

## PROPER USE OF CHEMICAL FUME HOODS

Laboratory exposures have occurred due to the improper use of chemical fume hoods. There are documented cases where investigators had prudently confined their experiment within fume hoods, but inappropriate technique disrupted the airflow, contributing to exposures of harmful chemical vapors. Such an event occurred at the NIH several years ago when a chemist was using cyanogen bromide in a certified, operating chemical fume hood, yet cyanide vapors apparently escaped under the sash, necessitating medical attention for the investigator. In this case, the rear, lower exhaust slot was blocked, which seriously compromised the effectiveness of the fume hood allowing a portion of cyanide vapor to escape into the lab environment.

Mishaps such as these can be avoided by observing the following guidelines:

- Chemical fume hoods should be utilized for all operations involving volatile, toxic, or malodorous chemical compounds. Conduct all work within the hood at a distance of at least six inches behind the face opening to avoid disruption of airflow from the airfoil. Studies have shown that moving an emission source from two inches to eight inches behind the hood face will yield a 1000-fold decrease in the measured concentration outside the hood (Note--even properly functioning chemical fume hoods are not 100% efficient in containing airborne materials. If needed, 100% containment is provided by use of a glove box).
- The sash should be positioned at or below the height specified on the hood certification sticker. At this level, the inflow velocity is 80 to 100 feet per minute (fpm), which will provide adequate containment for chemical operations. If your hood lacks a certification sticker call the Trouble Desk [x1068] or EHS [x1451] for assistance. Increasing inflow velocity above 100 fpm does not necessarily increase protection – in fact high velocities can induce turbulent air flow that spills contaminated air from within the hood into the operations space. The sash will also serve as a physical barrier in the event of chemical splashes or smaller explosions within the hood. For this reason, the sash should be kept well below eye level.
- Only the equipment necessary to perform an experiment should be present in the hood. Excess apparatus or chemical containers will cause turbulence within the hood, which can compromise containment. Be extremely cautious that the exhaust slots are not blocked.
- Chemicals should not be regularly stored inside the hood. Under-hood chemical

storage cabinets can be purchased and installed if necessary.

- Do not place accessory, electrical receptacles or other spark sources in the hood as this could ignite flammable liquids or gases.
- Minimize the amount of turbulence created by personnel moving in front of the hood, by drafts from open doors, and by heating and air-conditioning systems. Such turbulence compromises containment.
- Hoods are equipped with audible and visual alarms to alert laboratory personnel when airflow is inadequate. Before working in the hood, make sure it is operating properly and not in an alarm condition. (See Safetygram #134).
- The work surface of the hood should be thoroughly cleaned immediately following any spill.
- Use traps or scrubbers where possible to reduce toxic and malodorous emissions within the hood. Procedures, which involve the venting of toxic vapors, should be located at the back of the hood and vented in the direction of the airflow. Do not put your head in the hood when contaminants are being generated. Use shielding and catch pans whenever spills, splashes, or explosions may occur.

Questions concerning the safe operation of chemical fume hoods should be directed to EHS on x1451.