CONTROLLING CHEMICAL EXPOSURES IN LABORATORIES

The preferred method of minimizing employee exposure to hazardous materials is through engineering controls such as chemical fume hoods or local exhaust systems. Principal investigators, laboratory supervisors and chemical users should maintain a continual awareness of the specific hazards associated with the chemicals being used and utilize engineering controls when possible. Users must promptly report to building management any malfunctions or local alarm conditions associated with installed engineering controls.

1. General Guidance for Chemical Fume Hoods

Laboratory fume hoods (chemical fume hoods) are engineering controls designed to protect lab personnel from exposure to airborne contaminants. A secondary purpose of a chemical fume hood is to protect people and property against chemical splash, small fires or explosions.

1.1 The primary measure of a chemical fume hood's efficacy is its face velocity, measured in linear feet per minute (lfpm) through the open sash. Most chemical fume hoods at the University are designed to operate at 100 lfpm with an 18” sash opening.

1.2 Chemical fume hoods may be designed to operate at lower or variable flows to conserve energy. These fume hoods must be specifically ordered, installed and tested to certify that they can effectivey control lab emissions. (See ASHRAE 110 testing)

1.3 Never use a chemical fume hood to "dispose" of chemicals by evaporation.

1.4 Chemical fume hoods are safety backup devices for condensers, traps and other devices that collect vapors and fumes.

1.5 Only apparatus and chemicals essential to the specific procedure or process should be placed in the hood. Do not use hoods for extended chemical storage.

1.6 The work or apparatus inside the hood should be placed at least six inches inside the hood. Also, air baffles inside fume hoods must remain clear of obstructions for proper air flow and protection. Materials blocking the bottom baffle should be elevated on open racks.

1.7 Never remove hood sashes and replace damaged hood sashes promptly.

1.8 Keep the sash as low as possible when working in the hood. If the hood has horizontal and vertical sliding sashes, position one sash so it is directly in front of you. This positioning will provide maximum protection from splash and flying debris.

1.9 All chemical fume hoods should be equipped with a monitor or other flow sensing device at the time of new installation, or during renovation of existing chemical fume hoods. This monitor should be used continually to check proper air flow. In the event of monitor malfunction, contact Facilities Management to initiate repairs.

1.10 In the event of power failure or other malfunction, stop work, cover or close all chemicals, close the sash on the hood, and notify a supervisor.

1.11 Some chemical fume hoods are equipped with mute buttons on the flow alarm that will silence hood alarms for a period of time. Do not silence, disconnect or disregard alarms.

1.12 All chemical fume hoods must be certified annually for proper operation by the Department of Environmental Health and Safety or designee. PI's or supervisors are responsible to report hoods that are delinquent for annual certification to EH&S.

1.13 All new chemical fume hoods must be certified in place upon purchase or relocation. This certification shall follow ASHRAE 110 testing.

2. Constant Air Volume Chemical Fume Hoods

Constant Air Volume (CAV) chemical fume hoods exhaust the same amount of air at all times, regardless of the sash position. As the sash is lowered and raised, the air velocity at the face of the hood changes. Raising the sash completely will lower the face velocity and negatively impact the performance of the hood. Most CAV hoods at the University are designed to operate at 80-100 linear feet per minute (lft/min) when utilizing an 18" sash opening.

2. 1 The alarm on a CAV hood will alert the user if the face velocity has decreased outside of a predetermined range, typically below 80 lft/min. If the alarm sounds, lower the sash to increase the velocity of the air moving through the hood. If the alarm continues to sound, immediately discontinue using the hood, close the sash completely, and stop or stabilize the ongoing procedures. If there is a malfunction contact Facilities Management (412-624-9500).

3. Low Airflow Chemical Fume Hoods

Low Airflow chemical fume hoods have energy savings sensors that lower the airflow when the hood is not in use. Low Airflow chemical fume hoods maintain a constant face velocity by varying the amount of air exhausted from the hood in response to the sash opening. Most Low Airflow chemical fume hoods at the University are designed to operate at between 80-100 linear feet per minute (lfpm) with an 18" sash opening.

3.1 The alarm on a low airflow hood will alert the user if the face velocity has decreased outside of a predetermined range, typically 80 lft/min. If the alarm sounds, immediately discontinue using the hood, close the sash completely, and stop or stabilize the ongoing procedures. If there is a monitor or hood malfunction contact Facilities Management (412-624-9500).

3.2 Some low airflow hoods are equipped with an emergency purge feature. Pushing the emergency purge will cause the air flow to go to its maximum.

3.2.1 Do not use the emergency purge button if there is a fire or explosion inside the hood. This will increase the amount of oxygen available for the fire to consume.

3.2.2 The emergency purge is most useful in clearing out gasses or vapors that are generated too quickly to be evacuated under normal operating conditions.

3.3 On some low airflow hoods a light sensor is located between the emergency purge and mute buttons. If the sash is left open and the room lights are turned off the hood monitor will go into alarm, indicating an energy alert. Prior to leaving the lab, ensure the sash is completely closed.

3.4 On some low airflow hoods a motion sensor is located near the top middle opening of the hood. If the motion sensor detects activity in front of the hood, and the sash is not open beyond 17 inches, the air flow of the hood will be at 85 feet per minute. If no activity is detected in front of the hood for approximately 60 seconds, an energy saving mode will be activated. The energy saving mode will lower the air flow to 60 feet per minute. The energy saving mode will still provide enough air flow to exhaust any gasses or vapors being generated. EH&S recommends lowering the sash prior to moving away from the hood. Lowering the sash will maintain maximum protection.

4. Variable Air Volume Chemical Fume Hoods

Variable Air Volume (VAV) chemical fume hoods maintain a constant face velocity by varying the amount of air exhausted from the hood in response to the sash opening. VAV hoods are designed to operate a minimum of 100 linear feet per minute (lft/min), regardless of sash positioning.

4.1 An alarm will alert the user if the face velocity has decreased outside of a predetermined range, typically below 80 lft/min. If the alarm sounds, immediately discontinue using the hood, close the sash completely, and stop or stabilize the ongoing procedures. If there is a monitor or hood malfunction contact Facilities Management (412-624-9500).

4.2 Some VAV hoods are equipped with an emergency purge feature. Pushing the emergency purge will cause the air flow to go to its maximum.

4.2.1 Do not use the emergency purge button if there is a fire or explosion inside the hood. This will increase the amount of oxygen available for the fire to consume.

4.2.3 The emergency purge is most useful in clearing out gasses or vapors that are generated too quickly to be evacuated under normal operating conditions.

5. Other Chemical Control Devices

Other engineering control devices, such as flex ducts, snorkel vents, glove boxes, downdraft tables, benchtop containments or Class II type B2 biosafety cabinets can be used to control chemical exposures in a lab. Proper use of these devices not only restricts chemical use to a designated area but can greatly reduce potential employee exposure hazards by capturing and exhausting chemical contaminants at the point of generation.