

## Fume Hood Operation and Safe Work Practices

### Chemical Hygiene Plan

Fume hoods are the most important engineering control when working with hazardous chemicals in the laboratory. Fume hoods work by drawing air from the laboratory into the hood and exhausting the air through a slot(s) at the back of the hood and into the laboratory exhaust ductwork. The green arrows in the picture below show the slots at the back of the hood.



## Fume Hood Operation

### Face Velocity

Face velocity is defined as the average velocity of air at the sash opening of the fume hood. A proper face velocity is important to ensure containment of the contaminants. Standard fume hoods are designed to operate at a face velocity of approximately 100 feet per minute (fpm). If the face velocity is too high or too low, contaminants may escape the fume hood and enter the laboratory. (Newer high efficiency low flow (HELF) fume hoods are designed to operate at a lower face velocity of approximately 60 fpm.)

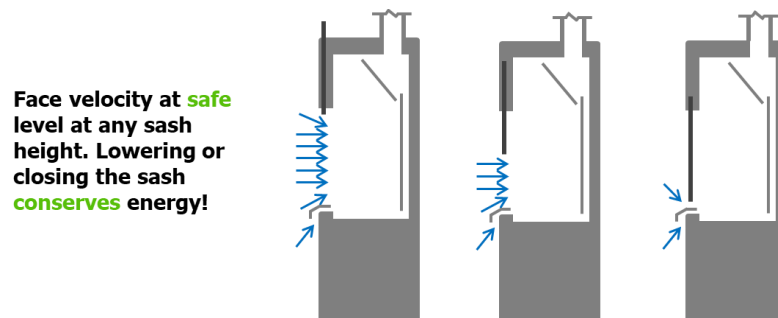
## Types of Fume Hoods

There are two types of fume hood systems, constant volume and variable air volume:

**Constant volume (CV)** hoods exhaust the same amount of air regardless of the sash height. As the sash is raised and lowered, the face velocity changes. CV hoods have a label on the fume hood indicating the safe sash height, typically 18 inches.



**Variable Air Volume (VAV)** hoods vary the air flow to maintain a constant face velocity regardless of the sash height.



## Fume Hood Monitoring Devices

Fume hoods are equipped with monitoring devices that continuously measure the air flow. The monitor has an audible and visible alarm that will activate when the air flow is too low or too high. If the fume hood alarm activates, check the sash height to make sure it is at the proper height as indicated on the label. If the alarm is still sounding, discontinue use of the hood, close the sash, post an “Out of Order” sign on the sash, and place a work order for repair. Never use a fume that is not working properly, and never permanently mute or disable the alarm.



## Fume Hood Safe Work Practices

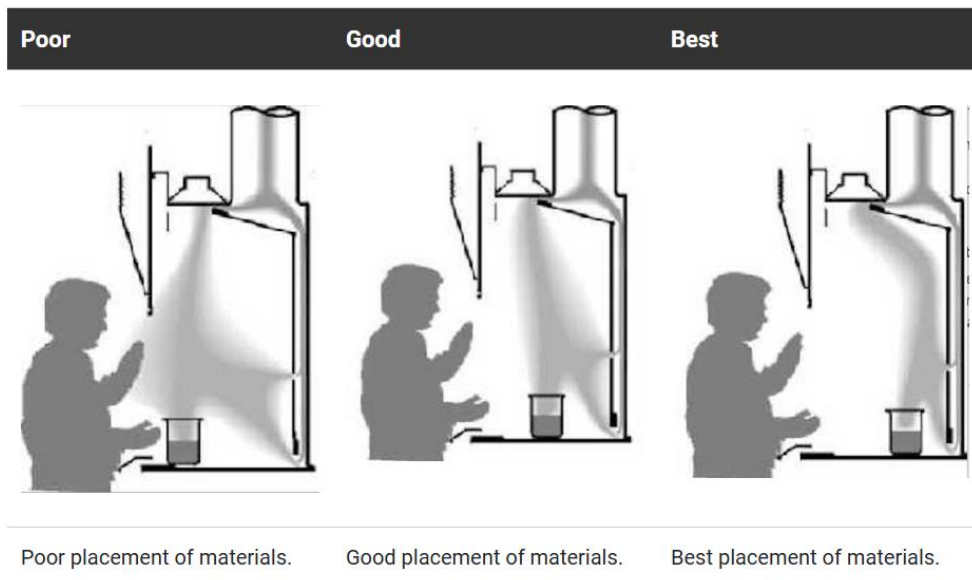
Fume hoods must be properly used and maintained to provide protection. The following work practices will help ensure the maximum protection:

- **Understand Uses and Limitations of Fume Hoods:** Use a fume hood for working with volatile hazardous chemicals and/or processes that generate aerosols or gases. **Do not** use a fume hood for:
  - **Biological materials:** Use a biosafety cabinet for work with infectious agents.
  - **Pyrophoric or highly toxic materials:** Use a glove box for working with these materials.
  - **Processes that generate larger amounts of particulate:** Particulate may be too heavy to get entrained in the air flow and may not be properly exhausted. Use local exhaust designed to capture particulate.
  - **Perchloric acid or acid digestion:**
    - Perchloric acid vapors can settle on ductwork and form explosive perchlorate crystals. Use a specialized hood with a washdown system.
    - High concentrations of acids will corrode a fume hood and ductwork. Use a specialized polypropylene hood that will not corrode for acid digestion.
- **Verify Fume Hood Function:** Always verify that the fume hood is functioning properly before using.
  - Check to make sure the fume hood is not in alarm.
  - Check that the air is flowing into the hood. A Kimwipe may be used to verify air flow direction.
- **Storage Limitations in Fume Hood:** A fume hood should only store the chemicals necessary for the work being performed and only for the duration of the procedure. Excessive storage of chemicals or equipment can restrict airflow, reduce efficiency, and compromise safety.
  - **Avoid Overloading:** Do not overload the fume hood or use it as a storage space. Blocking the back slot can disrupt proper ventilation and leave insufficient room for safe operation.
  - **Minimize Storage:** The fume hood should not be used as a storage cabinet for chemicals or equipment. Any materials kept inside should be minimal and arranged to maintain proper airflow.

