Bio Basics Fact Sheet: Biological Safety Cabinets

Background:

There is considerable confusion regarding both nomenclature and appropriate use of the various types of "hoods" used in laboratories. The intent of this fact sheet is to clarify the difference between fume hoods, clean benches, and biological safety cabinets and to present some basic guidance for biological safety cabinet use. Biological safety cabinets serve as primary barrier to protect workers and the environment against exposure to infectious biological aerosols generated during the manipulation of infectious agents.

Definition of Terms:

**Laminar Flow**

Laminar flow is unidirectional air moving at a steady velocity along parallel lines. Laminar flow cabinets may or may not be biological safety cabinets.

**HEPA Filter**

High efficiency particulate air filter designed to remove particles, including microorganisms, from the air. HEPA filters are effective at trapping particulates and infectious agents, but not at capturing volatile chemicals or gas. Only certain classes of biological safety cabinets that are exhausted to the outside can be used when working with small amounts of volatile chemicals.

**Laminar Flow Clean Benches**

These are not biological safety cabinets and offer no worker or environmental protection. Clean benches must never be substituted for biological safety cabinets. Air is blown at the worker exposing them to whatever is present on the bench. Clean benches should not be used for work involving cell cultures, toxins, volatile chemicals, infectious materials, or materials that may cause hypersensitivity to the worker - such as animal dander.

Laminar flow clean benches can have either horizontal or vertical airflow. HEPA-filtered air is discharged across the work surface to protect product on the bench from contamination. Vertical flow clean benches may have a sash similar to a biological safety cabinet but air is discharged at the worker under the sash. There is no air intake grill below the sash.

**Biological Safety Cabinet**

Biological safety cabinets are often referred to as "tissue culture hoods" or "laminar flow hoods". Biological safety cabinet is the correct term. All biological safety cabinets use HEPA filters to treat exhaust air. Class II cabinets filter both exhaust and intake air to protect the worker and the environment from contamination as well as to protect product in the cabinet. See http://www.dehs.umn.edu/bio_pracprin_biosafecab_types.htm to learn more about the different classifications of biological safety cabinets and how to select the correct cabinet for your work.
**Chemical Fume Hoods**

Chemical fume hoods are used to protect workers from exposure to volatile chemicals. Neither the intake or exhaust air is HEPA filtered. Infectious materials should not be used in chemical fume hoods. These hoods are part of the facility and are tested annually by DEHS (Environmental Health and Safety).

**Certification:**

Biological safety cabinets belong to researchers and are not certified by facilities or DEHS. Per CDC, [http://www.cdc.gov/biosafety/publications/bmbl5/BMBL5_appendixA.pdf](http://www.cdc.gov/biosafety/publications/bmbl5/BMBL5_appendixA.pdf)

"The operational integrity of a new BSC (biological safety cabinet) must be validated before it is put into service or after a cabinet has been repaired or relocated. Relocating a BSC may break the HEPA filter seals or otherwise damage the filters or the cabinet. Each BSC should be tested or certified at least annually to ensure continued proper operation."

Biological safety cabinets in laboratories and in animal care facilities approved for BSL2 experiments must be certified annually by a qualified service person. See [http://www.dehs.umn.edu/bio_pracprin_biosafecab_cert.htm](http://www.dehs.umn.edu/bio_pracprin_biosafecab_cert.htm) for a list of certifiers and additional information to insure safe and effective use of biological safety cabinets.

**Safe & Effective Work Procedures:**

**Open Flames**

Current construction codes prohibit the installation of natural gas lines to biological safety cabinets. Manufacturer labels indicate that gas should not be plumbed into biological safety cabinets. This is due, in part, to the risk of gas from leaks becoming concentrated because of air recirculation in the cabinet. For a more depth discussion of the use of flames in biological safety cabinets and alternative methods to using an open flame, see [http://www.dehs.umn.edu/bio_pracprin_biosafecab_flames.htm](http://www.dehs.umn.edu/bio_pracprin_biosafecab_flames.htm).

**Vacuum Lines**

Aspirator bottles or suction flasks should be connected to an overflow collection flask containing an appropriate disinfectant and to an in-line HEPA filter to protect house vacuum and vacuum pumps. See [http://www.dehs.umn.edu/bio_pracprin_biosafecab_vac.htm](http://www.dehs.umn.edu/bio_pracprin_biosafecab_vac.htm).

**UV Lights**

UV lamps must be turned off when the room is occupied to protect eye and skin from UV exposure, which can burn the cornea and cause skin cancer. Ultraviolet (UV) are not required in biological safety cabinets and may even create a false sense of security. For a more complete discussion on the limitations, hazards, and effective use of UV lights see [http://www.dehs.umn.edu/bio_pracprin_biosafecab_uv.htm](http://www.dehs.umn.edu/bio_pracprin_biosafecab_uv.htm).

**Reference:**