***STANDARD OPERATING PROCEDURE – C011***

**WORKING WITH POTENTIAL EXPLOSIVES**

1. **Objectives**

The objective of this document is to acquaint users with the proper and safe handling, use, storage, and disposal of explosives and potentially explosive compounds.

1. **Personal Protective Equipment**

To ensure safety during work with potential explosives, appropriate personal protective equipment (PPE) must be worn. This includes:

* Long pants and closed-toe shoes to protect against spills and splashes.
* A long-sleeved, buttoned lab coat to minimize skin exposure.
* Safety glasses or goggles to protect against splashes or flying debris.
* Disposable nitrile gloves to prevent direct contact with hazardous chemicals.
	+ **NOTE:** The chemical’s SDS should always be checked prior to start of work to ensure proper glove selection.
* If the user has long hair, it should be tied back.
1. **Potential Hazards**

When working with potential explosives, safety precautions must be taken to manage and maintain a safe working environment. There are several hazards a user can come into contact with and these include:

* **Explosive and Fire Hazard:** Chemicals in this band can cause a sudden, almost instantaneous release of pressure, gas, or heat when subjected to an initiator such as a sudden shock, pressure, light, or high temperature. This band also includes chemicals that can become explosive when they come in contact with incompatible chemicals.
* **Health Hazard:** Some of these compounds may also cause acute and chronic health effects. Therefore, Users must familiarize themselves with the specific hazards and toxicity of the compounds they are working with, which can be found on the chemical’s Safety Data Sheet (SDS).
1. **Training**

Ensure all personnel have received proper training on their hazards and safe handling techniques.

* MC03 Chemical Safety II / Hazardous Waste Management
* MC07 Chemical Safety I / Chemical Safety for Laboratory Users
1. **Procedures**
2. Storage and handling
* Explosives and potentially explosives must be used and stored in designated area(s). All containers and storage locations must be clearly labeled with a sign that at a minimum states: “EXPLOSION RISK”.
* Keep and store away from all ignition sources such as heat, sparks, light, incompatible materials, and any potential initiators.
* Store in secondary containment in an explosion-proof refrigerator/freezer or an explosion-proof cabinet that does not contain flammables or incompatible materials.
	+ It is best to store newly synthesized explosives and potentially explosives in an explosion-proof refrigerator or freezer.
* Limit the amount stored to only the amount needed for planned experiments.
* Always use compatible materials for storage, transfer, etc.
* Consult with your PI the first time you run a reaction or anytime you make a change.
* Always follow a published procedure.
* Always run the first reaction on a small scale.
* Allow for gas evolution. Never seal explosives in a closed metal vessel.
* Add potential explosives to solutions of catalysts (not the reverse). Be cautious when mixing explosive reagents or potentially explosive reagents and potential catalysts.
* Run reactions at the lowest temperature possible. If a reaction requires heat, slowly increase the temperature.
* Handle explosives, explosive intermediates, and potential explosives behind a blast shield.
* Do not work up the reaction in a manner that will concentrate explosives and potentially explosives.
	+ Never put solutions of explosives and potentially explosives on a rotary evaporator.
* Exercise due care when handling peroxide formers. Visually inspect bottle cap and threads of containers (without handling) for the presence of organic peroxide crystals.
* Conduct transfers and other operations with compatible tools and equipment. For example, some explosives can form more sensitive compounds when exposed to metal and especially heavy metals. For those chemicals, non-metal tools and equipment should be used.
* Do not attempt to crush or grind an explosive or apply other pressure to it unless it is explicitly known that the explosive is not sensitive to it.
1. Disposal of potential explosives
* Any formulation of explosive molecules farther apart will reduce the potential for an explosion. The more unstable the molecule, the more dilution is required to render it safe.
* Refer to the SOP titled “Disposal of hazardous chemical waste” for more details. Pretreat the chemicals before disposal whenever feasible.
* Dispose of potential explosives as hazardous waste
* Check a waste log sheet to avoid mixing with any incompatibilities.
* Avoid relying on the Labpack Waste Scheme as this could take long time, increasing the risk. If the Labpack Waste Scheme is inevitable, seal the container in a plastic bag or other compatible material if the original container is damaged or not in good condition, such as leakage. Keep the label intact or label the packing properly.
1. **Spills, Incidents and Reporting**
* In the event of a fire, activate the fire alarm and evacuate the area. Do not activate the emergency ventilation system, as they can exacerbate combustion.
* Skin or Eye Contact: Remove contaminated clothing or contact lenses and flush the affected area with water for at least 15 minutes. Obtain medical attention immediately.
* Inhalation: Move to fresh air. Obtain medical attention immediately.
* Ingestion: Obtain medical attention immediately.
* Report any accidents that result in injuries to the PI and/or the departmental safety officer (DSO) immediately.
* For serious incidents, notify the Security Unit immediately by calling the 24-hour hotline on **2358 8999**.
1. **References**
* Yale University. (2021). *Standard operating procedure: Potentially explosive and explosive compounds*. https://ehs.yale.edu/sites/default/files/files/explosive-compound-sop.pdf
* University of Arizona. (2015). *Explosives hazard class: Standard operating procedure*. <https://research.arizona.edu/sites/default/files/cs-chemical_hazard_class_sop_for_explosives_0.pdf>
* Health, Safety and Environment Office, The Hong Kong University of Science and Technology (n.d.). *Safe Handling of Peroxidizable and Potentially Explosive Chemicals.* Retrieved on June 30 2025, <https://hseo.hkust.edu.hk/safe-handling-peroxidizable-and-potentially-explosive-chemicals>
* Health, Safety and Environment Office - Hong Kong University of Science and Technology(n.d.). *Laboratory Emergency Preparedness and Response Video*, from <https://hseo.hkust.edu.hk/node/3653>
* Health, Safety and Environment Office, The Hong Kong University of Science and Technology (n.d.). *List of Shock Sensitive and Explosive Chemicals.* From<https://hseo.hkust.edu.hk/chem-info/shock-sensitive-chemicals>