment. [x]  appropriate street clothing (long pants, closed-toed shoes)[ ]  gloves; indicate type: \_\_\_\_\_\_\_[ ]  safety goggles [ ]  safety glasses [ ]  face shield [ ]  lab coat [ ]  flame-resistant lab coat[ ]  other: \_\_\_\_\_\_\_ |  |
| 2. Check the location/accessibility/certification of the safety equipment that serves your lab:

|  |  |
| --- | --- |
| **Item** | **Status** |
| **Laboratory Fume Hood/Glove Box or other Ventilation Control** | Location: \_\_\_\_\_\_\_*Check sticker to ensure that hood was certified within last 12 months.* |
| **Eyewash/Safety Shower** | Location: \_\_\_\_\_\_\_*Ensure that it is accessible, not blocked.**Check tag that it has been tested within last month.* |
| **First Aid Kit**  | Location: \_\_\_\_\_\_\_ |
| **Chemical Spill Kit**  | Location: \_\_\_\_\_\_\_ |
| **Fire Extinguisher** | Location: \_\_\_\_\_\_\_ |
| **Telephone** | Location: \_\_\_\_\_\_\_ |
| **Fire Alarm Manual Pull Station** | Location: \_\_\_\_\_\_\_ |

 |  |
| 3. [Describe the next step in the procedure.] |  |
| 4. [Describe the next step in the procedure. Insert additional rows in table, as needed.] |  |
| 5. Dispose of hazardous solvents, solutions, mixtures, and reaction residues as hazardous waste. |  |
| 6. Clean up work area and lab equipment.[Describe specific cleanup procedures for work areas and lab equipment that must be performed after completion of your process or experiment. For carcinogens and reproductive toxins, designated areas must be immediately wiped down following each use.]  |  |
| 7. Remove PPE and wash hands. |  |

 |
| 1. **EMPTY CYLINDERS and WASTE DISPOSAL**
 |

1. **Gas cylinders:**
* Never bleed a cylinder completely empty. Leave a slight pressure (25 psig) to keep contaminants out.
* Return empty and unneeded cylinders to vendor.
* Contact EH&S at 650-723-0448 for disposal of cylinders that are not returnable.
* Update ChemTracker immediately after returning or disposing of a cylinder.
1. **Other waste:**

[Describe quantities of waste you anticipate generating and appropriate waste disposal procedures. Include any special handling or storage requirements for your waste. Contact EH&S at 650‑723‑0448 for questions and additional guidance.]

|  |
| --- |
| 1. **EMERGENCY PROCEDURES**
 |

1. **Health-Threatening Emergencies**
2. **Fire, explosion, health-threatening hazardous material spill or release, compressed gas leak, or valve failure, etc.**
3. Call 911.
4. Alert people in the vicinity and activate the local alarm systems.
5. Evacuate the area and go to your Emergency Assembly Point (EAP): [Indicate EAP location]
6. Remain nearby to advise emergency responders.
7. Once personal safety is established, call EH&S at 650-725-9999 (or 286 in the School of Medicine).
8. Provide local notifications (see Section F below).

Note: For compressed gas leaks, shut off gas supply only if this can be done safely, without risk to personnel.

1. **Injuries and Exposures:**
2. Remove the injured/exposed individual from the area, unless it is unsafe to do so because of the medical condition of the victim or the potential hazard to rescuers.
3. Call 911 if immediate medical attention is required.
4. Call 650-725-9999 (or 286 in the School of Medicine) to report the exposure to EH&S.
5. Administer first aid as appropriate.
6. Flush contamination from eyes/skin using the nearest emergency eyewash/shower for a minimum of 15 minutes. Remove any contaminated clothing.
7. Bring to the hospital copies of MSDSs for all chemicals the victim was exposed to.
8. **Non-Health-Threatening Emergencies**
9. **Injuries and Exposures**

For injuries and exposures that are not considered serious or a medical emergency, call the Occupational Health Center (OHC) at 650-725-5308 between 8:00 am-5:00 pm M-F for immediate phone triage and to schedule an appointment. For urgent conditions when SUOHC is closed, go to the Stanford University Medical Center Emergency Department.

1. **Spills**

For hazardous material spills or releases which have impacted the environment (via the storm drain, soil, or air outside the building) or for a spill or release that cannot be cleaned up by local personnel:

1. Notify Stanford University responders by calling 650-725-9999 (or 286 in the School of Medicine). These services are available 24 hours a day, 7 days a week.
2. Provide local notifications (see Section F below).
3. **Local Cleanup of Small Spills**

In the event of a minor spill or release that can be safely cleaned up by local personnel using readily available equipment (absorbent available from EH&S in Small Spill Kit) and laboratory PPE:

1. Notify personnel in the area and restrict access. Eliminate all sources of ignition.
2. Review the SDS for the spilled material, or use your knowledge of the hazards of the material to determine the appropriate level of protection (do not clean up spills requiring respiratory protection locally).
3. Wearing appropriate personal protective equipment, clean up spill. Collect spill cleanup materials in a tightly closed container. Manage spill cleanup debris as hazardous waste.
4. Submit online [waste pickup request](http://www.stanford.edu/dept/EHS/prod/enviro/waste/pickup/WastePickup_form.htm) to EH&S at <https://wastetag.stanford.edu>.
5. Reporting Requirements: All spills cleaned up locally must be reported if they occur outside of secondary containment. A spill that occurs within secondary containment (a laboratory hood is considered secondary containment) must be reported if it is greater than 30 ml or if it takes longer than 15 minutes to clean up. To report a spill, call EH&S at 650-725-9999 (or in the School of Medicine, x286) as soon as possible.

## **Lab-Specific Procedures**

[This section is for any emergency procedures different from standard responses, or for additional emergency information due to the nature of materials or task. Include information on gas leaks, chemical spill, and personal exposure/medical emergency as appropriate.]

1. **Building Maintenance Emergencies**

Call Facilities Operations at 650-723-2281 (or 650-721-2146 in the School of Medicine) for building maintenance emergencies (e.g., power outages, plumbing leaks).

## **Local Notifications**

[Identify the area management staff that must be contacted and include their work and after-hours numbers. This must include the principal investigator and may include the lab safety coordinator, facilities manager, and/or business manager.]

|  |
| --- |
| 1. **TRAINING REQUIREMENTS**
 |

1. **General Training** [Check appropriate general training for the procedure]

[x]  General Safety and Emergency Preparedness (EHS-4200)

[x]  Chemical Safety for Laboratories (EHS-1900)

[x]  Compressed Gas Safety (EHS-2200)

[ ]  Biosafety (EHS-1500)

[ ]  Life Sciences Research Laboratory Safety Training (EHS-4875)

[In the School of Medicine, EHS-4875 is required for laboratory personnel in lieu of EHS-1900, 2200, and 1500.]

[ ]  Other: [Indicate any other required general training]

1. **Laboratory-Specific Training** [Check appropriate lab-specific training for the procedure]

[x]  Review of SDS for gases and other chemicals involved in process/experiment)

[x]  Review of this SOP

[ ]  Other: [Indicate any other required lab-specific training]

|  |
| --- |
| 1. **PRIOR APPROVALS**
 |

Obtain prior approval from PI/Lab Supervisor.

[Your PI or lab supervisor’s prior approval may be documented by his/her signature in the Approval Signature in Section I of this document. For granting prior approval to individuals other than the procedure author, use one of the methods described at <http://www.stanford.edu/dept/EHS/cgi-bin/lcst/restricted-chemicals-high-risk-procedures/>.]