Practical Pharmaceutical calculation
1st stage
College of Pharmacy

Lab 1 : Demonstration of different glassware used in pharmaceutical labs

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2025 -2026

Semester: 2nd

Syllabus

No.	Lesson Subject	Hours
1.	**Demonstration of different glass ware and equipment used in the field of pharmacy.**	
2.	**Pharmaceutical measurements.**	
3.	**Volume measurements.**	
4.	**Calculations involving liquid pharmaceutical preparations.**	
5.	**Calculations involving buffer and isotonic liquid preparations**	
6.	**Reducing and enlarging prescription contents.**	
7.	**Percentages in calculating prescription contents.**	
8.	**Stock solutions and dilution technique during dispensing technique.**	

Lab 1

Demonstration of different glassware used in pharmaceutical labs



- The pharmaceutical preparation, as the final forms used for medication, must be effective and safe.
- It should be accurate quantitatively and qualitatively.

1

- **Quantitatively: It means the amount (wt or vol.) of the ingredient be accurate.**

2

- **Qualitatively: It means the identity of the ingredient be certain.**

Instrument used in the lab

Mortar and pestle

- Mortar and pestle are implements used since ancient times to prepare **ingredients** or substances by crushing and grinding them into a fine paste or powder
- A mortar is a vessel in which substances are ground or crushed with a pestle.
- A pestle is a tool used to crush, Mash or grind materials in a mortar.



Wide mouth bottle

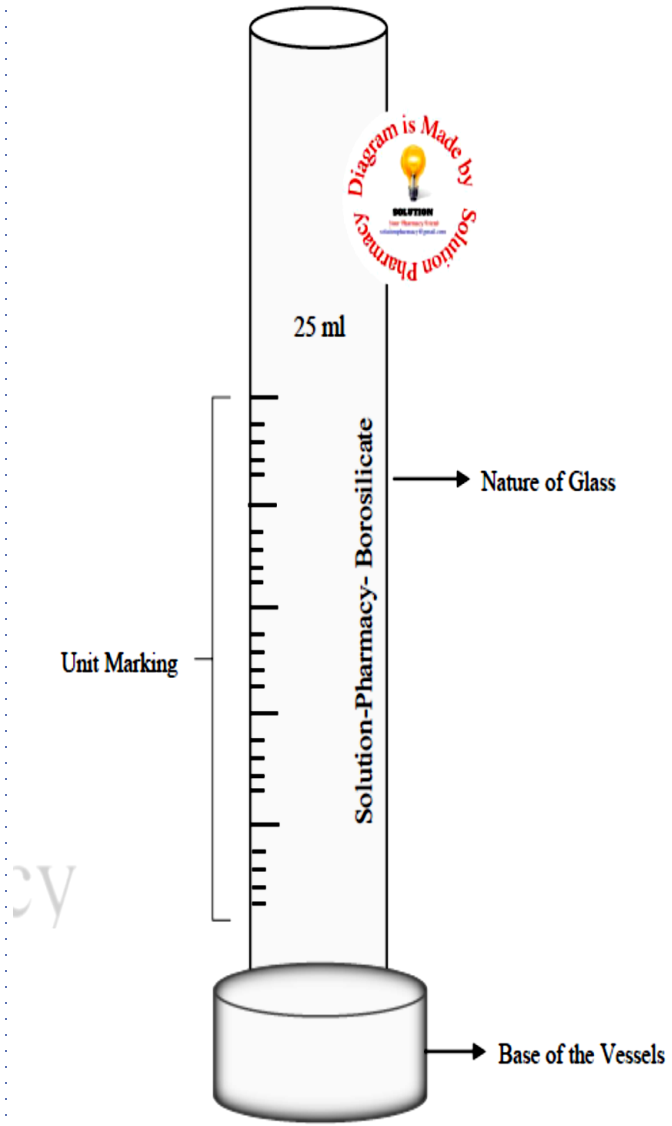
- are easier to fill and are recommended for the storage of solid, semi-solid and viscous liquid materials.
- Storage bottles provide a range of capacities and designs for safe keeping.
- They are often made of amber or opal glass, protecting light-sensitive pharmaceuticals from degradation due to exposure to light.
- Many storage bottles feature clear, visible volume markings, aiding in accurate measurement.





