



SOP: FUME HOOD USAGE

It is stated by legislation that flammable liquids to be used or applied in a cabinet of fire-resistant material specifically constructed for this purpose such as a **fume hood** (GSR: 4 [2]). This is the most commonly used device for removal of odours and vapours from a laboratory and for flammable, hazardous chemicals work.

Laboratory fume hoods only protect users when they are used properly and are working correctly. A fume hood is designed to protect the user and room occupants from exposure to vapours, aerosols, toxic materials, odorous, and other harmful substances. A secondary purpose is to serve as a protective shield when working with potentially explosive or highly reactive materials. This is accomplished by lowering the hood sash.

The fume hood sash must be of movable shatterproof, flame resistant material and be capable to close the entire front face. Vertical rising sashes are more preferred than horizontal ones.



The movement of people and equipment creates eddy currents of air, which decreases the efficiency of the fume hood and can expose the passer-by to potentially harmful vapours drawn from the fume hood. The air current at the fume hood should not exceed 20% of the average face velocity to ensure fume hood containment.

When working with highly hazardous materials, the higher the face velocity the better.

While it is important to have a face velocity between 0.3 m/s and 0.5 m/s, velocities higher than this are actually harmful. When face velocity exceeds 0.6 m/s eddy currents are created which allow contaminants to be drawn out of the hood, increasing worker exposures.

MYTH: A fume hood can be used for storage of volatile, flammable, or odiferous materials when an appropriate storage cabinet is not available.

While it is appropriate to keep chemicals that are being used during a particular experiment inside the fume hood, hoods are not designed for permanent chemical storage. Each item placed on the work surface interferes with the directional airflow, causing turbulence and eddy currents that allow contaminants to be drawn out of the hood. **Even with highly volatile materials, as long as a container is properly capped evaporation will not add significantly to worker exposures. Unlike a fume hood, flammable materials storage cabinets provide additional protection in the event of a fire.**



MYTH: The airfoil on the front of a hood is of minor importance. It can safely be removed if it interferes with my experimental apparatus.

Airfoils are critical to efficient operation of a chemical hood. With the sash open an airfoil smooths flow over the hood edges. Without an airfoil eddy currents form, causing contaminants to be drawn out of the hood. With the sash closed, the opening beneath the bottom airfoil provides for a source of exhaust air.

MAINTENANCE & TESTING



1. Evaluate the fume hood before each use to ensure adequate face velocities and the absence of excessive turbulence.
2. Monique Muller will conduct quarterly checks on FHs & testing face velocity with an Anemometer.
3. Fume hoods should be certified, at least annually, to ensure they are operating safely. Typical tests include face velocity measurements, smoke tests and tracer gas containment. Tracer gas containment tests are especially crucial, as studies have shown that face velocity is not a good predictor of fume hood leakage.
4. Fans on roof to be serviced and activated charcoal scrubbers cleaned monthly arranged by Properties & Services - Coastal Services.
5. Do not modify hoods in any way that will adversely affect its effectiveness e.g. by removing baffles, sashes, airfoils, liners and exhaust connections
6. Housekeeping & Cleaning of FH after use is crucial to ensure proper usage and to protect the ductwork and surface of the FH. This will ensure that no cross contamination takes place.
7. When there is a FH, fan/scrubber fan, air conditioning or damper failure OR
8. Any other maintenance issues such as loose or no sash handles, broken glass surfaces etc.– contact emergency staff member in your area and/or the Health & Safety Representative for your area
9. :Inform:
 - a. Monique Muller at Monique.Muller@uct.ac.za or x4549
 - b. Anwar Jardine at Anwar.Jardine@uct.ac.za or x4010
 - c. Manie Gamaldien at Abduraghman.Gamaldien@uct.ac.za or x4230

EXHAUST SYSTEM FAILURE

1. In case of exhaust system failure while using a FH - shut off all services and accessories
2. Lower the sash completely
3. Warn all persons in vicinity
4. Leave the area immediately
5. Contact emergency staff member and/or Health & Safety Representative of area
6. :Inform:
 - o Monique Muller at Monique.Muller@uct.ac.za or x4549
 - o Anwar Jardine at Anwar.Jardine@uct.ac.za or x4010
 - o Manie Gamaldien at Abduraghman.Gamaldien@uct.ac.za or x4230

Place a **WARNING: OUT OF ORDER TAG** on FH.
See Annexure 2!



