

# BCH 462 Biotechnology and Genetic engineering

Lecture 3

Basic Lab skills

# Lecture 2 outline, aim, and objectives

The appropriate way to dress to the lab.

Rules when entering the lab.

How to deal with chemicals and equipment.

Overview of solution preparation.

Autoclaving as a sterilization technique.

Safe disposal of waste.

# The appropriate way to dress to the lab



Wear a protecting lab coat and protect your eyes, if necessary (safety glasses or goggles).

Appropriate footwear (open-toed sandals or similar are inappropriate).

Ensure that hair is tied back.

Use gloves to protect your hands from the chemicals and/or samples. Gloves also protect your sample from contamination that might be in your hands!



# Rules when entering the lab

Usually, food and/or drink are not allowed in the lab.

Make yourself familiar with the fire regulations in the laboratory and building. Know where the emergency exits are.

Know where the first aid kit is.

Do not touch the chemicals with your bare hands.

Think ahead and plan your work accordingly.

Only use/take the minimum quantity of chemical required for your work.

# How to deal with chemicals and equipment

Use a fume cupboard for hazardous chemicals. Check that it is functioning properly before starting your work.

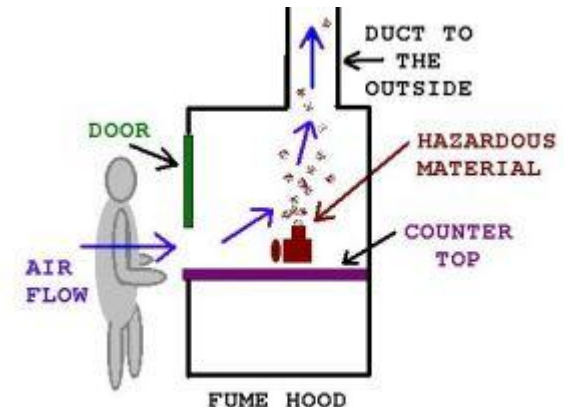
Clear up spillages on and around equipment and in your own workspace as they occur.

Learn as much as you can about the equipment you use and check equipment regularly.

Report problems with equipment to the person in charge.

Clean equipment after use (or regularly).

Protect equipment when not in use.



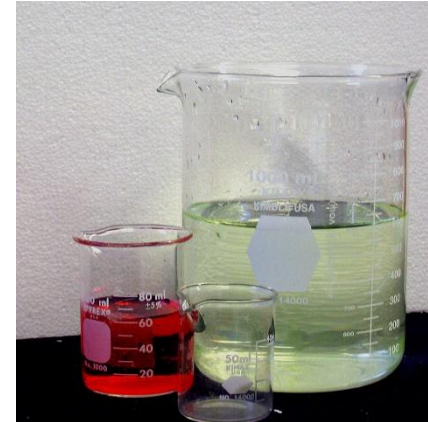
# Overview of glassware and solution preparation

**Glassware used for measurements  
(Quantitative and accurate preparation of solutions)**

Graduated cylinders, pipettes, and volumetric flasks

**Glassware used as containers and for qualitative work**

Beakers, Flasks, Bottles, and Test tubes



# Basic examples in solution preparation

Molarity (M)=number of moles/Volume in liters (L)

Number of moles=weight (g)/Molecular weight (g/mol)

How do you prepare 100 ml of 1 M solution of NaCl? molecular weight of NaCl=58.44 g/mol

Dissolve 5.844 gram of NaCl in 100 ml water to get a 1 M NaCl solution

1% solution is 1 gram in 100 ml (W/V) or 1 ml in 100 ml (V/V)

10% sucrose solution: 10 gram sucrose in 100 ml water

# Sterilization

Sterilization is a term referring to any process that removes or kills all forms of microbial organisms such as fungi, bacteria, viruses, etc. present on a surface or contained in a fluid.

Sterilization can be achieved by applying heat, chemicals, irradiation (UV light), high pressure, and filtration or combinations of the above.



# Autoclaving as a sterilization technique

The autoclave is a device used to remove microorganisms (Virus, Bacteria, fungus etc.) using high pressure and high temperature.

The boiling point is directly proportional to the pressure when the volume is constant.

## **Pressure $\propto$ Temperature**

So when the pressure is increased in the closed device the temperature increases proportionately (above the boiling point).

This pressure and temperature is kept constant for 20 minutes during autoclaving.

This is sufficient to kill all the organisms.



# Precautions while using autoclave

Heat resistant gloves must always be worn (elbow length preferable) when items are unpacked from the autoclave. This will prevent your arms from being burnt.

Open the door slowly to let steam escape.

When opening autoclaves, particularly the low level type, do not allow your face to get close to the door, as residual steam can rush out and burn unprotected skin and eyes.

Do not attempt to stretch your body into the autoclave with exposed arms to reach contents.

Always wear protective shoes, as vessels containing liquids may break during unpacking and pour hot liquids onto your legs and feet.

# Autoclaving is used for

Sterilization of media and equipment required for growing microorganisms.

Sterilization of cultures and waste materials prior to disposal.



# Safe disposal of waste

Dispose chemicals and hazardous material as instructed by the provider.

Plan appropriate leak proof, puncture proof containers for the transfer and disposal of sharps, infectious waste, and specimens.

Sharps containers should be moved to the point of use so sharps can be discarded by the original user.