**THIS IS A TEMPLATE/BASIC STARTING POINT. CUSTOMIZE THIS TEMPLATE WITH INFORMATION PERTINENT TO YOUR SETUP AND THE PROCEDURE YOU WILL BE USING/YOUR GROUP’S PERSONAL USE.**

STANDARD OPERATING PROCEDURE

Use this form to document the Health and Safety information associated with the procedure.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Procedure Title** | | Using Septum-Sealed Chemical Containers | | | | | | |
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| **Dept** |  | |  | **Bldg/Rm** |  |  | **Supervisor** |  |

**Procedure Overview** (brief description of the project)

Air and/or water reactive reagents, or anhydrous solvents may be purchased in a septum-sealed container (Sigma Sure/Seal or Fisher AcroSeal are some examples). The septum is used to protect the material from oxygen and moisture, as well as other contaminants, while allowing researchers easy access to the material.

**Health and safety information for materials used (**briefly describe the hazards associated with the materials and/or equipment **OR** document your hazard assessment in Section I)

Always read and understand the safety data sheet (SDS) for a chemical before use or storage.

Reagents in septum-sealed containers may react violently with air and/or water so it is important to keep them under an inert atmosphere.

**Hazard Control Measures**

Please select which type of lab coat, eye protection, and hand protection will be used (Lab coat, eye and hand protection, and closed toe/heel shoes must be selected as required by Section D of the ISU Laboratory Safety Manual.)

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Latex gloves |  | Insulated gloves |  | Face shield |  | Respirator |
|  | Nitrile gloves |  | Safety glasses |  | Lab coat |  | Fume hood |
|  | Neoprene gloves |  | Vented goggles |  | Apron |  | Biosafety cabinet |
|  | Vinyl gloves |  | Splash goggles |  | Dust mask |  | Glove box (if applicable) |
|  | Fully enclosed shoes |  | Long pants |  | Flame resistant lab coat (if applicable) | | |

***Other Control Measures***

**Safety Equipment:**

An eyewash and safety shower must be available and in working order in the laboratory.

An appropriate fire extinguisher must be available. See the SDS for extinguisher requirements.

**Special Handling Procedures and Storage Requirements:**

* Assess the condition of the septum before and after each use. A rubber septum does not provide an infinite positive seal. The rate of degradation depends on the size/gauge of the needle you are using.
  + Dispose of the container when the septum becomes compromised.
* Store air and water reactive reagents under an inert atmosphere such as nitrogen.
* Avoid using and storing in areas with flammable solvents or materials, heat/flames, oxidizers, and water sources.
* Containers carrying pyrophoric materials must be clearly labeled with the correct chemical name and hazard warning.

**Safety Practices**

* Do not work alone when handling pyrophoric reagents.
* Notify others in the lab prior to working with pyrophoric reagents.
* Use the smallest quantity possible.
* Perform all pyrophoric work in a fume hood with the sash positioned at the lowest feasible position.
* Utilize a splashguard or safety shield whenever possible.

**Methods** (Include step by step instructions detailing the process or attach this document to an existing method.)

1. Clamp the reagent container to ensure that it will not move or tip. If the liquid comes in contact with the septum, it can cause damage or speed degradation.
2. Insert the nitrogen (or other inert gas) needle inlet making sure that the needle is above the surface of the liquid. Allow the inert gas to flow gently - this will keep the pressure equalized in the bottle during the transfer and facilitate filling the transfer syringe.
3. Draw inert gas into the transfer syringe and flush it out three times to the atmosphere to ensure that there is no oxygen in the syringe.
   1. The needle must be oven-dried and of an appropriate gauge for the syringe size and material being transferred.
   2. Do not use larger than 18 gauge needle to puncture the septum. If a larger gauge needle is necessary, the contents of the container must be transferred to a suitable storage vessel, as the septum will not provide protection.
4. Insert the transfer syringe into the container, below the surface of the liquid.
5. Holding the needle and syringe together, slowly pull back the plunger, drawing the chemical back into the syringe.
   1. Excess and gas bubbles can be expelled from the syringe by holding the syringe parallel to the bottle, with the needle still inserted.
6. The needle is then drawn above the surface of the chemical, still in the bottle under inert atmosphere.
7. The plunger is drawn back again to fill the top of the syringe with inert gas. This will ensure that when the syringe is drawn out, the reagent will not accidentally be expelled from the syringe.
8. The transfer syringe can then be removed from the bottle, and the reagent injected into the reaction flask.
9. The reagent container should be recapped immediately.

