The fumehood

Information sheet: Laboratory General RhL023

De tekst "De zuurkast" is ook beschikbaar in het Nederlands.

Information for employees and students working at the Faculty of Science (W&N)
This AMD information sheet provides instructions to researchers about the proper use of the fumehood, and check-up of its functioning.

1 When do you work in the fumehood?

In laboratories in which work is performed with hazardous substances, the fumehood is the most important ventilation and safety device (see also AMD information sheet RhL022). The proper functioning of fumehoods is, therefore, a first prerequisite, but their proper use is at least as important.

The fumehood provides protection in two ways:

- Against exposure by inhalation of hazardous vapours and powdery substances. This is achieved by the large ventilation capacity and the specific flow profile in the fumehood.
- Against splashes in the face by keeping the sash closed as much as possible during work.

Work with large quantities of chemicals should always be performed in the fumehood, as well as work with substances in the following categories:

- Toxic substances
- Carcinogenic, mutagenic, teratogenic, or reprotoxic (CMR) substances
- Volatile and explosive substances, such as volatile organic solvents
- Strong acids and bases, due to aerosol formation and the risk of splashing.

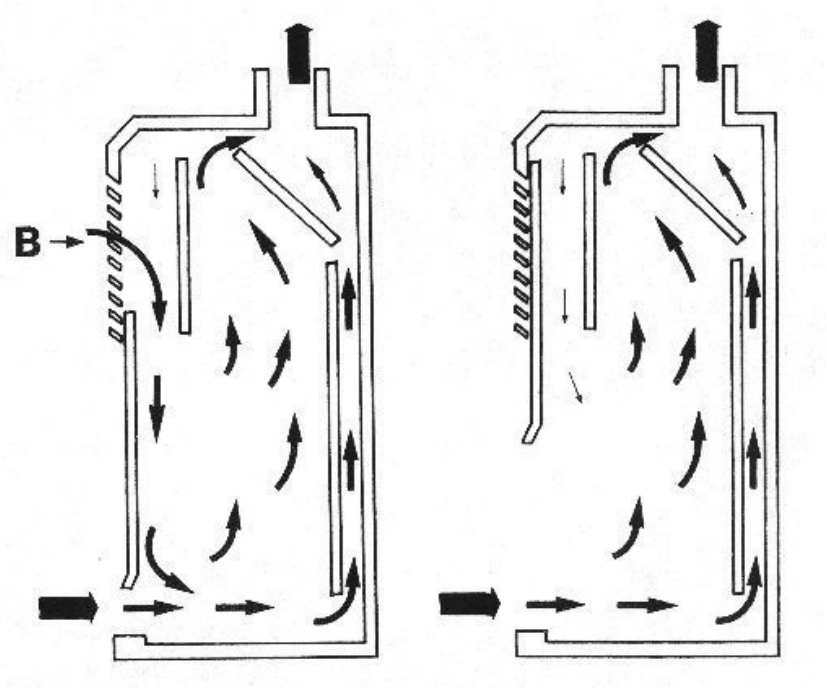
Additionally, work with nanomaterials is performed in the fumehood, when this is indicated by the project's nano-Risk assessment (see AMD information sheet VOM050).

2 Fumehood function

Most fumehoods at the Faculty of Science are of the bypass type fumehood (B in the diagram). Such a fumehood is a complex set-up of baffle plates (flow panels) that affect the air flow, and functions as follows:

Up until the maximum operating setting (40 cm [16 inch], indicated by the yellow marking *or* by the supplier's sticker with the text: "werkstand" [=operating setting]), the total amount of air sucked in through the window and bypass (B in the diagram) remains approximately constant. If the window is opened even further, the bypass is sealed off.

