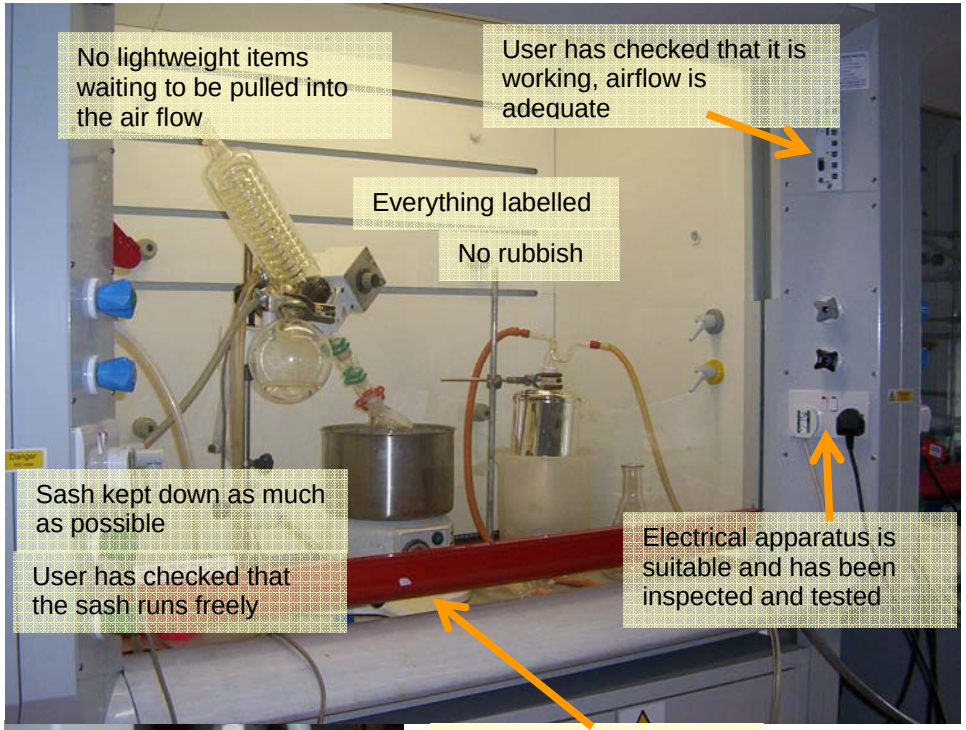
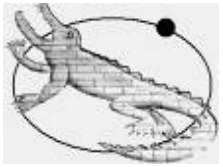
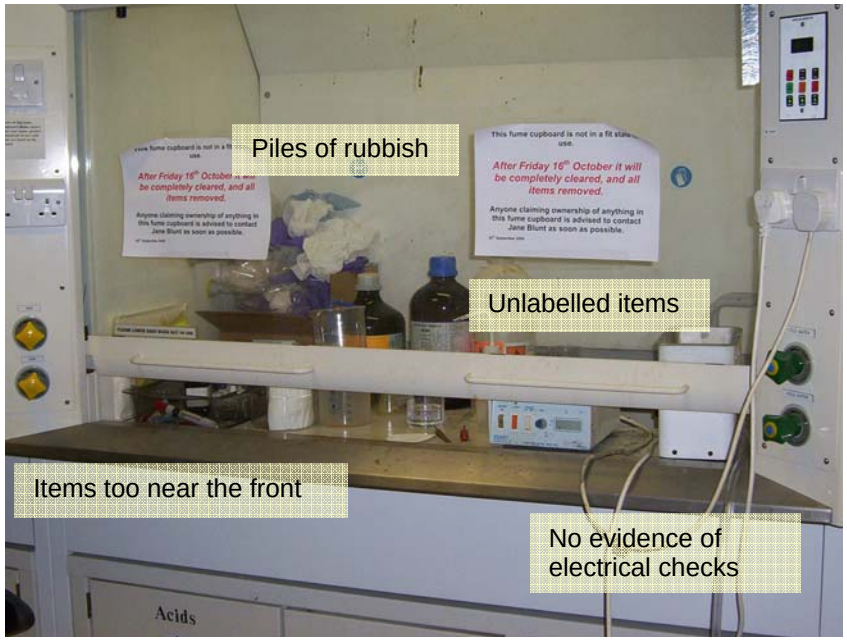


That's Better!



The Laboratory Fume Cupboard

How to get the best out of it



NOT like this!

