CWRU - Three Types of Laboratory Hoods

Chemical Fume Hoods

Chemical fume hoods protect researchers from chemicals and radiological exposure. Any toxic or volatile (tendency of a chemical to vaporize) chemical must be used inside of a chemical fume hood to lower chances of inhalation. The following practices will maximize the effectiveness of a chemical fume hood.

1. Be sure the chemical hood has an inspection sticker dated within a year.
2. Verify that the chemical hood is drawing air. Check the flow monitor (if present) or use a "Kimwipe" to demonstrate flow into the hood.
3. Use sashes to maximize protective shielding and ventilation.
   - Vertical sashes should be lifted only as far as needed to work comfortably. The sash should never be lifted above the most current certification label.
   - Horizontal sashes should minimize openings and keep a panel between you and your work.
4. Perform all work and keep all apparatus at least six inches into the hood. Performing work at least six inches inside the hood will help prevent disruptive air currents from developing at the hood face.
5. Discontinue work and inform EHS if the flow alarm sounds.
6. Perchloric acid should not be heated in a chemical hood unless it is specifically designated as a “Perchloric Acid Hood."
7. Chemicals, including hazardous waste, should not be stored nor allowed to evaporate inside the hood.
8. Close chemical hood sashes when the hood is not in use.
9. Keep your head out of the hood when chemicals are in the hood or experiments are in progress.
10. Route service connections under the airfoil. Electrical cords, tubing from compressed gas cylinders, etc., should be under the airfoil to prevent disruption in airflow and allow the sash to be closed completely.
11. Slots in the hood baffle should be free of obstructions and air allowed to flow freely inside chemical fume hood.
12. Objects inside the hood should be kept at least six inches from all edges.

To report a problem with a fume hood, or request certification, go to Report Chemical Fume Hood Issues.

Laminar Flow Hoods

Laminar flow hoods protect samples by directing clean air toward the research or out of hood. This prevents any contaminated air from entering the laminar flow hood and contaminating samples. Laminar flow hoods must never be used when working with any infectious material or volatile/toxic chemicals.

Biological Safety Cabinets (BSC)

Choosing the proper BSC for your laboratory can be difficult. Protection of personnel, protection of research samples, cost of equipment and annual certification are a few factors to consider. The following information is a guide to choosing the appropriate laboratory equipment.

Types of BSCs

Class I BSCs provide personnel and environmental protection, but no product protection. Class I hoods can be either hard-ducted into a building exhaust system or allowed to circulate air back into the room. With both situations a HEPA filter is in place to provide protection to the environment. Users are protected by inward airflow.

Class II (types A1, A2, B1, and B2) BSCs provide personnel, environmental and product protection. Users are protected by inward airflow while a downward laminar flow of HEPA-filtered air provides product along the work surface of the cabinet. Air exhaust is passed through a certified exhaust HEPA filter that removes all contaminant. This air may be re-circulated into the laboratory (Type A) or exhausted out of the building.

Type A1—70% re-circulated, 30% exhausted to a common plenum. To prevent build-up of chemical vapors in the room, volatile chemicals must not be used.

Type A2—similar to type A1, but with a negative rather than positive pressure plenum. Type B3 has been replaced by a type A2-hard ducted to the building's exhaust.

Type B1—designed for manipulations of minute quantities of hazardous chemicals with in vitro biological systems. This system does recirculate 30% of exhaust back into room so extremely volatile chemicals must not be used.

Type B2—system provides both biological and chemical protection by providing total external exhaust. Please note that some chemicals have the ability to degrade the HEPA filter causing a loss of containment.

Class III provides maximum protection to the environment and the worker and should be used when working with microbiological agents assigned to biosafety level 4.

TYPES OF BIOLOGICAL SAFETY CABINETS

Type	Face velocity (lfpm)	Airflow Pattern	Radionuclides/ Toxic Chemicals	Biosafety Level(s)	Product Protection
Class I* open front	75	In at front; rear and top through HEPA filter	No	2, 3	No
Class II Type A	75	70% recirculated through HEPA; exhaust through HEPA	No	2, 3	Yes
Type B1	100	30% recirculated through HEPA; exhaust via HEPA and hard ducted	Yes (low levels/volatility)	2, 3	Yes
Type B2	100	No recirculation; total exhaust via HEPA and hard ducted	Yes	2, 3	Yes
Type B3	100	Same as IIA, but plena under negative pressure to room and exhaust air is ducted	Yes	2, 3	Yes
Class III	NA	Supply air inlets and exhaust through 2 HEPA filters	Yes	3, 4	Yes

* Glove panels may be added and will increase face velocity to 150 lfpm; gloves may be added with an inlet air pressure release that will allow work with chemicals/radionuclides.

Biological Safety Cabinet Certification Form

The importance of proper certification cannot be emphasized enough, since persons who manipulate infectious microorganisms are at increased risk of acquiring an occupational illness when their BSCs are functioning improperly.

–Centers for Disease Control (CDC), Primary Containment for Biohazards

Biological Safety Cabinets must be inspected and certified by a trained technician annually. The EHS office contracts with Laboratory Certification Services, Inc. (LCS) to certify all BSCs on campus. The cost of certification is the laboratory's responsibility.

To schedule certification,
complete the Biological Safety Cabinet certification form.