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EH&S Fact Sheet

Environment, Health and Safety Information for the Berkeley Campus

Fume Hoods

One of the most important safety devices in a laboratory is a properly functioning fume hood. The fume hood protects users by containing and exhausting airborne hazards; it does this by constantly pulling room air into the hood and exhausting it from the roof. Fume hood sashes also provide shielding in the event of an explosion or fire inside the hood.

A fume hood should be used in the following situations:

- When working with chemicals with significant inhalation hazards, such as hazardous chemical vapors, volatile radioactive materials, toxic gases or respirable toxic powders
- When carrying out procedures that could explode or generate high pressure
- When chemical vapors generated could cause a fire hazard
- When working with compounds that have an offensive odor

Please visit the link below to view an instructional 3 minute video on the proper use of a fume hood at the University of California, Berkeley.
http://www.youtube.com/watch?v=A4AHxLnByts

Air Velocity Measurements and Maintenance

To capture vapors adequately, a fume hood should provide an average face velocity of at least 100 feet per minute (fpm) through the work opening. Excessive air velocities can cause turbulence at the front of the hood that may bring the contaminants back into the user's breathing zone. The campus considers fume hood face velocities in the range of 100-150 fpm to be satisfactory.

The Office of Environment, Health & Safety (EH&S) checks campus fume hoods once a year to verify that the inward air velocity at the work opening is within an acceptable range. The air velocity measurements are noted on a tag on the hood. If the hood is found to be operating unsatisfactorily with a face velocity below 100 fpm, EH&S will post a warning label on the sash of the fume hood and notify Physical Plant to correct the problem.

The fume hood is powered by exhaust fans on the roof that draw air up from the fume hoods through ducts and push the hood air out the exhaust stack. The exhaust ducting from other hoods is often connected together to dilute concentrated airborne hazards before exhausting. The hood exhaust fan is typically driven by an electric motor and a fan belt.

Just like any mechanical system, a fan or motor can break, which prevents airflow from exhausting properly. Low airflow into the hood can create a hazard for the hood user, so it is important that hood users frequently check the airflow and report any problem.

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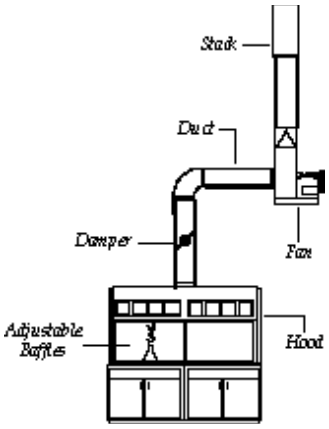
In an electrical power outage, the laboratory ventilation may not work properly. It is recommended that the sashes on hoods be closed during outages. There should still be some minimal inflow of room air up the ductwork from a chimney effect, which will assist in keeping contaminants in the hood even if the hood fan goes out. For further information on what to do in a power outage see *http://ehs.berkeley.edu/sites/default/files/lines-of-services/workplace-safety/16powerfailure.pdf*.



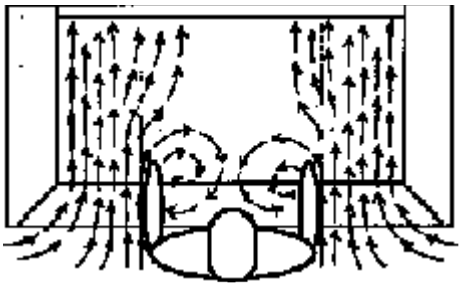
How to Use a Fume Hood

1. Verify proper hood airflow. All hoods should have an airflow indicator that informs the user if the hood is working properly. New hoods may have sophisticated airflow monitors that read-out in feet per minute, and will alarm when the airflow is not satisfactory. Older hoods may have pressure gauges that need to be checked by the hood users. To learn more about the monitor on your hood go to this link: *http://ehs.berkeley.edu/fume-hood-flow-meter-information-and-instructions*. If the airflow monitor is not working or there is no monitor, tape a piece of tissue paper to the sash. If the tissue paper is not drawn into the hood, the exhaust fan on the roof may not be working, and the hood should not be used. On the other hand, with airflow velocities that are too high, turbulence can bring airborne contaminants back toward the user.

If you feel that the hood exhaust fan is not working or to have an airflow monitor installed, call the Physical Plant Campus Services (PP-CS) work order desk at 642-1032 (or follow your departmental procedures). After repairs have been made, PP-CS should check the adjusted airflow, or call EH&S at 642-3073 to request a recheck of the airflow for the fume hood.

Turn the fume hood light ON before working with hazardous materials. If the hood light is not working, request that the light be repaired. It is important to be able to see properly when working with hazardous materials.

2. Adjust the sash to protect you. Fume hoods have glass sashes that slide horizontally or vertically. Position sashes at or below the sash stop arrows to ensure proper airflow velocities through the work opening. Adjust the sash to shield yourself from splashes or flying objects. Horizontally sliding sashes can be used as a body shield by wrapping your arms around the sash panel as you work to protect yourself from explosive reactions or splashes of hazardous materials.



