

Completing Particularly Hazardous Substances (PHS) SOPs

National Institutes of Health • Office of Research Services (ORS) • Division of Safety (DS)










As required by OSHA and the NIH Chemical Hygiene Plan, Particularly Hazardous Substances (PHS), i.e., carcinogens, reproductive hazards, and acute toxins, require a written SOP for use and compliance purposes. To determine if a chemical is a PHS, consult the SDS, Appendix B of the [NIH Chemical Hygiene Plan](#), the [Chemical Hygiene Officer](#), or your [Safety Specialist](#). Refer to the [Division of Safety \(DS\) Fact Sheet on Particularly Hazardous Substances \(PHS\)](#) for more information.

The Division of Safety has developed a library of control banded SOP templates for PHS. If a lab has multiple chemicals belonging to the same control band, these chemicals can be grouped into the same SOP. When combining chemicals in a single SOP, the lab can list all applicable chemicals within the SOP or create an attached or linked excel file that includes chemical names and CAS numbers.

SOP development process

1. Begin by accessing the [PHS SOP library](#)

SOP templates for Particularly Hazardous Substances (PHS)

Control bands/Pictograms	Hazards	Example	SOP#
	Carcinogen/ reproductive toxin	Boric acid, Cadmium, beryllium and its compounds, estrogen, nickel compounds, silica, tamoxifen, formamide, dexamethasone etc.	SOP-1
	Acutely toxic	Acetaldehyde, copper cyanide, epinephrine, phenyl thiourea, sodium fluoride	SOP-2
	Acutely toxic and carcinogen/reproductive toxin	Carbon tetrachloride, Dichloromethane, Chloroform, 1,1-Dichloroethane, Ethylene dichloride, Vinylidene chloride, cis and trans-1,2-Dichloroethene, 1,2-Dichloropropane, Methyl chloroform, 1,1,2-Trichloroethane,	SOP-3
	Acutely toxic and carcinogen/reproductive toxin	chromium, arsenic, sodium azide, sodium cyanide, diazomethane, nickel carbonyl, chloroaniline, vanadium oxide, thallium salts, ethidium bromide, amino pyridine etc.	SOP-4
	Acutely toxic and Corrosive	Bromine, ammonia, acrolein etc. HF requires chemical specific SOP	SOP-5
	Carcinogen/reproductive toxin and flammable	Carbon disulfide, dimethylformamide (DMF), Diethylene glycol dimethyl ether (diglyme), heptane, hexane, toluene, xylene etc.	SOP-6
	Acutely toxic and flammable	Allyl alcohol, bromoacetone etc.,	SOP-7
	Acutely toxic and oxidizer	Nitrogen oxides, chlorine trifluoride, chlorine dioxide, sodium nitrite etc.	SOP-8
	Acutely toxic, corrosive and carcinogen/reproductive toxins	chromic acid, phenol, arsenic oxide, cobalt chloride, imidazole etc.	SOP-9

2. Open/download the appropriate template based on the pictograms and hazards associated with the chemical(s). Examples of chemicals that fall into each control band are included in the above document. Note: the list is not inclusive of all PHS, and many more chemicals are classified as such that would qualify for the development of SOPs.
 - a. Example: a lab has ten chemicals that qualify as PHS; seven are flammable toxins (SOP 7), one is a corrosive toxin (SOP 5), and two are carcinogens (SOP 1). The lab would need to create three SOPs (SOP 1, 5, and 7) to cover these ten chemicals, and these SOPs would include details of each chemical in the respective SOP.
3. Areas requiring laboratories to edit and/or add additional information are highlighted in yellow. Pay specific attention to these sections and address all highlighted areas, even if they are non-applicable. Items that can be included on an attached excel file are highlighted in blue.

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Below is a walkthrough of the sections and how to complete each.

Section 1: Fill in the chemical name(s) and CAS number(s); this will auto-populate throughout the document so you will only enter it once. If you are utilizing the option to attach an excel file, fill the chemical name field with “Attached excel file of chemicals”. The excel file must be included with the final document for review and use by lab personnel. An example is shown below.

