



## Heating Sealed Vessels

Areas with **blue gray highlighted** text indicate that information must be provided or modified by researcher prior to the SOP approval.

**This SOP is not a substitute for hands-on training.**

Print a copy and insert into your laboratory SOP binder.

Department:	Chemistry
Date SOP was written:	11/3/2017
Date SOP was approved by PI/lab supervisor:	
Principal Investigator:	Name: Richmond Sarpong Signature: _____
Internal Lab Safety Coordinator or Lab Manager:	Name: Melissa Hardy/Justin Jurczyk Lab Phone: 406-696-1225/412-728-1952 Office Phone: 510-642-6312
Emergency Contact:	Name: Melissa Hardy/Justin Jurczyk Lab Phone: 406-696-1225/412-728-1952
Location(s) covered by this SOP:	832,834,836,837,838,839,842,844,847,849

### 1 - Purpose

This SOP covers the precautions and safe handling procedures for Heating Sealed Vessels.

***If you have questions concerning the applicability of any recommendation or requirement listed in this procedure, contact the Principal Investigator/Laboratory Supervisor or the campus Chemical Hygiene Officer at [ucbcho@berkeley.edu](mailto:ucbcho@berkeley.edu).***

### 2 - Physical & Chemical Properties

n/a

### 3 - Potential Hazards/Toxicity

The danger of Heating Sealed Vessels arises from lacerations due to shrapnel (metal, glass, ceramic, etc.) that might accompany a violent rupture of a sealed vessel that bursts due to overpressure.

A rupture might also lead to exposure to other hazardous chemicals. See the appropriate SOPs and SDSs for any other chemicals used while Heating Sealed Vessels to determine if there is the potential of exposure to toxic chemicals.



## 4 - Engineering Controls

Lab-specific information on engineering controls may be included in the Protocol/Procedure section.

The following is the set of engineering controls required when handling PECs:

- Work in a properly functioning chemical fume hood when handling PECs. Work with the sash as low as possible.
- When the fume hood sash does not provide adequate protection, use a portable blast shield, inside the hood.
- When working outside of a fume hood, a portable blast shield must be used.
- Laboratories and rooms where PECs are used must have general room ventilation that is negative pressure with respect to the corridors and external environment. The laboratory/room door must be kept closed at all times.

## 5 - Personal Protective Equipment

At a minimum, the following PPE must be worn at all times.

### Eye and Face Protection

- A. ANSI Z87.1-compliant safety glasses with side shields, or chemical splash goggles.
  - Ordinary prescription glasses will NOT provide adequate protection unless they also meet ANSI standard and have compliant side shields.
- B. If the potential for explosion/splashing exists, and adequate coverage is not provided by the hood sash, a face shield must be worn.

### Skin and Body Protection

- A. Gloves are required when handling hazardous chemicals.
  1. Refer to specific chemical SDS for information on glove selection.
  2. For additional information on glove selection, go to:  
<http://ehs.berkeley.edu/hs/63-laboratory-safety/94-glove-selection-and-usage.html>
- B. Lab coats are required when handling hazardous chemicals in the lab. Select the type of lab coat according to the substances at the specific workplace.
- C. Long pants, closed-toe/closed-heel shoes, covered legs, and ankles.

## 6 - First Aid Procedures and Medical Emergencies

*In the event of an injury, notify your supervisor immediately and EH&S within 8 hours.*



*Go to the Occupational Health Facility (Tang Health Center, on campus); if after hours, go to the nearest emergency room (Alta Bates, 2450 Ashby Ave in Berkeley); or*



*Call 911 (from a cell phone: 510-642-3333) if:*

- *it is a life threatening emergency; or*
- *you not are confident in your ability to fully assess the conditions of the environment and/or the condition of the contaminated/injured person, or you cannot be assured of your own safety; or*
- *the contaminated/injured person is not breathing or is unconscious.*

*Please remember to provide a copy of the appropriate manufacturer SDS (if available) to the emergency responders or physician. At a minimum, be ready to provide the identity/name of any hazardous materials involved.*



#### **In case of skin contact**

If skin contact occurs, and/or skin or clothing are on fire, immediately drench in the safety shower with copious amounts of water for no less than 15 minutes to remove any remaining contaminants. If possible to do so without further injury, remove any remaining jewelry or clothing.

#### **In case of eye contact**

Rinse thoroughly with plenty of water using an eyewash station for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses if possible.

#### **If swallowed**

Do NOT induce vomiting unless directed otherwise by the SDS. Never give anything by mouth to an unconscious person. Rinse mouth with water.

#### **If inhaled**

Move into fresh air.

#### **Needle stick/puncture exposure**

Wash the affected area with antiseptic soap and warm water for 15 minutes.

### **7 - Special Handling, Storage, and Disposal Requirements**

Lab-specific information on handling and storage may be included in the Protocol/Procedure section.

#### **Precautions for Safe Handling**

- Eliminate heating sealed vessels or substitute for refluxing the mixture when possible.
- Do not exceed the scale of procedures specified in Protocol/Procedure section without approval of the PI.
- Verify your experimental set-up and procedure prior to use.
- Know the location of the nearest eyewash, safety shower and fire extinguisher before beginning work.

