***STANDARD OPERATING PROCEDURE – C002***

**Working with Corrosives**

1. **Objectives**

The objective of this document is to establish standard operating procedures for working with corrosives, ensuring the safety of laboratory personnel by mitigating potential risks associated with hazardous materials, and injuries. In addition, this SOP aims to enhance the efficiency of experimental workflows.

1. **Personal Protective Equipment**

To ensure safety during the working with corrosives, 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 with side shields to protect against splashes.
* A face shield when handling large volumes or concentrated corrosives.
* Disposable nitrile gloves (check chemical compatibility with the specific corrosive).
* If the user has long hair, it should be tied back.

1. **Potential Hazards**

Working with corrosives presents various hazards that must be managed to maintain a safe working environment. These include:

* **Chemical Burns:** Direct exposure to corrosives can cause severe skin and eye damage.
* **Respiratory Hazards:** Inhalation of corrosive fumes or vapors can lead to respiratory irritation or long-term health issues.
* **Environmental Hazards:** Improper disposal or spills can contaminate soil, water, and air.
* **Reactivity Hazards:** Corrosives can react violently with incompatible materials, leading to explosions or toxic gas release.
* **Fire Hazards:** Some corrosives, such as acetic acid and formic acid are flammable and can ignite under certain conditions.

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. Preparation

* Review the Safety Data Sheet (SDS) for each corrosive substance to understand its properties, hazards, and emergency procedures.
* Keep the work area clean, well-ventilated, and organized, with a designated space for working with corrosives.
* Wear suitable personal protective equipment (PPE) when handling concentrated acids or bases.

1. Transportation and Storage

* Store corrosive chemicals in dry, well-ventilated locations at or below eye level.
* Use vented gas cabinets for storing corrosive gases and use a fume cupboard for handling corrosive chemicals.
* Use containers made from corrosion-resistant materials (e.g., glass, certain plastics) for storing and using corrosive chemicals.
* Store acetic acid and formic acid with flammable liquids due to their flammability and away from any oxidizers.
* Always add corrosive chemicals to water, never the opposite, to minimize the risk of splashing or violent reactions.
* Securely cap acid and alkali containers and store them on lower shelves to reduce the risk of accidental breakage.
* Avoid storing strong acids and strong bases together, as contact can cause violent reactions if containers break or rupture.
* Do not store oxidizing corrosive materials, such as perchloric acid, sulfuric acid, nitric acid and bleach with flammable solvents and reducing agents.
* Return the corrosive chemicals to the storage location immediately after use.
* Use tools like pipettes or transfer devices to handle corrosive chemicals, minimizing direct contact with skin.
* Transport corrosive substances in secondary containment, preferably using a polyethylene or other non-reactive acid/solvent bottle carrier.

1. Waste Disposal

* Clean all breakers and cylinders used during handling.
* Thoroughly wipe down and dry all surfaces.
* Ensure stock bottles are cleaned on the outside before storing.
* Dispose of waste in clearly labeled containers designated for hazardous waste.
* Do not mix different types of acids unless a compatibility test is conducted.
* Neutralization of acids or alkalis should be performed by a trained laboratory worker in a fume hood, using appropriate personal protective equipment.
* Once cooled, neutralized solutions are ready for disposal. Corrosive compounds with a pH of 6-10 that do not contain substances listed in Appendix A of the Procedures for Disposal of Chemical Waste can be disposed of down the drain.
* All other corrosive waste must be collected and treated as hazardous waste.

**6) First Aid and Incident Reporting**

* Ensure that eyewash and safety showers are readily accessible in areas where corrosive chemicals are handled.
* In the event of a spill, promptly inform nearby occupants and the departmental safety officer (DSO) and follow the spill response procedures. For significant spills, activate the emergency ventilation system and evacuate immediately.
* For eye or skin contact, use the emergency eye wash or shower and flush the affected area (removing any jewelry) with ample water for at least 15 minutes (do not apply neutralizing substances.) Seek medical attention.
* If corrosive chemicals are inhaled, move the affected person to a well-ventilated area if safe to do so, and seek immediate medical advice.
* In the event of ingestion of corrosive chemicals, seek immediate medical assistance.
* Accidents resulting in injuries must be reported immediately to the Principal Investigator (PI) and/or the departmental safety officer (DSO).
* For serious incidents, notify the security unit promptly by calling the 24-hour hotline on 23588999.

**7) References**

* Ward, A. (2016). *SOP\_SMB009: Working with corrosives.* Risk Assessment. The University of Sydney.
* Coleman, N. & Fisher, D. (2014). *SOP SMB009.2 (DF NC 0614): Working with corrosives.* Standard Operating Procedure. The University of Sydney.
* Safety and Environmental Protection Manual *- Chapter 7: General Laboratory Safety | Health, Safety and Environment Office - the Hong Kong University of Science and Technology*
* Safety and Environmental Protection Manual *- Chapter 8: Chemical Safety | Health, Safety and Environment Office - the Hong Kong University of Science and Technology*
* HKUST Procedures for Disposal of Chemical Waste – *Hong Kong University of Science and Technology*
* Health, Safety and Environment Office - Hong Kong University of Science and Technology (n.d.). *Chemical Waste Container Proper Selection Guide.* Retrieved June 24, 2025, from https://hseo.hkust.edu.hk/sites/default/files/Chemical%20Waste%20Container%20Proper%20Selection%20Guide.pdf
* Health, Safety and Environment Office - Hong Kong University of Science and Technology(n.d.). *Proper Disposal of Chemical Waste.* Retrieved June 24, 2025, from <https://hseo.hkust.edu.hk/sites/default/files/Proper%20Disposal%20of%20Chemical%20Waste.pdf>
* 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>