SAFETY ALERT

Classification:	Equipment and Property Damage	**Incident Date:**	Dec 2022 – Jan 2023
Equipment Type:	Fume Hood (FH) and ventilation ducts		

Use of Corrosive Materials in Fume Hoods

WHAT HAPPENED

Recently, HSE investigated two major incidents involving the use of corrosive materials in fume hoods and ventilated enclosures. In the first incident (Figure 1), baths of corrosive materials at high temperatures (100°C) were used in a fume hood and a ventilated enclosure for several days without interruption. In the second incident (Figure 2), researchers used corrosive materials in the fume hood for several years.

Both incidents resulted in a long shut-down of lab operations to repair the ventilation system. The ducts had to be dismantled to be either neutralized, cleaned, and re-installed or be replaced with new ducts.

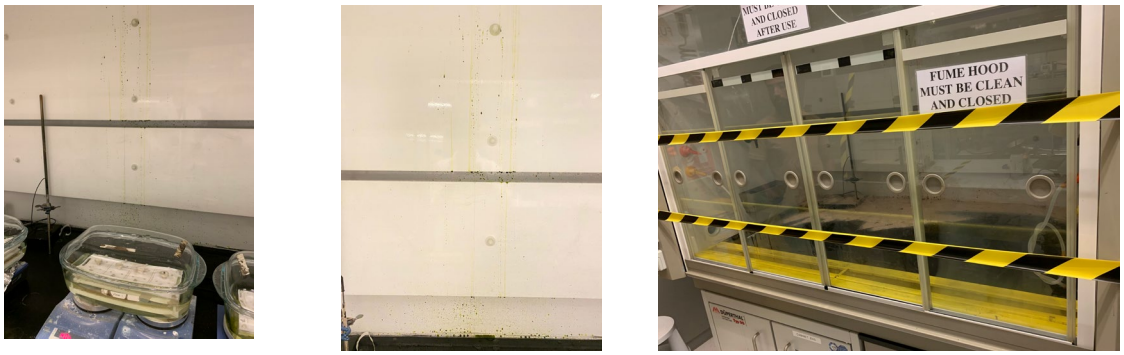

Figure 1: Baths of corrosive materials heated at high temperature for several days in the fume hood, resulted in the evaporation of large quantities of corrosive materials; leakage through the corroded ducts from the ceilings over labs and public areas; and severe damage to the exhaust ducts and shut-down of lab operation.

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Figure 2: Corrosion of the mesh was observed after removal of the fume hood baffle during inspection. Inspection of the fume hood exhaust and ducts revealed heavy corrosion and leakage of corrosive materials from the ducts.

HSE OBSERVATIONS

- Fume hoods are considered one of the best engineering controls for reducing the risk of exposure to hazardous fumes/emissions. However, **NOT ALL** fume hoods are designed to handle large amounts of corrosive materials. Always check that the fume hood is compatible with corrosive materials before using such materials. **Only a few fume hoods on campus have acid-resistant coating and dedicated exhaust.**
- Although some fume hoods are designed for handling corrosive materials, it is important to remember that exhaust ducts are made of metals (typically stainless steel). As a result, exposure to corrosive materials, will eventually lead to corrosion and damage of the ducts
- Ventilated enclosures **MUST NOT** be used as fume hoods as these are designated for low hazards tasks such as powder weighing.
- Chemicals that severely affect exhaust ducts include hydrochloric acid, perchloric acid, hydrofluoric acid, nitric acid, etc. **(see Table 1)**

Table 1

Hydrochloric Acid	**Perchloric Acid**	**Hydrofluoric Acid**
Nitric Acid	**Sulfuric Acid**	**Tetramethylammonium hydroxide**
Aqua Regia	**Base Baths**	**Hydrogen peroxide**
Ammonium hydroxide	**Pyridine**	**Hydrogen Cyanide**
Trifluoroacetic acid	**Hydrogen chloride**	**Ammonia**
Fluorine	**Chlorine**	

***Note: non-exhaustive list**

HSE RECOMMENDATIONS – CONTROL OF HAZARDS

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- Always prepare a SOP and risk assessment if you plan to perform an experiment that uses large quantities of acids or bases or that is out of the lab scope. The SOP should include details about the experiment, hazardous materials used and quantities, compatibilities, the equipment used, controlled measures in place, the process, etc.
- Use lower quantities of corrosive materials to reduce the risks or before you plan to scale up.
- When heating or boiling corrosive materials, always use an enclosure equipped with an **acid trap** and place the enclosure inside the fume hood. The **Glass Workshop** can assist you in designing and fabricating glassware for your experiment setup and the acid trap.
- Remember that you can increase the flow rate by pressing the emergency exhaust from the fume hood.
- Labs must contact Facility Management if they notice changes in the fume hood (for example; presence of droplets at the back of the hood or presence of rust or powder like materials around the grids at the back of the fume hood).
- If you notice a spill or leak in the lab and are not sure what it is, make sure you check the pH before cleaning it.
- Report low flow rate and fume hood alarms to Facility Management.
- For more information on how to work with corrosive material safely and prepare SOPs, please visit: Safety Guidelines for working with corrosive materials**.**

OTHER PRECAUTIONS AND REMINDERS

- ✓ Be prepared for emergencies, know the locations of first aid kits, spill kits and emergency exits.
- ✓ Report incident, near misses or hazards to HSE via Salute Incident Report.
- ✓ In case of an emergency call immediately 911 or 012 808 0911