Guidelines for Using an Autoclave

**Introduction**

Autoclaves are mechanical devices that use high pressure steam to destroy microorganisms for decontamination of laboratory waste and sterilization of laboratory glassware, media and reagents.

**Personal Protective Equipment (PPE)**

Because autoclaves utilize steam, heat and pressure the risk of personal exposure and potential harm is great. Therefore personal protective equipment must be worn. This includes:

* Eye and face protection (face shield minimizes the risk of facial steam burns),
* Gloves (latex or nitrile gloves prevent contact with contaminated material, while heat resistant gloves (asbestos free) must be used when loading and unloading the autoclave),
* Lab coat (long sleeves must be used to protect wrists and forearms, plus an apron if a spill hazard exists).

**Safe Use**

Although autoclaving provides an economical way of sterilizing and decontaminating items, not all material can be autoclaved. Some materials present specific hazards when they are autoclaved; such as the generation of toxic /noxious gas. To help you identify what may or may not be autoclaved a general list of items has been included in this guideline.

*Items that* ***CAN*** *be autoclaved are*:

* Cultures and stocks of infectious material.
* Culture dishes and related devices.
* Contaminated solid items such as: petri dishes, eppendorf tips, pipettes, gloves, paper towels.
* Items for sterilizations such as; glassware, media, aqueous solutions, equipment.

*Items that* ***CANNOT*** *be autoclaved are:*

* Materials containing: solvents, volatile, chlorinated compounds (HCL, bleach) or corrosive chemicals (such as: phenol, trichloroacetic acid, ether, chloroform) etc.
* Radioactive material (without prior approval).
* Some plastics materials.

**Training**

Only trained personnel should use the autoclave. Not only will this minimize the risk of personnel being harmed, but it is essential to ensuring a successful decontamination or sterilization of the material being handled. Each autoclave will have specific instructions for its own use. It is important to follow the manufacturer’s recommendations and each user must receive hands-on training on its use.

*All principal investigators and supervisors should document that this training has been received by their*

*staff (students and support staff) who will be using the autoclave.*

**Loading the Autoclave**

* Items should be packed in a way that ensures that steam will penetrate the load. Bags should not be sealed; if the tops have been taped or tied the bags should be opened to allow effective steam penetration.
* Place containers of liquid, bags of agar plates, or other items that may boil over or leak inside a secondary pan in the autoclave.
* Never place autoclave bags or glassware in direct contact with the bottom of the autoclave.
* Do not overload the autoclave; leave sufficient room for thorough steam circulation.
* Make sure the plug screen in the bottom of the autoclave is clean.
* Do not mix loads of liquids with solids.

**Unloading the Autoclave**

*The greatest risk of personal injury occurs during the process of unloading the autoclave.* Not only is the risk of burns or scalding significant, but one may also be exposed to the vapors and gases generated by the inadvertent autoclaving of volatile chemicals. Super-heated liquids also pose of risk of exploding if they are shaken or moved during the cooling process. In addition glassware can break if the autoclave door is opened too quickly, and sufficient time is not provided for them to approach room temperature.

*Procedures to follow:*

* Wear all necessary personal protective equipment.
* The chamber pressure gauge of the autoclave should be zero before opening the autoclave’s door.
* Crack door slightly and stand back to allow steam to escape. To minimize the risk of accidents caused by steam escape, the person who opens the autoclave door should stand directly behind it.
* Slowly open autoclave door. Opening the autoclave door too quickly may result in glassware breakage and/or steam burns to the skin.
* Be very careful of liquids, molten agar, etc. to avoid getting splashed with scalding liquid. Do not agitate containers of super-heated liquid or remove caps before unloading. If boiling or bubbling is present, wait until it subsides.