USC UNIVERSITY OF SOUTHERN CALIFORNIA

STANDARD OPEARTING PROCEDURE FOR EXPLOSIVES

DPS emergency number 213-740-4321

SCOPE AND IMPORTANCE

This SOP is intended for labs which may be synthesizing or using explosive compounds or mixtures. Due to the serious nature of explosive hazards, personnel must make every effort to customize this SOP with lab and experiment specific information.

This SOP is not aimed at labs which use explosive compounds under conditions of dilution, where explosion is impossible (e.g. picric acid solution used for staining).

Due to the grave nature of the hazards associated with potentially explosive materials, especially when synthesizing or using explosive compounds or mixtures, rigorous training and thorough understanding of all experimental procedures is essential. It is incumbent on personnel intending to work with potentially explosive materials to research and understand the chemistry and hazards of the materials they will be using. Training may be done by the PI's designee; however, as supervisor, the PI is ultimately responsible for the quality and appropriateness of lab- and experiment-specific safety training.

PLANNING FOR SAFE WORK

Personnel must be aware of the serious nature of the potentially explosive materials that they intend to use and must be fully trained to work with these materials to the satisfaction of the PI. In addition, ensure all other laboratory personnel are aware of the hazardous nature of the work taking place around them.

It is the responsibility of personnel to use every available engineering and administrative control available to them, to utilize appropriate PPE and to employ strict minimization of quantities when possible. Personnel should keep the hierarchy of safety controls in mind and utilize substitution when available.

Two fundamental rules must be kept in mind when planning safe work with potentially explosive materials: **A potentially explosive material cannot be assumed as safe simply on the basis that it has been worked with one or more times previously without exploding and it is unsafe to significantly scale-up any work with potentially explosive materials.**

It is essential for personnel working with potentially explosive materials to read, understand and follow the safe working practices outlined in Section 8, Subsection Potentially Explosive Substances, of the CHP. All personnel who agree to abide by this SOP are required to familiarize themselves with the contents of Section 8 of the CHP.

NATURE OF HAZARD

Explosives are substances capable of undergoing extremely rapid combustion/decomposition, which may propagate thermally below the speed of sound ("deflagration"), or via a supersonic shock wave ("detonation"). Many explosives produce large volumes of gas and high temperatures on explosion. Explosion may cause severe physical damage directly from the shock wave or extreme peak pressures, and indirectly from projectiles. Explosive materials also exhibit fire and burn hazards.

HAZARD IDENTIFICATION

Classification and identification of explosives is covered in detail in Section 6 of the CHP. All personnel who agree to abide by this SOP are required to familiarize themselves with the contents of Section 6 of the CHP.

For chemicals being purchased, identification as an explosive material is made according to information found in the SDS. The OSHA/GHS hazard classification system is covered in detail in Section 6 of the CHP.

For individuals preparing potentially explosive chemicals or mixtures in the lab, it is imperative that they understand the guidelines for identification outlined in Section 8, Subsection Potentially Explosive Substances of the CHP. This section contains information on identifying structural features in molecules that may cause them to be explosive. It also contains information on the types of mixtures which may have explosive or pyrotechnic properties. All personnel who agree to abide by this SOP are required to familiarize themselves with the contents of Section 8 of the CHP.

Further information on identifying explosive hazards should be sought from Bretherick's Handbook of Reactive Chemical Hazards (available online at USC Libraries). Safety information given in synthetic procedures in academic journals should also be consulted.

PREPARATION

- Wear all appropriate PPE (Safety Goggles, Face Shield, Heavy Leather Gauntlets and Apron, Hearing Protection, Two layers of gloves)
- All users within vicinity of explosives must be sufficiently protected with adequate eye and hearing protection.
- Do not wear contact lens (Contact lens are not permitted in the cleanroom).
- Identify the locations of safety equipment (Eyewash and Shower station, Emergency buttons, and phones, Hazardous Waste Container, Blast Shield, Fire Extinguisher, Manual Pull Fire Alarms).
- Save DPS emergency line 213-740-4321 into personal phone.
- Read the Material Safety Data Sheet for specific Explosives intended for use.
- Ensure an adequate supply of clean-up material is within reach in case of spills.
- Ensure an appropriate waste container is accessible to dispose contaminated clean-up material.
- Minimize the quantity of explosives in the work area (explosives must be handled under a fume hood).
- Clearly label all containers with any chemicals, including containers with water. Place containers with Explosives into secondary polypropylene container while not in use.
- Labels must include User Name, Group (PI) Name, Contact Email or Phone Number, Chemical Name, and Chemical Formula.

WASTE DISPOSAL

- Wash all beakers and cylinders used in handling.

- Wipe down and dry all surfaces.
- Store waste in containers labelled “CHEMICAL/HAZARDOUS WASTE FOR DISPOSAL.”

SKIN AND EYE EXPOSURE

- For skin exposure, immediately flush with cool water for a minimum of 15 minutes. Remove contaminated clothing and footwear while rinsing.
- For eye exposure, forcibly hold eyes open and flush for at least 15 minutes. Continue flushing area with water if pain continues.
- Do not use neutralizing chemicals, creams, abrasives, or lotions.
- Contact DPS and alert cleanroom staff.

INHALATION EXPOSURE

- Move to location with fresh air.
- Obtain medical attention immediately if symptoms develop (coughing, shortness of breath, wheezing, burning in mouth or throat, or chest pain).
- Alert cleanroom staff and call DPS for medical assistance.

INGESTION

- Alert cleanroom staff and call DPS for medical assistance.
- If possible, determine what material was ingested by victim.
- If victim begins to vomit, turn head or entire body to one side to avoid choking.
- Do not induce the victim to vomit or drink any beverage unless instructed to by qualified medical personnel.

ACCIDENTAL SPILLS

- Minor spills can be cleaned with a spill kit or simple items like wipes or absorbent pads.
- For all spill emergencies, contact DPS and alert cleanroom staff.
- Evacuate personnel from spill area and deny entry.

UNATTENDED EXPERIMENTS

- Chemicals may not be left unattended for more than 15 minutes.
- For unattended experiments longer than 15 minutes, notify cleanroom staff to get permission.
- The maximum time for unattended chemicals is one hour.
- Unattended chemicals require displayed signage at fume hood.
- The sign must contain the hazards of the experiment, the experimenter’s name and contact information, responsible PI’s name and contact information, expected date and time of disposal.
- For more information on unattended hazardous experiments, please refer to the Unattended Hazardous Operations Fact Sheet.

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EMERGENCY NOTIFICATION

- Notify the Department of Public Safety (DPS) at (213) 740-4321 or (323) 442-1000. For a non-emergency, dial (213) 740-6000.
- State the nature of the emergency (e.g., injury, hazardous materials or biohazards spill, fire) and provide details.
    a) Location of injury/incident
    b) Name(s) of injured and name(s) of witness(es)
    c) Contact information (your name and call-back number)
    d) Injury/incident summary
- Notify EH&S immediately at (323) 442-2200 or injuryprevention@usc.edu to report the injury/incident.
- Notify the cleanroom staff and your supervisor.

References

- SOP – Potentially Explosive and Explosive Materials | USC Environmental Health & Safety
- Chemical Hygiene Plan
- Bretherick's Handbook of Reactive Chemical Hazards

Contributors	Revised Date
Shiva Bhaskaran, Joey Vo	06/03/2021