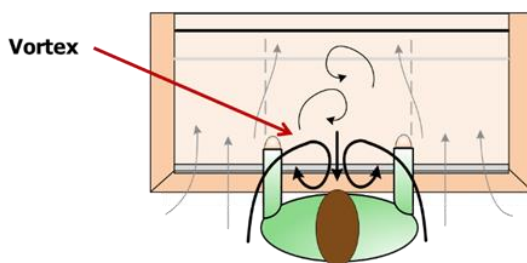


- **Position Work Appropriately:**

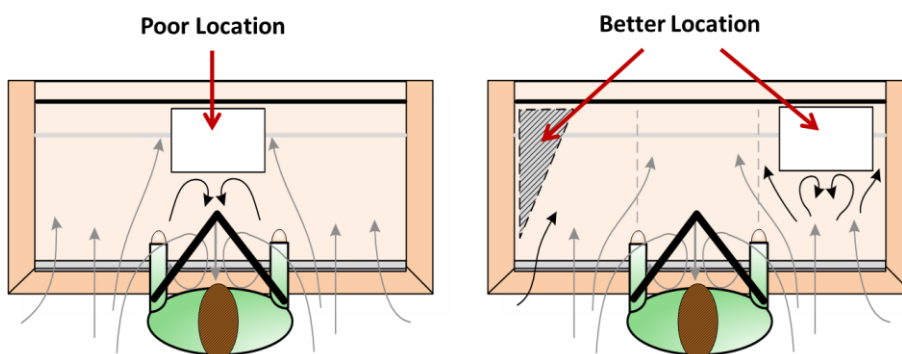
- Mark a line with tape 6 inches behind the sash and keep all chemicals and equipment behind that line during experiments. This will help to keep materials from escaping the hood when disturbances like air currents from people walking past the hood, etc., interfere with airflow at the face of the hood.



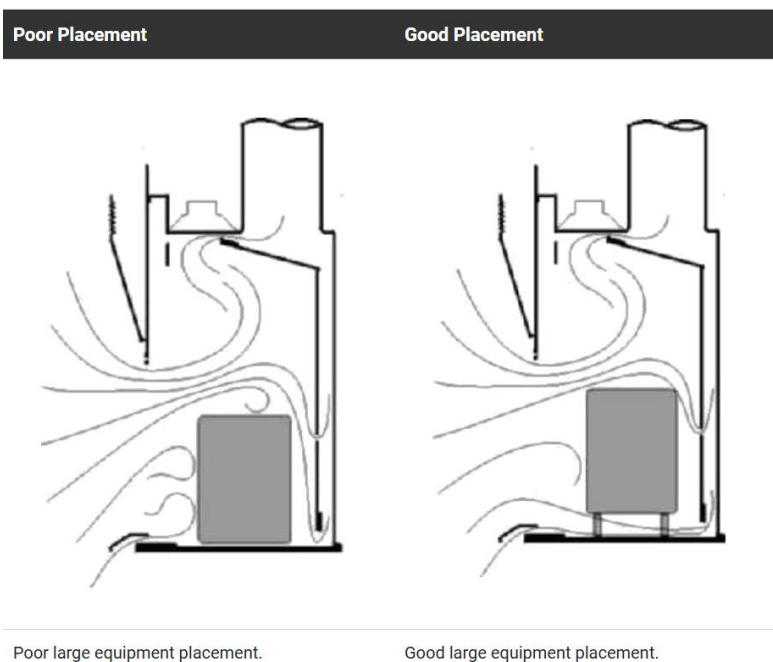
- Work as close to the center of the hood as possible and at least 6 inches back from the sash opening. A vortex forms in front of your body that can cause contaminants to flow out of the hood.



- Large equipment can create vortices and can block the slots used to exhaust the air, which can cause contaminants to flow out of the hood. Position large equipment to the side when possible and place equipment on blocks to prevent it from blocking the back slot.



- Do not block slots. If large equipment must be placed in the hood, put it on blocks to raise it approximately 2 inches above the surface so that air may pass beneath it. Place large or bulky equipment near the rear of the fume hood. Large items near the face of the hood may cause excessive air turbulence and variations in face velocity.



- **Place Sash at Proper Height:** Position the sash at the proper height indicated by the label, typically 18 inches. Close the sash when the fume hood is not being used or when there is an unattended experiment in the hood. For unattended experiments, place a notice on the sash with an emergency contact number and hazard information.
- **Maintain Air Balance:** Keep laboratory doors closed and limit movement in front of the hood to maintain proper air balance in the room and prevent turbulence that can affect the hood's operation.
- **Protect Yourself from Exposures:**
  - Wear appropriate PPE while working in a fume hood. Fume hoods do not completely contain the experiment, and incidents can occur in a fume hood that lead to skin and eye exposure.
  - Never place your head inside a fume hood while working with hazardous chemicals.
- **Respond Properly to Fire in a Fume Hood:** If there is a fire in a fume hood, close the sash if it is safe to do so, evacuate the lab, and call 911 immediately to report the fire.