**Lab-Specific Standard Operating Procedures for General Hazard Classes: Oxidizing Liquids & Solids**

**Introduction**

The hazard class Standard Operating Procedures (SOPs) provided by the Department of Environmental Health and Safety (DEHS) are intended as a voluntary resource to provide general guidance on how to work with these materials and to provide a template for laboratories to customize to fit their needs.

These SOPs templates should be used for materials with one hazard class and for procedures and materials requiring only basic PPE (i.e., lab coats, goggles, and nitrile gloves).

For more complex procedures and materials with multiple hazards these templates can be used as guidance when conducting your lab’s own risk assessment, and writing procedure specific SOPs.

If you have any questions about writing Standard Operating Procedures, chemical safety, hazard assessment, or any other research safety questions, contact your Departmental Safety Officer (DSO) or call your DEHS Research Safety Professional (612) 626-6002.

**Instructions**

All text or spaces in yellow are intended for customization by your laboratory. Fill in the information needed, customized for your lab’s accepted practices, materials used, available resources, etc. Consider which materials your lab uses in the hazard class, and what your lab is experienced with and feels comfortable handling. You can also add any specific information, best practices, or other lab-specific information you would like.

If you are unsure if a specific material or procedure requires its own SOP, contact DEHS for guidance.

When complete, ensure the SOP is approved by the lab’s PI and added to your lab’s safety manual and annual training. SOPs should be reviewed with all lab members annually, and should be reviewed and updated at a minimum of every 3 years.

**Lab-Specific Standard Operating Procedure**

**Safe Use and Handling of Oxidizing Liquids & Solids**

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| ***PI:*** | *Cooper, S.* | ***Lab Location:*** | *Loeb 1709* |
| ***Issue Date:*** | *9/12/2016* | ***Revision Date:*** | *9/12/2019* |
| ***Prepared by:*** | *Hofstadter, L.* | ***Approved by:*** | *Penny* |

***Hazard Identification***

Oxidizing material containers must be labeled at a minimum with the name of the contents and the word “Oxidizer” or the GHS pictogram for oxidizing materials, pictured to the right. Information on the hazards of specific materials can be found in their SDS.

Examples of oxidizers in use in the Cooper lab include:

* Example 1
* Example 2
* Example 3

***Risk Assessment***

The primary risk of working with oxidizing materials is they can intensify combustion of material by providing oxygen to a fire. Oxidizers are broken down into four NFPA categories based on the risk presented when mixed with other material. For this document, only NFPA categories will be referenced, not GHS.

You may use this template for class 1, 2 and 3 oxidizers. If you are using a Class 4 oxidizer, a material-specific SOP must be developed.

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| **NFPA Class** | **Definition** |
| 1 | An oxidizer that does not moderately increase the burn rate of another material |
| 2 | An oxidizer that will moderately increase the burn rate |
| 3 | An oxidizer that will cause a severe increase in burn rate. |
| 4 | An oxidizer that has the potential to lead to an explosive oxidation when combined with other materials |

This SOP should not be used for nitric acid, perchloric acid, piranha solutions, and aqua regia because of specific requirements and hazards. Chemical-specific SOPs should be written by your lab for use of these materials. Fact sheets containing additional information on some of these materials can be found at <http://z.umn.edu/safetyfactsheets>.

Oxidizers may have additional hazards associated with them, such as toxicity, corrosiveness, or being a peroxide former. Materials with additional hazards are not addressed in this SOP.

**Storage and Transport**

* Only use manufacturer approved containers for oxidizing material.
* Oxidizers should never be stored near flammables, reducing agents or other incompatible material that could form peroxides upon exposure to oxidizers. Store oxidizers in a cool, dry place in their own secondary containment bin away from all incompatible material.
* Avoid storage of oxidizers in/on combustible material (i.e. wooden shelves, cardboard boxes, etc.).
* Do not seal containers of oxidizers with cork or rubber stoppers.
* If you are moving containers between campuses, or will be shipping any material, contact DEHS at (612) 626-6002 before doing so.

