
Pacific Northwest National Laboratory

Chemical Process Permit

Permit Name:	PSL-1520-CPP-373	Revision:	1	Created:	26-MAY-1999
Author:	Mikhail Alnajjar			Effective Date:	21-JUN-1999
Title:	Organic, Inorganic, and Organometallic Synthesis and Separations.			Use Category:	Information
Building:	PSL	Room:	1520	Org Cd:	D7E42

Permit Approval/Signatures

Author:	<u>Mikhail Alnajjar</u>	<u>21-JUN-1999</u>
	(Electronic Approval)	(Date)
ES&H Representative:	<u>Richard Johanson</u>	<u>21-JUN-1999</u>
	(Electronic Approval)	(Date)
Line Manager:		<u>21-JUN-1999</u>
	(Electronic Approval)	(Date)
Technical Reviewer 1	_____	_____
	(Donald Camaioni)	(Date)
Technical Reviewer 2	_____	_____
	(John Linehan)	(Date)
Technical Reviewer 3	_____	_____
	(Thomas Autrey)	(Date)
Technical Reviewer 4	_____	_____
	(James Franz)	(Date)

Chemical Process

Description of Chemical Process:

The chemical processes performed in this laboratory include the synthesis and purification of new organic, inorganic, and organometallic materials. Normally, the individuals operating in this space use small quantities of chemicals. The hazards associated with each task are listed in description of hazards section, categories 1 through 12 below. Acids and bases (organic and inorganic), thiols, phosphines, hydrocarbons, and alcohol base baths are also used in this space. Workers must be cautious of flammability, corrosiveness, and combustibility of the materials used.

Chemical Identification

#	Chemical/Chemical Group	Chemical Hazards	Volume/Quantity per Use	Frequency of Use
1	Inorganic Acids (see description of hazards in Category 1 below)	Moderate	25-400 mL	Weekly
2	Organic acids (see description of hazards in Category 2 below)	Moderate	25-700 mL	Weekly
3	Bases (see description of hazards in Category 3 below)	Moderate	25-5000 mL	Weekly
4	Organic liquids (see description of hazards in Category 4 below)	Moderate	25-5000 mL	Weekly
5	Inorganic salts (see description of hazards in Category 5 below)	Moderate	10-200 g	Weekly
6	Organic solids (see description of hazards in Category 6 below)	Moderate	10-300 g	Weekly
7	Organometallics (see description of hazards in Category 7 below)	Moderate	10-200 g	Weekly
8	Water & Air Reactive Materials (see description of hazards in category 8 below)	Moderate	5-100 g	Weekly
9	Formaldehyde (see description of hazards in Category 9 below)	Suspected Carcinogen	5-50 g	Weekly
10	Benzene (see description of hazards in Category 10 below)	Suspected Carcinogen	5-100 mL	Weekly
11	Compressed Gases (see description of hazards in Category 11 below)	Moderate	5-1000 psi	Weekly
12	Cryogenics (see description of hazards in Category 12 below)	Low	100-2000 mL	

Chemical Process Hazards and Risk Analysis

Description of Hazards:

Category 1) Inorganic Acids (including, but not limited to, nitric acid, hydrochloric acid, sulfuric acid, perchloric acid, and phosphoric acid): General hazard-corrosive.

Category 2) Organic acids (including, but not limited to acetic acid, formic acid, trifluoroacetic acid, polyphosphoric acid, and glycolic acid): General hazard-corrosive; flammable/combustible.

Category 3) Bases (including, but not limited to sodium hydroxide, potassium hydroxide, ammonium hydroxide, and sodium phosphate monobasic, and metal salts of organic substrates): General hazard-corrosive (caustic).

Category 4) Organic liquids (including, but not limited to, alcohols, acetone, ethers, ketones, esters, hydrocarbons, amines, thiols, alkyl tins, alkyl silanes, peroxides, alkyl boranes, alkyl halides, phosphines, and other combustible liquids): General hazard-flammable/combustible/ignitable.

Category 5) Inorganic salts (including, but not limited to, metal salts of nitrates, halides, sulfates, phosphates, silicates, transition metal compounds, and carbonate composition): General hazard-none. This category may include oxidizers and combustible materials.

Category 6) Organic solids (including, but not limited to phenol, phosphine oxides, synthesized organic compounds, high molecular weight hydrocarbons, resorcinol, polymers, peroxides, alcohols, amines, and benzophenones): General hazard-none. The category may include oxidizers, toxic, and flammable compounds.