Document prepared by Jane Blunt and Suresh Mistry, February 2010

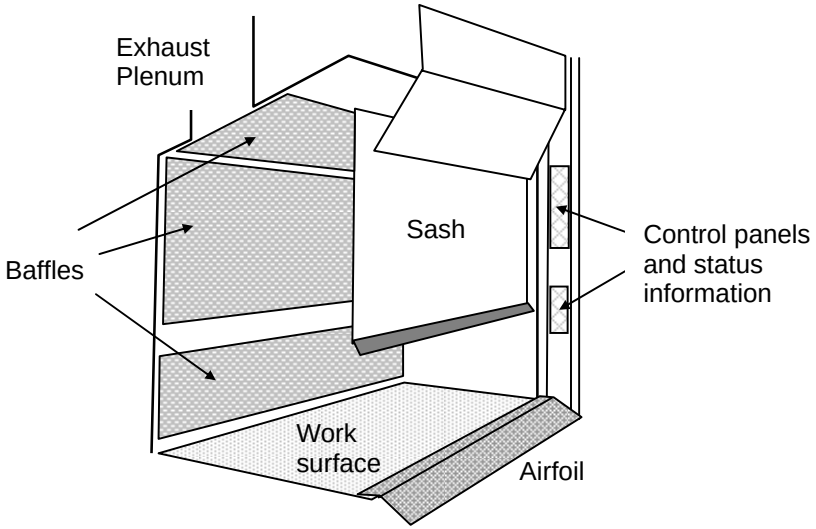
What is a fume cupboard?

It is a ventilated enclosure that protects workers from exposure to chemical fumes, gases, and chemical aerosols. It is a type of Local Exhaust Ventilation (LEV) – but it is only a **partial** containment device.

Physical size and shape varies - from 'bench top' to 'walk in'. There may be a fan motor in the plant room on the roof, or it may be inside the cupboard itself. Designs vary in the sophistication of the airflow.

At the design stage, the work tray materials are chosen to resist chemical attack e.g. HF resistant, stainless steel, ceramic etc.

The parts of the fume cupboard



The naming of the parts of a fume cupboard

The parts of the fume cupboard are named in the accompanying diagram.

Maintenance and testing

By a Competent person

Fume hoods are a form of local exhaust ventilation and must, by law, be tested to ensure satisfactory function once a year

- The standard test is to measure the air velocity at the sash face
  - Normally between 0.4 – 0.6 ms^{-1}
  - Velocities above 0.6 ms^{-1} can create eddy currents
  - 'Low velocity' cupboards maybe as low as 0.1 ms^{-1} **The tester needs to know what type of fume cupboard it is.**
- SF6 containment testing
  - This is not required by the Regulations but can be used in special circumstances

By the User

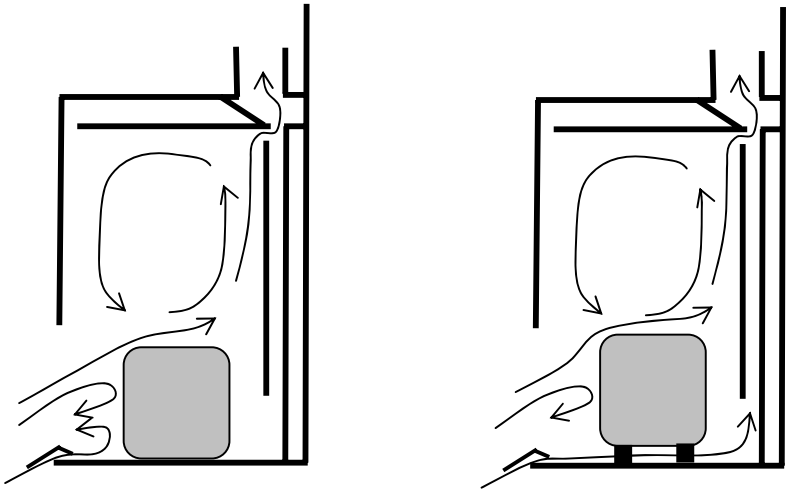
Daily 'User' checks are essential

- Sash running smoothly
- Air flow is good – check indicator !
- Lights working
- Fire Trace pressure gauge in the 'green'

Summary of Good practices

- Keep the sash at or below the safe sash opening marker
- Place the sash at the lowest level for convenient operation to provide the best protection
- Confirm that the hood is operational – look at the indicator panel
- Maintain a 100-150mm deep 'equipment free zone' at the front
- Avoid using large objects inside the hood
- Arrange apparatus carefully
- DO NOT put your head inside the fume hood !!
- Use suitable PPE
- Avoid competing air currents
- DO NOT store chemicals or equipment within the fume hood
- Only keep those items needed for the current experiment within the hood
- Ensure lightweight items such as tissues, disposable gloves and filter papers are not drawn into the hood ducts
- Use extreme caution with ignition sources inside the hood.

Obstructing the air flow



Raising large pieces of equipment reduces the quantity of air that spills out of the front

Large pieces of equipment placed on the work surface tend to create an airflow that allows contaminants to spill out of the cupboard. Raising the equipment on supports to allow air to flow underneath it is good practice.