1	SPECIFIC CHEMICAL HAZARD INFO for Chemical name
Refer to SDS for completing Section 1.	
<i>One SOP can be used for covering multiple chemicals that are acute toxins and carcinogens/reproductive toxins provided they don't possess any additional health hazards or physical hazards (flammable, pyrophoric, corrosive etc.). If one SOP is used for multiple chemicals, attach the list of names and CAS# of the chemicals to the SOP and fill out the “chemical name” and “CAS number” as “Attached List”</i>	
CHEMICAL NAME (s): Chemical name	
CAS number: [XXX]	
Routes of Exposure: Inhalation, absorption, ingestion, and injection	
Signs/symptoms of exposure: Refer to the SDS	

	A	B	C	D	E	F
1	Dr. Young's SOP 1 Attachment					
2						
3	Chemical Name	CAS #	Storage location(s)	Handling/use location(s)	Additional PPE	Decontamination solution
4						
5						
6						

Section 2: Add a brief but complete description of the work being done; an example of what this should include is provided in the template. Select the quantity of the chemical(s) used; if multiple quantities are used for the same or different chemicals, select as many as applicable from the options. Note: you must include more information if procedures, manipulation, etc. increases the risk.

Section 3: Attach or link the applicable SDS.

Section 4: Select where the chemical(s) will be manipulated and used from the available options.

Work involving the use of Chemical name will be performed in a:
<input type="checkbox"/> chemical fume hood
<input type="checkbox"/> ducted biological safety cabinet
<input type="checkbox"/> glove box
<input type="checkbox"/> other, see below*

If you choose “other”, provide specific information at the end of the section.

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*Describe any work outside of a hood or exhausted containment including controls put in place to prevent exposure.

[Click here to enter text](#)

Section 5: If additional PPE beyond what is already listed in this section is required for the work being done, describe it here or list on the accompanying excel sheet.

Section 6: Use the link to print the [PHS designated area sign](#) and hang in the area(s) of the lab(s) where PHS are stored and used.

Select from the dropdown list what equipment is used when preparing or manipulating solutions of the chemical(s). If there is additional information needed regarding environmental controls, include those in section 4.

All manipulations of [Chemical name](#) will be performed on plastic-backed absorbent pads in a [Select ventilation control from dropdown](#). Pads will be disposed of after completion of tasks or immediately upon contamination. Wear all required PPE for all procedures involving preparation and handling of [Chemical name](#). Bottles should be opened only in a chemical fume hood.

The rooms where the chemical(s) are used and stored need to be listed in this section. If instead they will be included in the excel file, please fill in 'see attached excel file'. Options for storage units are offered; check all that apply.

Use

All work with [Chemical name](#) must be done in a labeled designated area. Work will be conducted in the [following room\(s\): list room\(s\) where chemical is used](#).

- A sharps container will be in the immediate vicinity for safe sharps disposal.
- All potentially contaminated disposable items will be placed in a waste bag before disposal as hazardous waste.
- Hands must be washed upon completion of tasks.

STORAGE

[Chemical name](#) containers will be labeled and stored in a/an:

- ☐ freezer
- ☐ refrigerator
- ☐ chemical cabinet
- ☐ box
- ☐ other

in the [following room\(s\): room\(s\) #](#) (away from any incompatible chemicals).

Store powder and stock solutions in a leak-proof, secondary container in the designated area.

Section 7: No additional information or edits to this section are required.

Section 8: If specific cleaning materials and agents are required for one or more of the chemicals covered by the SOP, add that information to this section. If standard cleaning agents are acceptable for all chemicals, no edits are needed.

Section 9: List the room(s) where the safety equipment indicated are located for each space the chemical(s) are stored and used. You may also state this information on the excel file.

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LOCATION OF SAFETY EQUIPMENT

Location of Eyewash:

Location of Safety Shower:

Location of Fire Extinguisher:

Additionally, delete the emergency services information that does not apply to your campus/location.

Section 10: Delete the local OMS information that does not apply to your campus/location.

Section 11: Signatures of all lab members need to be collected on this page. All existing and future lab members are required to read and sign the SOP prior to beginning any work with a PHS. The SOP needs to be readily available for lab members to consult at any time, as well as to show to DOHS surveyors, safety staff, or other regulatory officials. Training on and review of the SOP is required annually or if significant change is made to processes or procedures.