Graduated Cylinders

- Used to measure precise volumes of liquids with high accuracy.
- Suitable for measuring liquids of various **viscosities**
- Graduated cylinders come in a variety of sizes such as 10 ml, 25 ml, 50 ml, 100 ml, 500 ml and 1,000 ml.
- Scientists take measurements by viewing, at eye-level, the lowest point of the convex dip that the liquid in the cylinder makes.



Conical measure cylinder

- Conical measure cylinder is a type of laboratory glassware which consists of a **conical cup** with a **notch** on the top to allow for the easy pouring of liquids, and **graduated** markings on the side to allow easy and accurate measurement of volumes of liquid.



Beaker

- A beaker is a cylindrical glass or plastic vessel used **for holding liquids**.
- It is a **multi-purpose** piece of equipment used for containing a chemical reaction, measuring liquids, heating them over a Bunsen burner's flame or collecting them in a titration experiment.



Conical flask - Erlenmeyer flask

- This shape allows the flask to be sealed with a bung for heating purposes, while also allowing a researcher the freedom to shake or stir the flask without spilling liquid.
- The **Erlenmeyer flask** has diverse **uses** such as holding and measuring chemical liquid samples, but can also be used to mix, heat and boil chemicals.



Volumetric Flasks

Precise Measurement

- Designed to contain a **specific volume of liquid** at a particular temperature
- Used to accurately prepare and dilute solutions
- Commonly used in chemical laboratories for mixing, storing, and transporting liquids



Test tube

- They are designed to hold **small quantities** of chemicals and feature a flared lip to make pouring easier.
- Test tubes can **hold liquid or solid chemicals** and can be used to contain **small chemical reactions**.
- The **slimness** of the test tube **reduces** the spread of any **vapors** that may be produced by the reaction.
- They can **accommodate** a range of closures, such as stoppers or caps, for sealing and storing samples securely.





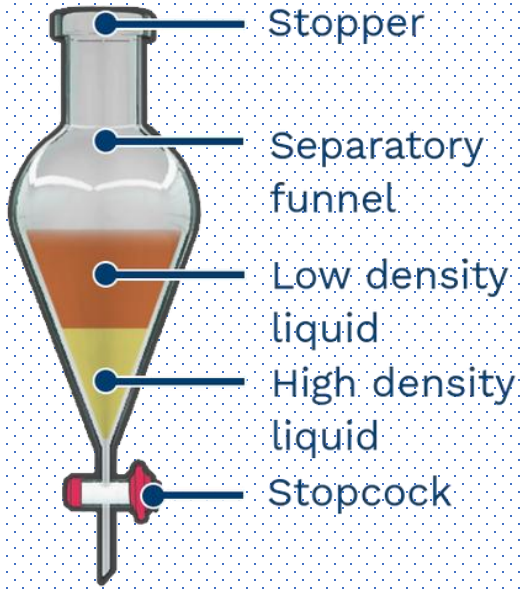
Funnel

- tube or pipe that is wide at the top and narrow at the bottom, used for guiding liquid or powder into a small opening.
- Used for filtering and pour liquids materials into narrow mouth containers such as flask and bottles
- Funnels come in various types, including simple and separatory, each designed for specific applications.
- They are commonly made of glass, plastic, or stainless steel.