The flow pattern may be disrupted by the following causes, the consequence being that hazardous substances could escape from the fumehood. (The solution is given in italics):



- Broken windows/panels (turbulence).
  Make sure these are repaired before use.
- Placement of a fumehood close to an access door (suction, drafts).
  Unfortunately, this is the case in several laboratories: Please keep this in mind when using these. Do not perform highly toxic work in a fumehood next to the entrance. Keep the door closed when working in these fumehoods. Use these fumehoods for waste disposal drums, etc.
- Passing quickly in front of a fumehood, or excessive motions (suction, drafts).
  Move without rushing to prevent turbulence and the outflow of substances.
- A crowded fumehood or placement of large objects that block the air flow (disruption of a balanced flow pattern, turbulence, outflow).
  Keep fumehoods clear of unnecessary stock. Put water baths and large equipment on blocks of at least 10 cm (4 inch) height, so air may still flow underneath. If necessary, the flow pattern may be checked using a so-called smoke test ("rooktest"). Make sure that any racks and such allow as much air flow as possible: Use wire netting or perforated plate material.
- Materials and equipment sticking out through the window opening or laying on the threshold, such as paper tissues, pipettes, power cords of hot plates, etc. (outflow).
  Keep these materials and equipment inside the fumehood as much as possible.
- Placement of set-up or equipment too close to the exhaust wall.
  Keep a clearance of at least 10 cm (4 inch) at the back.
- Sash insufficiently closed (> 40 cm [> 16 inch]).
  Therefore, the sash must be closed as much as possible in fumehoods in which no work is performed. Only when setting up or cleaning the fumehood, the sash may be opened beyond 40 cm (16 inch). Please apply for repairs when moving the sash becomes harder!

3 Check-up and repair

3.1 Daily check-up before use

Before starting your work in the fumehood, you yourself, as a user, should check the proper functioning of the fumehood. This may be done simply by using adhesive tape to mount a strip of paper tissue at the lower side of the sash and visually determining the presence of a flow. The strip should be sucked into the fumehood.

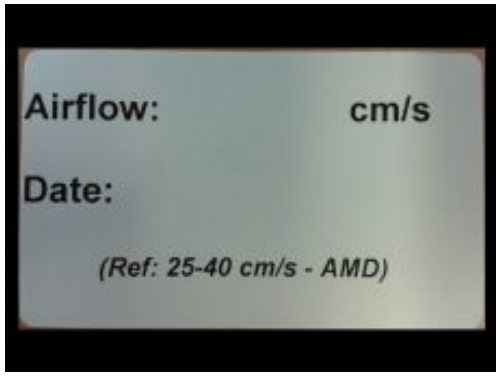
Most fumehoods in the faculty are provided with electronic air flow detection. In those cases, please check if the green light on the box burns. In case of doubt you can always apply the tissue method. When the box indicator burns red, you need to call in Technical Services, and the fumehood will be out of commission until repaired (See 3.3).

Are all flow indicators in the lab burning red? If so, it is very likely that the air treatment facilities are down, and there is no exhaust function at all. Please call Technical Services using 4600 and stop all work in the fumehoods!

3.2 Regular air speed check-up measurements

The proper functioning of the fumehood is regularly assessed by measuring the air speed in the window plane, with the sash at a 40 cm (16 inch) opening (maximum operating setting). The air velocity measured and date are registered on a sticker mounted on the lower right corner of the sash. If there are any doubts about the exhaust capacity between measurements, please call AMD who will readily perform an extra test.

"Box" for air flow detection



Check-up sticker air speed measurement

Warning sticker for an improperly functioning fumehood

A fumehood is approved at an air velocity between 25 and 40 cm/s. Below 25 cm/s the exhaust of hazardous substances is insufficient. In such a case, you will see a red/yellow warning sticker: "Malfunction, do not use!", after measurement, which means that the fumehood needs to be repaired and cannot be used.

Above 40 cm/s problems with the flow pattern may occur: due to turbulence the hazardous substance may in fact flow out through the window. This needs to be checked with a smoke test ("rookproef").
When working with CMR substances, choose a fumehood with an exhaust of at least 30 cm/s. The air velocity measured can be found on the check-up sticker on the sash.

The fumehoods in the new Gorlaeus Building are of another type and can not be tested by the AMD. Those fumehoods are tested on a maximum outbreak of chemicals and not on air velocity. Please report all problems with those fumehoods directly to the Buildings and Technical Services department and do not use them until maintenance has been carried out.