#### **Conditions for Safe Storage**

n/a

#### **Disposal**

- Waste materials generated must be treated as a hazardous waste.

### **8 - Chemical Spill**

**Spill** – Assess the extent of danger; if necessary request help by calling **911** (from a cell phone: **510-642-3333**) for emergency assistance or 510-642-3073 for non-life threatening situations. If you cannot assess the conditions of the environment well enough to be sure of your own safety, do not enter the area. If possible help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors from spill. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

- **Minor Spill** – In the event of a minor spill, if there is no potential for hazardous chemical exposure, report the spill to 510-642-3073 and if you are trained, proceed to clean it. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and request pick-up.
- **Major Spill** – Any hazardous chemical spill that involves chemical exposure, any chemical spill that due to size and/or hazard requires capabilities beyond your training, or any chemical spill



that gives the perception (because of odor, for example) that there has been a hazardous release. Call **911** or 510-642-3073 for assistance.

## 9. Cleaning and Decontamination

Lab-specific information on decontamination may be included in Section 12 - Protocol/Procedure.

- Wearing proper PPE, laboratory work surfaces must be cleaned at the conclusion of each procedure and at the end of each work day.
- Decontaminate all equipment before removing from a designated area.

## 10. Hazardous Waste Disposal

Label Waste

- Label all waste containers. See the EH&S Fact Sheet, "Hazardous Waste Management" for general instructions on procedures for disposing of hazardous waste.

Dispose of Waste

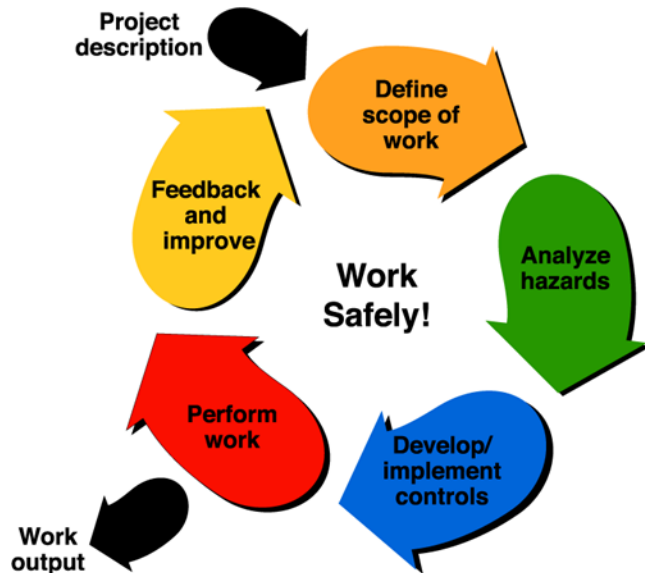
- Dispose of regularly generated chemical waste within 6 months.
- Contact EH&S at 642-3073 if you need assistance.

## 11. Safety Data Sheet (SDS) Location

SDS can be accessed online at <http://ucsd.com>



## -Take Ownership of Your Safety-



**Before starting any work, ask yourself:**

- 1- **What will I be doing?**
- 2- **Do I know what the hazards are?**
- 3- **Do I have everything I need to do the job safely?**
- 4- **Am I doing the job safely?**
- 5- **What can we do better?**



### 12 - Protocol/Procedure – Heating Sealed Vessels

**Section 12 must be customized to your specific needs.**

#### Scale, Engineering Controls, Equipment and PPE

- **Scale:** Heating up to 200 mL of a reaction mixture in a sealed vessel. **Obtain PI approval if higher scale is necessary.**
- **Engineering Controls/Equipment:** All reactions heating sealed vessels must be performed in a properly operating fume hood with the sash as low as possible. If you are heating a reaction mixture more than 50 °C above its boiling point, a portable blast shield is required.
- **PPE:**
  - **Eye protection:** Wear ANSI Approved tightfitting safety goggles or safety glasses with side shields.
  - **Face Protection:** Face shields are to be used when there is no protection from the hood sash.
  - **Hand Protection:** Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.
  - **Clothing:** Wear Nomex IIIA (NFPA 2112) lab coat; full length pants or equivalent; and close-toed and close-heeled shoes.

#### Procedure Steps

Whenever possible, heat the reaction mixture in an unsealed vessel equipped with a reflux condenser to avoid the hazards of heating sealed containers.

Use a Schlenk flask that is filled with a reaction volume of no more than 20% of the vessel's volume.

Be aware of any sideproducts or byproducts of the reaction that could evaporate and increase the pressure within the vessel. Consider these when choosing the appropriate vessel for the volume you need to heat.

Keep the hood sash closed whenever possible, use a blast shield if you'll be heating the mixture more than 50 C above the boiling point of the solvent used in the reaction mixture.



**13 - Documentation of Training (signature of all users is required)**

- Prior to conducting any work with **Heating Sealed Vessels**, designated personnel must provide training to his/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.

I have read and understand the content of this SOP:

Name	Signature	Identifier	Date