**Waste Disposal Procedures**

All reagent bottles should be submitted to EH&S for collection.

Empty containers:

1. In a fume hood carefully remove the crown cap and liner.
2. Leave the open bottle in the fume hood to allow the last traces of reactive reagent to be slowly air-hydrolyzed and oxidized.
3. After at least a day, the inorganic residue can be rinsed out with water.
4. Submit an EH&S pick-up request for the empty bottle/container.

**Air-hydrolysis in a fume hood is only appropriate for the last traces of material that remain after the container has been emptied as completely as possible via syringe or double-ended needle transfer. Consult the SDS for larger amounts of reactive chemicals.**

Dispose of needles/syringes into your laboratory sharps container.

**First Aid Procedures**

Remove all contaminated clothing, wash all contaminated skin with copious amounts of water. Consult the chemical specific SDS. Seek medical treatment if needed.

**All accidents and injuries occurring at work or in the course of employment must be reported to the employee's supervisor as soon as possible (even if no medical attention is required).**

<http://www.ehs.iastate.edu/occupational/accidents-injuries>

**Spill/Release Containment, Decontamination, and Clean Up Procedures**

The procedure for spill cleanup will depend on the specific reagent. See the SDS for information on spill clean-up and consult other SOP's and/or appropriate lab personnel for more information on the reagent in question before its use.

**Using Substances Requiring Special Procedures?** No  Yes

(If Yes; identify authorized personnel, designate a use area and specify specialized safety precautions here. Refer to Section B in the ISU Laboratory Safety Manual for details.)

Use of septum-sealed reagents requires site-specific training and the approval from the professor in charge.

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| **Written By** |  |  | **Date** |  |
|  |  |  |  |  |
| **Approved By** |  |  | **Date** |  |

(PI or Lab Supervisor)

1. **HAZARD ASSESSMENT**

Use the hierarchy of controls to document the hazards and the corresponding control measure(s) involved in each step of the procedure.

Consider *elimination or substitution* of hazards, if possible.

***Engineering Control(s):*** items used to isolate the hazard from the user (i.e. fume hood, biosafety cabinet).

***Administrative Control(s****):* policies/programs to limit the exposure to the hazard (i.e. authorizations, designated areas, time restrictions, training).

***Required PPE***: indicate PPE including specific material requirements if applicable (i.e. flame resistant lab coat, type of respirator or cartridge).

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| **Task** | **Hazard** | **Engineering Control(s)** | **Administrative Control(s)** | **Required PPE** |
| Pyrophoric reagents | Highly moisture and/or oxygen sensitive and may react violently with both air and/or water. | Use a glove box if you have one, or a fume hood with an inert gas line. Sash should be in the lowest feasible position. | Site specific training. Read and understand the SDS.  Ensure there is a safety shower and eyewash near the work area. | Fire resistant lab coat, safety glasses, gloves, long pants, fully enclosed shoes, face shield |
| Needle | Punctures |  | Complete and document safety training. | lab coat, safety glasses, gloves, long pants, fully enclosed shoes |
| Nitrogen Compressed Gas | Contains gas under pressure; may explode if heated.  May displace oxygen and cause rapid suffocation. | Store and use in a well-ventilated area. | Complete and document safety training. Read and understand the SDS. | lab coat, safety glasses, gloves, long pants, fully enclosed shoes |
| **Customize for your group/lab** |  |  |  |  |
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1. **TRAINING RECORD**

Use the following table to record the training associated with this Standard Operating Procedure.

|  |  |  |  |
| --- | --- | --- | --- |
| **Print Name** | **Signature** | **Trained By** | **Date** |
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