3. Keep all work at least 6 inches inside of the hood. The capture ability of a fume hood may not be 100% at the front edge of the hood because of air turbulence. Working with hazardous materials further toward the back of the hood is safest.

Other Fume Hood Operation Guidelines

- **Minimize storage.** Do not take up hood space and block ventilation by storing unused equipment or chemicals in hoods. If large items must be kept in the hood, contact EH&S.

- Never lean your head inside the fume hood when hazardous chemicals are present.

- Most hoods have a bypass that allow some room air to be exhausted even if the sash is closed, but if you are unsure leave a small gap. Closing the sash may also decrease the noise from airflow into the fume hoods. **Close the sash when the hood is not being used (at night or when away from the laboratory), but never close non-bypassed hoods completely.** Leave at least a two-inch sash opening, particularly if flammable materials are present in the hood (e.g., distillation of solvents).

- **Avoid cross drafts near the hood work opening.** Do not position circulation fans near the hood work opening and be aware of activity near the hood opening. Someone walking rapidly past the work opening can create a cross draft that may disturb the airflow and cause turbulence that could draw airborne contaminants out into the room.

- **Prevent air pollution.** The chemical vapors generated in most hoods are exhausted untreated into the atmosphere. To minimize pollution, seal all chemical containers not in use. Never use the hood to evaporate excess chemical waste. By law, all chemical containers must be capped when the hood is not operating.

- **Keep the hood clean.** Remove unneeded experimental glassware and clutter. Wipe-up spilled chemicals or residues. Make sure you can see through the glass sash, and that the light in the hood works.

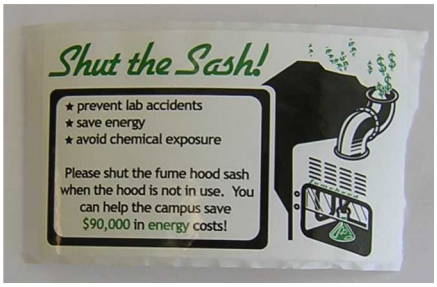
- **Do not heat perchloric acid ($HClO_4$) in standard fume hoods.** Perchloric acid vapors may create explosive perchlorates in the duct work. Contact EH&S if you are performing perchloric acid digestions. There are a few special hoods on campus that are specifically engineered for the use of perchloric acid. These hoods have a special water washdown feature that needs to be used if perchloric acid vapors are generated.

- **Do not adjust the damper on the exhaust duct above the hood.** Doing so may adversely affect airflow to other fume hoods. Users may adjust the baffles at the back of the hood based on the vapor pressure or temperature of the materials being used. (See drawing on page two for locations of damper and baffles.) For most laboratory applications, the adjustable damper should be left in the normal (middle) setting.

Additional Fume Hood Information

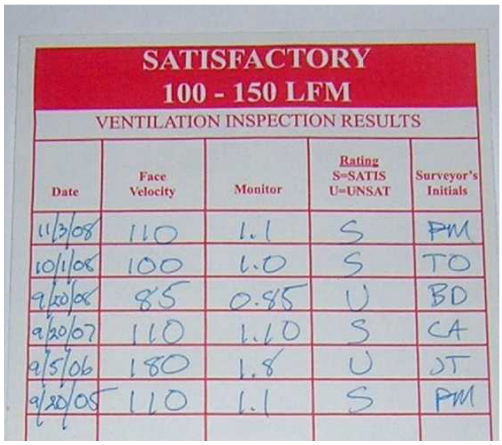
Variable air volume (VAV) versus constant volume hoods (CV)
VAV hoods have controls that vary the airflow depending on the position of the sash but keep the face velocity constant. When the sashes on a VAV hood are closed the volume of air exhausted is decreased. The more common CV hoods are set to exhaust a constant volume of air, but the velocity of the air through the work opening varies depending on the sash position.

Closing the sash of any hood when it is not being used is generally safer because it isolates chemical hazards that are in the hood. If the hood is VAV controlled it will save energy when the sash is closed, and it may be quieter.



Sticker reminding VAV hood users to shut the sash.

How to Read the EH&S Airflow Measurement Sticker
The sticker on the hood will list (1) when the hood was last checked by EH&S or Physical Plant, (2) what the average inflow velocity was with the sash at the normal maximum opening, (3) what the airflow monitor read when EH&S tested the hood, and (4) whether the velocity was satisfactory or unsatisfactory. If the average velocity is 100 - 150 fpm it will be marked as satisfactory.


SATISFACTORY
100 - 150 LFM
VENTILATION INSPECTION RESULTS

Date	Face Velocity	Monitor	Rating S=SATIS U=UNSAT	Surveyor's Initials
11/3/08	110	1.1	S	PM
10/1/08	100	1.0	S	TO
9/20/08	85	0.85	U	BD
9/20/07	110	1.10	S	CA
9/5/06	180	1.8	U	JT
9/20/05	110	1.1	S	PM

Walk-in Hoods

There are some large hoods that allow the user to step inside the hood to set up large equipment (i.e., wheel-in gas cylinders). Users should never work inside these hoods when hazardous materials are present. Work on research equipment from outside the hood, through the sash opening.

For further information on chemical fume hoods or for related safety training, call EH&S at 642-3073.