Category 7) Organometallics (including, but not limited to, ferrocene, chromium hexacarbonyl, aluminum isopropoxide, palladium acetate, rhodium acetate, molybdenum compounds, rhenium compounds, tungsten compounds and iron oxides): General hazard-none. The category may include pyrophoric and/or flammable/combustible materials.

Category 8) Water and Air Reactive Materials (including, but not limited to sodium, potassium, lithium, lithium aluminum hydrides, lithium hydride, sodium hydride, potassium hydride, active metal alloys and amalgams, calcium hydride, butyl lithium, and phosphorus pentachloride): General hazard-flammable/combustible, corrosive, and pyrophoric.

Category 9) Formaldehyde (An OSHA/WISHA regulated material; includes C-13 labeled formaldehyde for NMR studies).

Category 10) Benzene (An OSHA/WISHA regulated material; includes benzene-d6 and C-13 labeled benzene for NMR studies).

Category 11) Compressed Gases (including, but not limited to, nitrogen, argon, oxygen, propane, hydrogen, hydrogen chloride, and other lecture bottles): General hazard-none. Caution should be exercised since this category may include flammable gases.

Category 12) Cryogenics (include but not limited to liquid nitrogen): General hazard-none. Cryogenics may accelerate the combustion of flammable materials since cryogenics are able to condense oxygen from the air. Enriched oxygen environment enhances the burning of noncombustible materials.

The following hazards were identified under the previous CPP format:

Flammable, Corrosive, Pyrophoric, OSHA Regulated, Toxic, Compressed Gas, Oxidizing, Cryogen, Asphyxiant

Description of Risk Analysis:

Manipulation of volatile chemicals is done in fume hoods or within enclosed ventilation systems. Exposure to chemicals is minimal since only small quantities are used at one time. Protective equipment (such as goggles, gloves,

shields, and appropriate clothing) is used when handling acids, bases, and other hazardous materials.

Engineered Controls

<input type="checkbox"/> General Ventilation ¹	<input checked="" type="checkbox"/> Local Ventilation ²	<input type="checkbox"/> Snorkel Ventilation ³	<input checked="" type="checkbox"/> Enclosure ⁴	<input checked="" type="checkbox"/> Separation ⁵	<input checked="" type="checkbox"/> Storage ⁶
Description of Engineering Controls used to mitigate the hazards associated with this process:					
<ol style="list-style-type: none"> 1. General ventilation is used for dilution of hazardous aerosols to below regulated levels 2. Local ventilation is used for maintaining hazardous chemicals concentration below regulated levels in this workspace 3. Snorkel ventilation is used to control airborne hazardous chemicals at the point of generation 4. Chemicals are used in enclosures such as glove boxes or vacuum chambers 5. Reactive materials covered within the scope of this Process Permit are segregated and stored separately. 6. Flammable solvents are stored in flammable-liquids storage cabinets. 					

Administrative Controls

<input checked="" type="checkbox"/> Labels ¹	<input checked="" type="checkbox"/> Chemical Inventory ²	<input checked="" type="checkbox"/> Operating Limits ³	<input checked="" type="checkbox"/> Inventory Limits ⁴	<input type="checkbox"/> Medical Surveillance ⁵	<input checked="" type="checkbox"/> MSDS ⁶	<input type="checkbox"/> Exposure Monitoring ⁷
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Description of Administrative Controls used to mitigate the hazards associated with this process:

1. All chemicals covered within the scope of this Process Permit are labeled as to their contents of the materials present in the container
 2. All chemicals covered within the scope of this Process Permit are included in PNNL's Chemical Management System. The web site address is "<http://www1.pnl.gov/computing/cms/index.html>"
 3. Flammable liquids, combustibles, and reactive material inventories as defined by NFPA 45 are maintained within the control limits
 4. Flammable liquids, combustibles, and reactive material inventories are limited to quantities defined by the Facility Use Agreement (FUA)
 5. Medical surveillance requirements apply where users of benzene are routinely exposed to amounts above the permissible exposure limit for the substance.
 6. Material Safety Data Sheets for all chemicals covered within the scope of this Process Permit are available from PNNL's computer network. (Access instructions are available on PNNL's home page under ES&H or at the web site address "<http://w3.pnl.gov/safety/msdata.htm>"). For the use of liquid nitrogen refer to IOPS Practice, "Working With Cryogenics".
 7. Exposure monitoring is required for
- Note: Exposure monitoring is not required in this laboratory. Fume hood ventilation is used in this workspace. Chemical concentrations, including formaldehyde and benzene, are kept below the permissible exposure limit.