A similar effect is obtained if you clutter the fume cupboard with all your spare bottles of chemicals – the air flow is obstructed and the fume cupboard under-performs. If you should have a mishap with your experiment, there are more things to contribute to the accident as well!

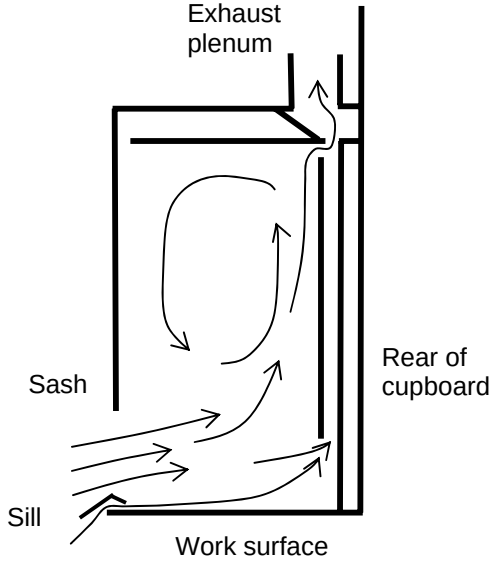
The up-draught can be quite strong, and loose objects such as tissues can be drawn into the ducting. They can then get stuck and impede the airflow.

Note the following: the airfoil in most cupboards has a gap beneath it. This is part of the air flow design. However it is also possible to lift it to insert electric cables underneath. Note that the gap underneath the airfoil means that if liquids are allowed to flood onto the work surface, they finish up on your feet.

The sash usually has an end stop, indicating where it should be in normal operation.

How it works

Protection is provided by room air that is drawn into the opening of the cupboard and vented to the atmosphere via the plenum. This airflow is crucial to maintaining containment. The airfoil and baffles are designed to minimise turbulence, which is critical in ensuring that the airflow carries vapours into the exhaust plenum.



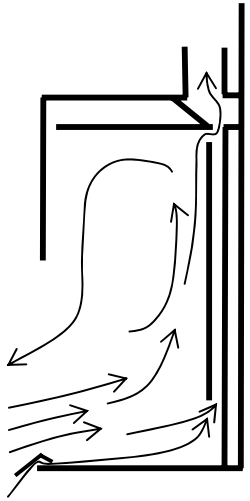
Simplified airflow schematic

Avoid putting your head in the fume cupboard! We do acknowledge that there are some fume cupboard designs that are so bad that you have to do this to retrieve things from the sink!

What can go wrong

The sash

If the sash is too high, vapours can spill out through the front of the fume cupboard and eventually into the breathing zone of the operator.



Airflow with sash too high

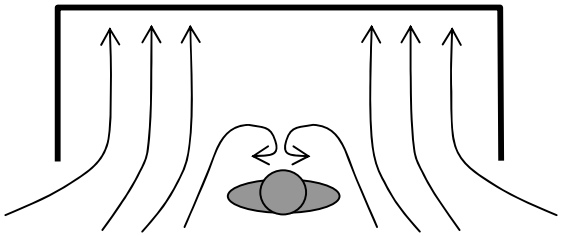
When the sash is pulled down to the position which is marked on the side of the fume cupboard, there is better control

Whenever possible keep the sash between your face and the work. It also helps to prevent splashes to your face and upper body. You should still wear personal protective clothing to protect against splashes, if your chemical risk assessment indicates that the substance can harm you if it splashes on your eyes or skin.

Turbulence

Obstruction of the front

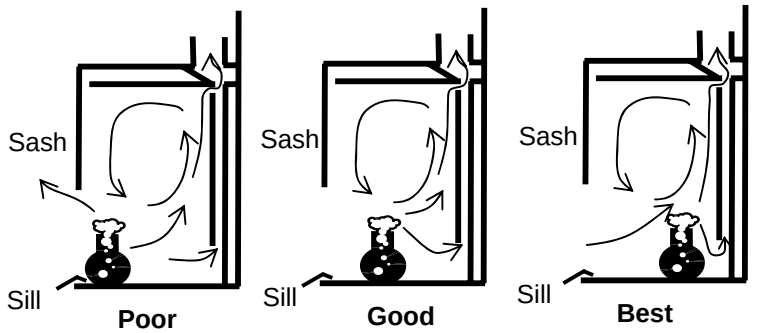
Unfortunately, when you stand in front of the fume cupboard, the air from the room has to go around you and this can lead to an area in front of you that is at a lower pressure, sucking material out of the fume cupboard. You can minimise the effects of this by not moving quickly when close to the cupboard.



View from above of turbulent airflow around a user standing in front of the cupboard

Poor placement of equipment

For similar reasons, containment is poor when items are at the front, within 100-150mm of the sill. Place your equipment and work away from the front of the cupboard.



A comparison of the performance with distance from the front of the cupboard