Safe Use of Equipment and Tools in Biological Research

Biological Safety Cabinet

Biological Safety Cabinets at UNC Asheville are classified as A2 cabinets.

- Front access opening with carefully maintained inward airflow, 100 fpm intake.
- HEPA-filtered, vertical, unidirectional airflow within the work area.
- HEPA-filtered exhaust air to the room.
- 70% air recirculated. 30% exhausted from a common plenum to the room.

Safe Work Practices for Biological Safety Cabinets

- Cabinets must be certified annually or after they have been relocated.
- To maintain proper directional airflow, do not block the front air intake or the rear exhaust grille and minimize the amount of material kept inside the cabinet.
- Do not use a Bunsen burner inside a cabinet. It will damage HEPA filters and disrupt the protective airflow pattern.
- Work 4-6 inches from the front of the cabinet, over the tray and not over the grille; avoid rapid arm movements that can disrupt airflow.
- In order to minimize arm movement in and out of the cabinet, place all needed materials in BSC at the start of procedures, arranging them so that 'dirty' items do not pass over 'clean' ones. Clean cultures (left) can be inoculated (center); contaminated pipettes can be discarded in the shallow pan and other contaminated materials.
- Allow cabinet fan to run 5 minutes prior to and at the completion of work; wipe interior with 70% ethanol before and after work.
- Many BSCs are equipped with UV lights, but routine disinfection of work surfaces is more critical in ensuring a contaminant-free work area, and relying heavily upon the disinfection activity of the UV light is not recommended.
- Most BSCs have a removable work surface tray and front grille, and the space beneath it requires regular cleaning to avoid contamination problems. A schedule for regular removal of the work surface tray and disinfection of the space beneath with an appropriate disinfectant is recommended. The drain valve under the work surface can facilitate cleaning.
**Centrifuges**

- Before use, check to see if:
  - Balanced
  - Overfilled
  - Caps or stoppers properly in place
- Use sealable buckets (safety cups) or sealed rotors
- After run, check to see if:
  - Centrifuge completely stopped
  - Spills or leaks (clean immediately with appropriate disinfectant)
  - Allow aerosols to settle

**Needles and Syringes**

- Avoid use whenever possible
- Use a biosafety cabinet for all operations with infectious agents or materials that may cause a disease
- Fill syringes carefully
- Shield needles when withdrawing from stoppers
- Do not bend, shear or recap needles
- Dispose of all used needles and syringes in a sharps container

**Pipettes**

- Mouth pipetting is prohibited
- All biohazard materials should be pipetted in a biosafety cabinet
- Never “blowout” fluids
- To avoid splashes, allow discharge to run down the receiving container wall
- Never mix material by suction and expulsion
- Reusable pipettes should be placed horizontally in a disinfectant filled pan and autoclaved before reuse

**Blenders, Grinders, Sonicators and Lyophilizers**

- Operate in a biosafety cabinet (except lyophilizer) whenever possible. Allow aerosols to settle for 5 minutes before opening
- Safety blender
  - Do not use glass blender jars
  - Decontaminate immediately after use with appropriate disinfectant
- Lyophilizers
  - Use glassware designed for vacuum work
  - Ensure there is no damage before using
  - Disinfect all surfaces immediately after use with appropriate disinfectant
Use vapor traps whenever possible

**Inoculation Loop**

- Sterilization in an open flame may create aerosols which may contain viable microorganisms
- Use a shielded electric incinerator
- Shorter handles minimize vibrations
- Disposable plastic loops are a good alternative

**Liquid Nitrogen Use**

- Wear appropriate gloves and face shield when dispensing liquid nitrogen.