Personal Protective Equipment

<input checked="" type="checkbox"/> Safety Glasses ¹	<input checked="" type="checkbox"/> Chemical Safety Goggles ²	<input checked="" type="checkbox"/> Chemical Splash Shield ³	<input type="checkbox"/> Respiratory Protection ⁴
<input checked="" type="checkbox"/> Gloves ⁵	<input checked="" type="checkbox"/> Gauntlets ⁶	<input checked="" type="checkbox"/> Lab Coats ⁷	<input type="checkbox"/> Lab Aprons ⁸

Description of Personal Protective Equipment required to control exposure:

1. Safety glasses at a minimum, are worn when handling any of the chemicals described in this permit.
2. Chemical safety goggles, at a minimum, are worn when handling the corrosive chemicals that may splash.
3. Chemical splash shields, in combination with safety glasses or safety goggles, are worn when working with corrosive liquid chemicals that may splash.
4. Respiratory protection is worn when working with these chemicals. The specific types of respiratory protection are ... : Contact safety personnel for specifics.
5. Operations that pose a skin exposure while working with chemicals require hand gloves to be worn. The specific types and manufacturers are ... : Contact safety personnel for specifics.
6. Appropriate gauntlets (gloves with long, flared cuffs) are worn when working with corrosive liquid chemicals that may splash. Consult the chemical resistance glove guide for assistance.
7. Lab coats are worn when working with corrosive liquid chemicals that may splash.
8. Lab aprons are worn when working with corrosive liquid chemicals that may splash.

NOTE:

1. All staff will be familiar with the use of the personal protective equipment that is indicated
2. When handling corrosive chemicals that may splash , minimum clothing worn is closed-toe shoes, long pants, and a long-sleeved shirt. A lab coat or chemical apron may be substituted for a long-sleeved shirt and long pants.

Waste Management Requirements

<input type="checkbox"/> Sewer Discharge Permit ¹	<input checked="" type="checkbox"/> Satellite Accumulation Area ²	<input type="checkbox"/> Treatment by Generator ³
Description of Waste Management Requirements:		
<p>1. If sewer discharge is to be performed in this space, a valid sewer discharge approval(s) must be attached to this Chemical Process Permit (CPP). Contact the FSR, HMC or delegate for assistance. The waste generated will be discharged according to the conditions of the approval(s).</p> <p>2. Hazardous waste will be segregated and accumulated in appropriate containers that are properly labeled. The waste containers will be stored in designated satellite accumulation areas.</p> <p>3. If treatment is to be performed in this space, an approved Hazardous Waste Treatment & Disposal Approval form must be attached this Chemical Process Permit. Contact the FSR, HMC or delegate for assistance. The hazardous waste approved for the treatment will be treated according to the conditions of the approval.</p>		

Spill Kits

Acid:	In cabinet located at the NW wall of lab 1524.	Base:	In cabinet located at the NW wall of lab 1524.
Mercury:	In cabinet located at the NW wall of lab 1524.	Other:	Solvents: In cabinet located at the NW wall of lab 1524.

Emergency Response

In the event of a chemical spill, please follow the Lab Handbook Practice - "Chemical Spill Response."

In the event of an emergency or off-normal event, call 375-2400 then notify your Building Manager. When calling 375-2400, state the problem, request any needed emergency assistance, and request notification of the appropriate personnel. If you need further instructions, be sure the PNNL Control Room Technician (375-2400) has the telephone number where you can be reached. This applies 24 hours a day, 365 days of the year.

Loc. of Safety Shower:	Outside the lab, personnel corridor.	Location of Eyewash:	Near the sink, at the North end of the lab.
CSM Name:	Mikhail Alnajjar	Telephone:	509/375-2321

Chemical User Qualifications

Prior to working with hazardous chemicals, the lab worker must read the Chemical Process Permit and sign off on the documentation. If the Chemical Process Permit is read on-line via IOPS, completion of the reading assignment will be recorded electronically. Staff signatures indicate they understand the procedures and are qualified to do the work.

Formal Training	Job Specific Training	Medical Surveillance	Printed Name	Signature/Date	Process Owner Initials (i required)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____

Formal Training:

<input checked="" type="checkbox"/> Hazard Communications (671)	<input type="checkbox"/> Confined Space (694)	<input checked="" type="checkbox"/> Waste Management (833)	<input type="checkbox"/> Lock and Tag (692)
<input checked="" type="checkbox"/> Hood (685/686)	<input checked="" type="checkbox"/> Eyewash Safety Shower (695/696)	<input type="checkbox"/> GERT (817)	<input type="checkbox"/> Other

Job-Specific Training: Staff must understand the hazards presented by their specific work tasks, how to protect themselves from those hazards, and know the location of emergency showers and eye washes. Job-specific training will be fulfilled when the user has read this document and signed his/her name above.