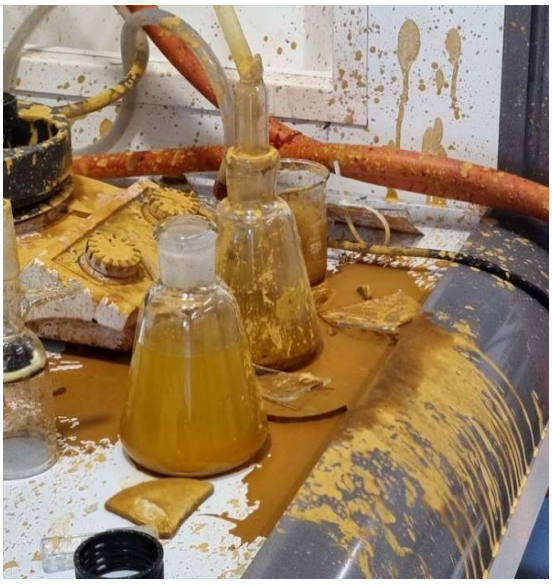
Safety Alert – October 2022

Subject: Vacuum Filtration

UNSW Safety is issuing a Safety Alert to remind staff and students about the risk of equipment failing during vacuum filtration.



Background:

A person was performing a chemical process involving a vacuum filtration unit inside a fume hood. Suddenly the glass filter unit lost containment, ejecting pieces of broken glass and chemicals both within and outside the fume hood. Chemicals were ejected onto the clothes of the person performing the process and onto the clothes and face of a second person who was working in the adjacent fume hood. The hazardous chemicals being used in the reaction were iron chloride, diethyl ether, zinc metal, ammonium chloride, 2-methoxyethanol and a nitrobenzene compound.

The investigation identified:

- The level of vacuum being used was appropriate for the equipment and does not explain the equipment failure.
- The fume hood sash was raised at the time of the incident.
- The equipment was checked and washed before use with dimethyl sulfoxide then acetone which is the standard practice in the school.
- The chemicals involved in the reaction should not react in an explosive manner.
- It was noted that a precipitate had formed during the reaction which was unexpected and may have caused the frit (filter) to become blocked.
- The person tried to clear the frit by stirring the contents of the funnel with a pipette.
- If the frit had been contaminated (dirty) with residue from previous chemical processes, there was potential for an unexpected chemical reaction to occur.
- The cause(s) of the incident are identified as one or more of the below:
  - cracks in glassware which weren't identified and caused the glassware to fail,
  - a contaminated or worn frit,
  - a pressure build-up due to the frit becoming blocked with the precipitate.

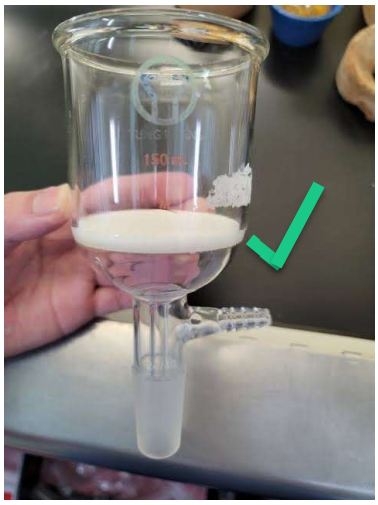
Actions taken following the incident:

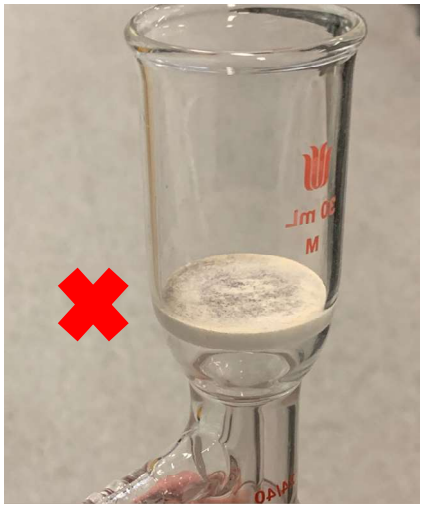
- The persons involved removed their clothing and were placed directly under the safety shower/eyewash and irrigation was performed for 15 mintues.
- The fume hood sash was pulled down.
- Security was called by another worker who was present in the lab.
- The lab was locked down to preserve the incident scene (a requirement under WHS legislation).
- Paramedics were called in to assess the persons.

- The incident was reported to SafeWork NSW, who advised that the scene could be released.
- The persons were provided with dry clothing and shoes.
- The broken glassware and chemicals in the fume hood and on the floor were cleaned up using compatible cleaning agents.
- If the reaction is to be repeated an alternative method will be used.

What is recommended going forward:

- Risk assessment for chemical reactions must be comprehensive and signed off by the supervisor.
- Glassware must be checked before every use and must be discarded if there is any sign of cracking or fatigue.
- Frit condition must be checked prior to every use and discarded if they are obviously contaminated or worn (see photos below showing clean and dirty frits).
- The fume hood sash must be lowered while reactions are being performed.
- If a blockage occurs during vacuum filtration:
  - Close the fume hood sash or place a blast shield in between the user and the equipment.
  - Switch off the vacuum source.
- Laboratories where chemical exposures are a risk should consider the need to carry spare clothing and shoes in case of a spill or exposure.





Further Information: safety@unsw.edu.au