PROCEDURES FOR CORRECT USE

STEPS of FH use:

8. Before starting setting up experiment of working in FH – check if exhaust is on & working by checking if light - either on top of FH or at wall is **GREEN**
9. Switch FH on by the ON/OFF or Damper ON/OFF Switch - (except on level 6 as dampers are permanently open)
10. Wait for approximately 2 minutes until dampers are on maximum open position.



11. Check that FH is operating correctly either by - looking on monitoring device or looking at the strip of paper taped to outside at the left side of the sash – if drawn inwards there may be enough extraction.
12. Recognize the limitations of the FH. It may be necessary to use a closed system such as a “glove box” for highly toxic materials.
13. When setting up an experiment or when working in a FH, wear the correct PPE & keep exhaust fans on at all times AND/OR keep damper switch ON OR as far as possible keep Sash at not higher than 30cm / 300mm (**SAFE OPERATING POSITION – ALSO INDICATED BY A RED DOT ON EACH SIDE OF FH FRAME AT SASH**) AND keep light switched ON.
14. Place a placard / log on Sash of FH indicating the following details (see Annexure1):
 - a) Name
 - b) Contact details
 - c) What experiment is busy with
 - d) Hazards of experiment
 - e) From when until what date experiment will be running
15. When finished in FH leave damper open / fan on for another 10 – 15 min.
16. Remove all equipment place in the proper storage and/or wash areas.
17. Remove all chemicals, ampules, vials, samples, experimental results etc. from FH.
18. Clean the entire interior of the FH – work surfaces, sash, glass panel on work surface, underneath the glass panel, sash – leave to dry.
 - a) Wash interior + exterior with soap and water (most probably something like Teepol)
 - b) If biological agents have spilled or leaked, clean with a 10% bleach solution (1 part bleach to 9 parts water). Be careful not to combine incompatible substances such as bleach and ammonia.
 - c) Wipe/clean out with isopropyl alcohol
 - d) Leave to dry
 - e) Dispose of all materials used during clean-up as hazardous chemical waste
19. After 10 - 15 min Switch OFF the damper, lighting and lower the Sash to its lowest point.