3.3 Applying for repairs

To ensure safety, malfunctioning and badly exhausting fumehoods must be reported as soon as possible to Selfservice facilitair for repair (Please mention location and number of the fumehood. The number may be found under the cover for the electronics, or sometimes on the side of the fumehood. If there is no number, then please indicate the location in the room, for example, "left of the entrance"). Put the malfunctioning fumehood out of commission until repaired and checked.

Examples of defects are *(risks between brackets)*:

- broken flow panels *(affecting the flow pattern disadvantageously, outflow of hazardous substances possible)*
- broken window *(affecting the flow pattern disadvantageously, outflow of hazardous substances possible)*
- broken cable *(sash is difficult to move, risk of arm injuries if second cable breaks)*
- air flow detector malfunction *(doubts about flow, possible exposure)*
- no flow, ventilator failure *(exposure to hazardous substances => fumehood must be put out of commission immediately!)*
- needing force to move sash *(working with the sash too high, danger of exposure and splashing)*

The fumehood's user is responsible for its household cleanliness (no residual chemicals or deposits on user reachable surfaces), so maintenance or cleaning personnel has a minimal risk of exposure to substances unknown to him/her. The Technical Department (TD) is only allowed to work on fumehoods that are empty and of household cleanliness, and asks for a signed release form. When the fumehood is empty and scrubbed, fill in the "fumehood release form (vrijgaveverklaring zuurkast)", ask the AMD for a verification, and stick the signed form to the sash of the relevant fumehood.

No work is allowed in a fumehood with a release form until its repair. If work is done anyway, the fumehood needs to be cleaned and released all over again!

Without release form, no work will be done on the fumehood!

Please note: The TD or cleaner must take into account that the user can only clean the places reachable to him/her. It is possible that contamination may be found behind the baffle plates, etc. If work is necessary in those places, suitable safety measures should be taken. These may be in the form of a work protocol to prevent spreading of the contamination, and the use of additional personal protection, aside from the normal work clothes. Please ask the AMD for advice if you need it.

4 Additional points of interest for the user

- As a rule, bottom cupboards ("onderkasten") are not ventilated. Therefore, these are suitable only for the storage of laboratory equipment and non-hazardous substances, and not for chemicals. Cupboards with ventilation are always specially marked with the yellow-green sticker: "geventileerde onderkast" (= ventilated bottom cupboard). In the new Gorlaeus some fumehoods are equipped with certified chemical cupboards underneath; these are ventilated cupboards.
- Fumehoods are often provided with a drainage opening (for cooling water). Under no circumstances chemicals may be discharged into these. If, for example, in case of a calamity, this happens anyway, this must be reported as soon as possible as an environmental incident to the AMD. This way, any violations of the discharge permits may, possibly, be explained. Do not allow the drainage to dry out; or have them sealed off when not in use. If not, bad smells may arise, or heavy vapours may reach another lab through the sewer system, with possibly undesirable consequences.
- A fumehood is NOT a storage facility for chemicals. Chemicals should be stored in 90 minutes fire resistant cupboards. Any incidental bottles have to be placed in a drip tray *inside* the fumehood too. Though putting them back in the cupboard after use is preferred!
- Sometimes during practical courses students will have to share a fumehood. Please communicate well about the experiments and methods: Are the substances used, reaction products, equipment, and method compatible with those of your fellow student? Make sure it is safe: Setting up requires a sash opening higher than the maximum operating setting!
- Never sit down on a stool in front of the fumehood waiting for your chemical experiment to finish. When you are seated, your head is exactly in the window opening, the danger zone for splashing and inhalation.
- On the other hand, a lot of biological/pharmacological work is performed seated in front of the fumehood. If this happens often, then please choose a fumehood without bottom cupboard, considering ergonomics.
- Should your chemical experiment run overnight or during the weekend (therefore, unattended) in the fumehood, then please consult the overnight/weekend form ("overnacht/weekend formulier") for the required extra safety measures.