

## Hazard Analysis

### Autoclave

**Caution: This apparatus uses steam and high pressure**

#### Personal Protective Equipment (PPE) required:

- Safety glasses
- Lab coat
- Appropriate Heat Resistant, dry gloves
  - If gloves are constructed of a cloth material, ensure that they are completely **dry** before using

#### General Considerations:

- First time users must read through the autoclave SOP, have been trained by a competent person and demonstrate proficiency prior to operating an autoclave alone.
- Do not autoclave items containing corrosives (e.g. acids, bases, and phenol), solvents or volatiles (e.g. ethanol, methanol, chloroform) or radioactive materials.
- Sharp objects should never be placed in an infectious waste bag. These should be disposed of in an appropriate sharps container.
- Use caution whenever handling an infectious waste bag in case sharps were accidentally placed in the bag. Bags should be loosely secured to allow for steam penetration.
- It is recommended that autoclaves are **periodically monitored** to assure effectiveness. There are two types of tests used; a chemical and a biological indicator. The chemical indicator is generally used with each load and changes color when the temperature reaches 121° C. The biological indicator is generally used on a more sporadic basis and includes heat resistant spores that are killed by exposure to 121° C for at least 15 minutes. Both indicators should be placed down into the center of the bag of waste to be autoclaved to ensure sterilization.

#### Load Preparation:

- Ensure the infectious waste bag is secured with a twist tie, large rubber band, or autoclave tape.
  - **Do not over fill bags.**
- Place materials to be autoclaved into an autoclavable tub. Only use tubs known to withstand temperatures/pressures of autoclaving.
  - Handle the infectious waste bags by the top only; never lift a waste bag by supporting the bottom with your hand.
- Only autoclave items (glassware, plasticware) that are known to withstand the temperature/pressures of the autoclave.

- Liquids cannot be autoclaved in tightly closed containers. Loosen caps on bottles.
  - **Fill liquid containers only half full.**

### **Loading autoclave:**

- Open autoclave door: **Always stand behind autoclave door.** Use autoclave door as shield to protect you from any steam that might escape from the autoclave chamber. Let all steam escape from the chamber before looking directly into chamber.
- Make sure the chamber is empty and there is direct access to it.
- Wearing autoclave gloves, place tub(s) with materials to be autoclaved into chamber. The walls of the autoclave chamber are very hot. Avoid contact.
- Make sure that the tubs fit into chamber without obstructing the door.
- Close door and turn wheel until the door is locked. Check for "door locked" indicator light. Do not start autoclave if indicator light is not on.
- Choose appropriate program for your particular load (liquid, Dry goods, etc.) and start autoclave cycle.
  - **Note:** Consideration should be given to the size and content of the load when deciding on the **time/temperature selection.** Large loads or loads containing dense materials may need a different time/temp. selection than those that are smaller or contain lighter materials.
- Observe initial autoclave operation. If anything appears unusual, do not turn off power. Manually forward program to end of cycle, if autoclave can be approached safely.

### **Unloading autoclave:**

- Decide on a place to safely put autoclaved load before removing anything from autoclave. There should not be anything that will obstruct removal and placement of the autoclaved load.
- Always make sure that the autoclave cycle has been completed. Never attempt to open autoclave door before cycle is completed.
- Check if pressure in the chamber has reached normal atmospheric pressure.
- Turn locking wheel to unlock door. Always stand behind door, using door as a shield. Open door partially. It should open easily, do not force door open.
- While standing behind autoclave door, allow steam to escape from autoclave chamber. **Never look into the chamber immediately after opening door.**
- When all the steam has escaped open door completely.
- From a safe distance observe autoclave load. Do not remove anything from the autoclave that is still boiling. Wait until load has cooled further.
- Wearing autoclave gloves, remove tub from autoclave chamber. Avoid contact with walls of autoclave chamber.
- **The tub and its content are very hot.** Any liquid inside the tub will be very hot. Avoid contact with liquid. If the heat resistant gloves become soaked with very hot water and scalding of the skin will result.

- Close autoclave door to allow safe passage for others.
- Let load cool. Do not transport any hot items, if there is a chance of contact with yourself or anyone else in the laboratory. Carry item in such a way that it cannot be spilled on yourself or others. It is recommended that a cart be used to move materials just removed from the autoclave.
- If heat-resistant glove become wet, place them somewhere to dry. Do not place them where others might pick them up for use to hold hot items.

### **Emergency Procedures:**

- Mechanical problems - Contact your supervisor for assistance. Tag out the autoclave as “Out of service” if needed to inform other possible users.
  - Injury - Contact your supervisor for assistance or call 911 for campus police if you need immediate emergency assistance.
  - Spills, odors, broken items -
    - Spills - Allow the unit to cool before either attempting to clean up the spill or contact the original generator of the waste to clean up the spill.
    - Unusual Odors - Contact your supervisor if there is an odor associated with the autoclave operation. You may also contact DOHS at 831-8475 for assistance.
    - Broken items - please use mechanical means for cleaning broken items out of the autoclave (i.e. tongs or forceps).
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