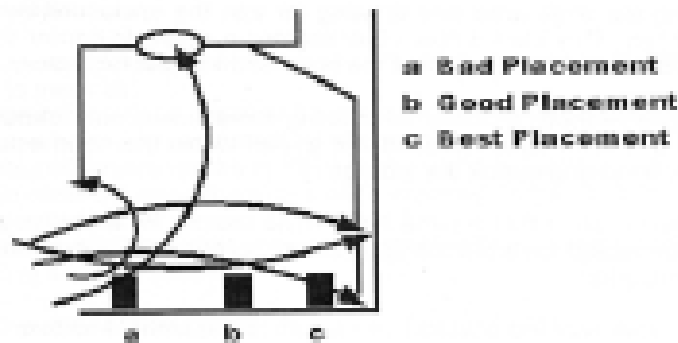
IMPORTANT

1. FH IN 1 CLUSTER USING ONLY 1 EXTRACTOR / DRY SCRUBBER FAN:

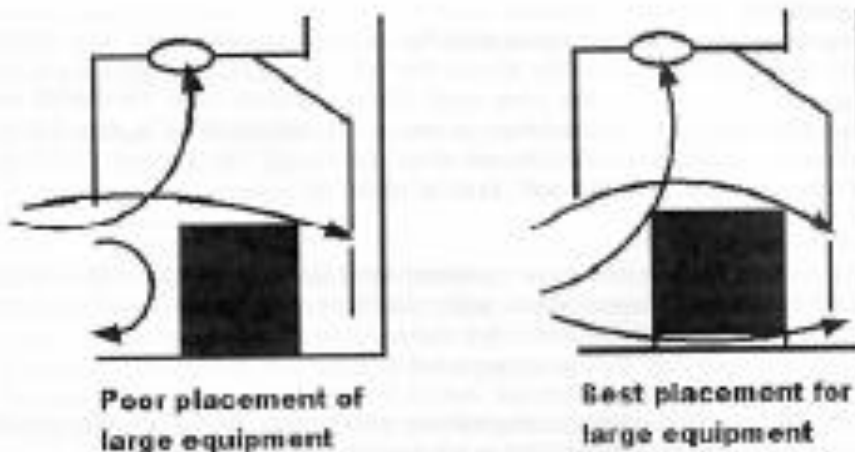
ONLY 50% of FHs in a cluster can be effectively operating at one time. Thus if there is 10 FHs attached to one extractor/scrubber fan then only 5 FHs can effectively extract fumes in that cluster.

It is thus important that when not in use the FHs on level 7 should be cleaned out and switched OFF at the Damper Switch and the Sash on FH on all the levels lowered to Down position.

2. Move work at least 20cm inside the face of the FH. This minimizes the effect of cross-drafts and eddy currents created by the operator working at the hood or occupants walking by the hood.
3. Place equipment as far back as possible without blocking the bottom baffle.



4. Avoid overcrowding the FH work areas with chemicals and extra equipment. Chemicals and extra equipment should be moved from the FH to an appropriate cabinet for storage.
5. If possible **DO NOT** use large pieces of equipment in FH as they tend to cause dead spaces in the airflow and reduce hood efficiency.
6. Separate and elevate each instrument by e.g. using blocks or racks so that air can flow easily around equipment.
7. Create a 2-4 cm air gap under any large bulky equipment in the FH. Large items in the hood will cause eddies that can be reduced by making sure there is an air space on all sides including the bottom.





IMPORTANT

8. **DO NOT** place electrical spark producing equipment in a hood with flammable chemicals
9. If possible, position the FH sash so that work is performed by extending the arms under or around the sash, placing the head in front of the sash on the outside and keeping the glass as a barrier
10. The **Sash Up**, or top full open position, is for procedures involving high heat loads and lighter than air gases. **The Centre**, or normal position, is for average work utilizing general procedures, **The Down**, or bottom full open position, is used when fumes are generated at the work surface or heavier-than-air gases are involved.
11. Always work with the sash partially or completely down as this provides the best overall protection for the user. If that is not possible use a separate safety shield (when appropriate) around the process inside the FH.
12. Avoid opening and closing the Sash rapidly and avoid swift arm and body movements in front or inside the hood as these actions may increase turbulence and reduce the effectiveness of hood containment.
13. Control cross-drafts by keeping windows and doors closed.
14. Keep traffic near the FH to a minimum.
15. Control the rate of velocity of released vapours and particles from chemical reactions in order to minimize the risk of exposure.
16. Do not leave a reaction unobserved for an extended period of time.
17. Together with eye/face protection, lab apron/coat and other Personal Protective Equipment (PPE) this provides the safest environment for you, the user, if an accident should occur inside the fume hood.
18. **SPILLAGE IN FH:** Keep damper on, lower sash, warn persons in vicinity, clean up spillage and dispose of spill clean-up as hazardous waste.



ANNEXURE 1: FUME HOOD IN USE LOG/TAG

NAME OF USER: _____

CONTACT CELL NUMBER: _____

EXPERIMENT BUSY CONDUCTING:

DATE STARTED: _____ **DATE ENDED:** _____

HAZARDS ASSOCIATED WITH EXPERIMENT:



ANNEXURE 2: OUT OF ORDER TAG



**DO NOT
USE OUT
OF ORDER**

Authorised by.....
Date.....