

## LAMINAR FLOW HOODS & BIOLOGICAL SAFETY CABINETS

### What are HEPA (High Efficiency Particulate Air) filters?

- They consist of a thin pleated sheet of boron silicate microfibrils with aluminum separators
- They are particulate filters which retain airborne particles and microorganisms (gases pass freely through)
- Filtration occurs by five distinct methods (\*primary mechanisms):
  - 1) sedimentation
  - 2) electrostatic attraction
  - 3) interception\*
  - 4) inertial impaction\* and
  - 5) diffusion\*

### How are HEPA filters rated?

- HEPA filters are rated on their ability to retain particles of around 0.3 microns in size
- tested with PAO (poly alpha olefin) which produces particles of 0.26 microns in size
- most aerosol droplets are greater than 0.26 microns

### Do you know the difference between a laminar flow hood and a biological safety cabinet?

#### Laminar Flow Hoods

- **provide product protection only and must not be used when working with any form of biohazard or chemical hazard**
- any potentially infectious aerosol that is created will lead to exposure of the operator and the environment
- horizontal-flow clean-air bench used for cell cultures can expose the researcher to aerosols of allergenic or infectious materials.
- vertical-flow clean-air bench also blows air out into the room

#### Biological Safety Cabinets

- provide personnel and environment protection and usually product protection
- infectious agents must be used in a biological safety cabinet NOT a laminar flow hood

### Do you know the difference between Class I, II & III Biological Safety Cabinets?

#### Class I Biological Safety Cabinet:

- **a ventilated cabinet which provides personnel and environmental protection only**
- air flow is directed away from the researcher, but is not HEPA filtered, therefore there is no product protection
- similar to a fume hood with a HEPA filter on the exhaust system to protect against the release of biohazards
- inward air flow ranges from 75 – 125 linear feet per minute (lfpm)
- can be used with radioisotopes and some toxic chemicals

### **Class II Biological Safety Cabinet:**

- **provides personnel, product and environmental protection**
- there are supply air and exhaust air HEPA filters
- two general types: IIA cabinets have a minimum inward air flow of 75 fpm and recirculates 70% of the air; IIB cabinets have a minimum inward air flow of 100 fpm and exhaust either 70% (type B1) or 100% (type B2)
- most of the biological safety cabinets at UVic are Class II

### **Class III Biological Safety Cabinet:**

- **these cabinets provide personnel, product and environmental protection**
- they are hermetically sealed and all procedures are conducted through arm-length rubber gloves
- used in high level (Level 4) containment labs
- there are two HEPA filters on the exhaust system

### **Are you sure you are using your Biological Safety Cabinet correctly?**

- the cabinet must be turned on at least 5 minutes before starting work in order to purge the air and remove any particulates
- the researcher should wear a closed-front lab coat (or surgical gown) and gloves
- the gloves should overlap the cuffs
- all materials needed for the manipulations should be placed in the cabinet before the work is initiated to minimize in-and-out motions
- **do not cover the air intake grill**
- the researcher should work well into the cabinet and not out close to the front (at least four inches from the front grill)
- when in use, the entry door to the lab (particularly in small rooms) **must** be kept closed and traffic minimized
- do not have electric fans blowing in the room when the biological safety cabinet is in use – this will seriously effect the air flow of the unit
- develop procedures for the collection and decontamination of waste materials to avoid clutter and minimize in-and-out motions
- the cabinet must be decontaminated with an appropriate disinfectant at the end of each work operation
- periodic use of 1-10% household bleach in water is acceptable, but chlorine is corrosive (70% ethanol or quaternary ammonium compounds may also be used if effective against agent)
- **all biological safety cabinets must be certified for use when first installed, any time the unit is moved or repaired, and on an annual basis**
- all cabinets will have a certification sticker indicating the last date of testing on the front face of the cabinet

***For further information on the use, testing or selection of biological safety cabinets please contact Occupational Health, Safety and Environment at local 8971.***