

**CLASSROOM PRACTICAL INSTRUCTION GUIDE: CASE DISCUSSION**  
**BIOHAZARDOUS WASTE**

## **Case Discussion: Biological Waste and Mixed Biohazardous Waste Management**

**Prerequisite: Instructor must have read and understood local waste management regulations.**

### **Reference Material:**

- **WHO Laboratory Biosafety Manual Part IV. #14 pgs 82-93 and Annex 5, pg 145.**
- **MSDS sheet for Hydrogen peroxide (commonly used in ELISA development).**

What is biological waste?

- Instructor does not need to provide a specific definition for the terminology of biological waste. The main purpose of this question is to generate discussion
- Name two major biological wastes in the following laboratories
  - Bacteriology such as used liquid culture media and used agar plates
  - Virology such as viral samples (solid and liquid) and used ELISA plates
  - Molecular Biology such as liquid waste from PCR reaction or from DNA or RNA extractionThe main purpose of this question is to recognize commonly generated biological wastes in their laboratories. Some waste will be mixed. Discuss the removal of expired chemicals from the laboratory area. Chemical stored in the laboratory must be treated both as a chemical waste and disposed of according to the MSDS sheet and also as a bacterial waste and decontaminated. A common mixed waste in serology laboratories are used ELISA plates. The developer used in an ELISA is often toxic and should be treated and disposed of as a hazardous chemical waste. After a review of the MSDS sheet, your institute may decide to collect the liquid from the plate before autoclaving the plates. All waste treatment should be based on a risk analysis and is dependent on the organisms and chemicals used in the laboratory.

What is hazardous waste?

Instructor should discuss what is toxic, reactive, ignitable, and corrosive. Give examples.

Common toxic chemicals used in the biology laboratory include ethidium bromide, formaldehyde, SDS and Congo Red. Ask participants if they can think of other toxic chemicals. Toxic chemicals are often marked with a skull and crossbones on the outside of the package.

Common ignitable chemicals include the alcohols but also include some chemical that you may not think of as ignitable such as SDS. Check for a flame symbol on the label or consult the MSDS sheet. Ignitable chemicals must be stored in a Flammable Cabinet.

The most common corrosive used in a biological laboratory is bleach. Bleach must be neutralized before autoclaving as it is destructive to metals and will destroy the autoclave. Bleach must be rinsed with water or alcohol as a diluent when used for surface cleaning. Bleach must be stored in secondary containers away from ignitable chemicals and acids.

Sulfuric acid and hydrochloric acid are common acids used in the biological laboratory. Acids must be stored away from toxic chemicals in an Acid Cabinet.

- Name one hazardous waste in your bacterial laboratory (such as bleach or sulfuric acid used in ELISA)

What is mixed biohazardous waste?

- Name one mixed biohazardous waste in your molecular laboratory (common answers may be inoculated bacterial media or agar plates, used ELISA plates, and extracted nucleic acids).
- The following questions are related to management of mixed biohazardous waste
  - Where can you find information on managing a specific hazardous material such as sulfuric acid or bleach)  
Instructor should discuss material safety data sheet (MSDS)
  - How do you manage a liquid waste containing *Bacillus anthracis*, culture medium, and bleach?  
Instructor can discuss liquid waste, biological risks, autoclave, disinfection, and bleach management such as neutralization

#### CASE STUDY:

1. How do you manage solid biological waste such as used ELISA plate or PCR microtubes? This answer will vary depending on the assay used (developer etc) and local laws. MSDS sheets should be used for the discussion.
2. Discuss should all solid waste be autoclaved? Why or Why not? What other methods are available. Has a risk assessment been done on alternative methods to assure they are safe under all occasions?