**Set-Up and Active Work**

* Always check for incompatibilities when using oxidizers in any part of a reaction. Section 10 of the Safety Data Sheet will list incompatible materials.
* If oxidizers must be mixed with incompatible material, as required in a peer-reviewed experimental procedure, slowly mix small quantities of the material under cooling conditions to prevent a potential exotherm.
* Do not return excess material to the original bottle – dispose of it as hazardous waste. Small amounts of impurities can cause an unexpected and potentially violent reaction.

**Exposure Controls**

* Work in a fume hood when conducting procedures using oxidizing material. If heating or pressurizing reactions, consider the use of an explosion proof shield.
* If oxidizers must be weighed or dispensed outside of a fume hood, consult with your supervisor or DEHS before beginning work – you may need to wear a respirator and participate in the University of Minnesota’s Respiratory Protection Program.
* Do not heat open vessels containing >25 mL of oxidizing liquids (i.e. perchloric acid) in a fume hood that does not have a chemical wash-down system. If using a hood with a chemical wash-down system, verify that the system works prior to starting work and contact FM for proper use instructions.

**Minimum PPE Requirements**

PPE requirements include:

* Lab coat (if applicable to your lab)
* Safety glasses/goggles (if applicable to your lab)
* Nitrile gloves (if applicable to your lab)
* Additional PPE (if applicable)

If procedure or material-specific PPE is required beyond the minimum listed above, another SOP should be available for that procedure or material. (Example: cartridge respirator, neoprene gloves, etc.)

***Spill & Accident Planning/What-If***

During lab-specific training, researchers should be informed where fire extinguishers, safety showers, alarm pull stations, and egress routes are. All labs are set up so that this emergency equipment is readily available and near exits.

**NOTE**: OXIDIZERS PROVIDE FUEL TO THE FIRE AND FIGHTING WITH TRADITIONAL METHODS IS NOT EFFICIENT. YOU ARE NEVER REQUIRED TO ATTEMPT TO EXTINGUISH ANY FIRE.

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| **Lab-Specific Emergency Response Procedures** |
| **Small Fire** | *Define what (if any) fires your lab allows to be handled internally. Describe lab-specific response procedures.* You are never required to attempt to extinguish a fire – it should only be attempted it if can be done safely and you are comfortable doing so. |
| **Large Fire** | Move away from the fire and contain it by shutting doors or sashes. Notify others and call 911. Pull the fire alarm as well, if available. Evacuate the area. |
| **Small Spill** | *List the maximum amount of spill that your lab is comfortable with and prepared for cleaning up yourselves. Describe your lab-specific response procedures.* |
| **Large Spill** | If the spill is larger than XX liters/grams, in a public area, reaches a drain, or is a stench chemical, contact DEHS for assistance at (612) 626-6002. Close sashes or doors to isolate the spill and evacuate yourself and others from the area. |
| **Utility Failure** | *Describe lab-specific procedures related to oxidizing materials for responding to a power, water, or gas outage.* |

All fires, injuries, or damage to the facility must be reported to and investigated by DEHS. Injuries which require medical treatment require a First Report of Injury (FROI) to be filed.

***Waste Storage and Disposal***

* Diligently label oxidizing waste and keep it separated from incompatible waste streams.
* Do not collect oxidizing waste in bottles that contained incompatible materials (i.e. flammable liquids) UNLESS the bottle has been thoroughly rinsed and dried before waste collection is started.
* Metal or plastic-coated amber bottles are recommended to block light from forming peroxides and for strength and integrity.
* Oxidizing waste should not be placed in paper boxes for pickup. Use buckets or other vessels that are compatible with oxidizing material.
* More information on hazardous waste procedures and pick-up can be found here:

<https://dehs.umn.edu/hazardous-waste-disposal-procedures>

In the Reynolds lab, hazardous waste is stored: *list the location of your hazardous waste storage area(s).*