Separatory funnel

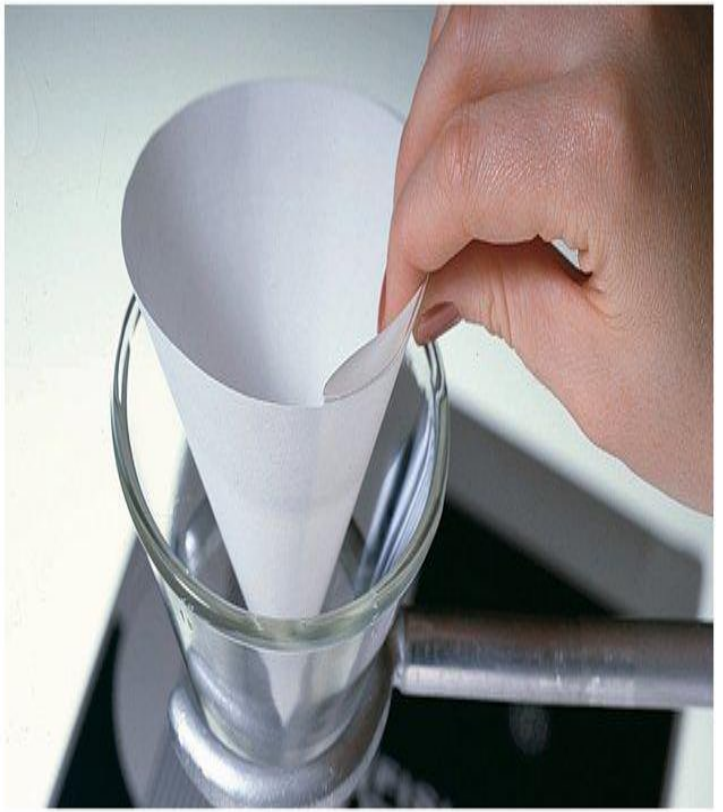


- A **separatory funnel**, is apiece of laboratory glass ware used in liquid-liquid extractions to separate the components of a mixture in to two immiscible solvent phases of different densities.
- A Separatory funnel is a pear-shaped glass container with a stopcock (valve) at the bottom and a stopper at the top
- Typically, one of the phases will be aqueous , and the other a lipophilic organic solvent such as ether, chloroform or benzene.
- All of these solvents form a clear delineation between the two liquids.



Filter paper

- Used for **separation** of different materials , especially the **soluble** from the **non soluble ones**



Pipette

- A pipet **transfers** relatively small amounts of liquid.
- In the most commonly used pipettes, experimenters **draw liquid** into one end of a glass or plastic cylinder by the prior squeezing of the rubber or plastic ball at the opposite end.
- The amount of liquid able to be drawn into the pipette is usually **fixed, to enable accuracy in measurement.**
- Available in various designs for different types of liquids



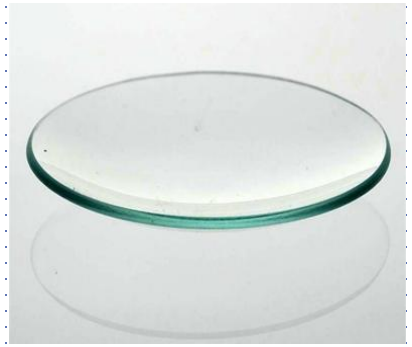




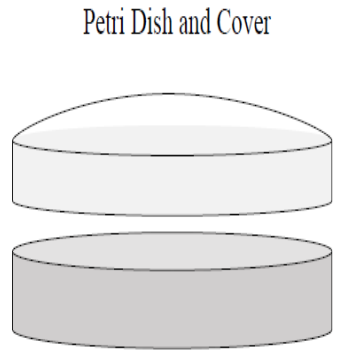
Petri dish and Watch glass •



- A **watch glass** is a **circular, shallow, concave piece of glass** commonly used in chemistry laboratories.
- **Main Uses**
  1. **Evaporating liquids** – A small amount of liquid can be placed on the watch glass and allowed to evaporate.
  2. **Holding solids during weighing** – It is often placed on a balance to hold solid chemicals while measuring their mass.
  3. **Heating small quantities of substances** – Small samples can be gently heated on it.
  4. **Covering a beaker** – It can act as a lid to prevent contamination or splashing while still allowing gases to escape



- **Petri dish is a shallow glass or plastic flat bottomed dish with a lid .**
  - Used primarily in laboratories for the culture of bacteria and other microorganisms on specially prepared media



Water Bath



- A **Water bath** is a **laboratory device used to heat substances gently and uniformly using hot water**.
- A **water bath** is a **container filled with heated water that maintains a constant temperature**, used to warm or incubate samples placed in test tubes, flasks, or bottles.

Main Uses

1. **Gentle heating of chemicals** that should not be heated directly with a flame.
2. **Maintaining a constant temperature** for chemical or biological reactions.
3. **Melting substances** such as agar or wax.



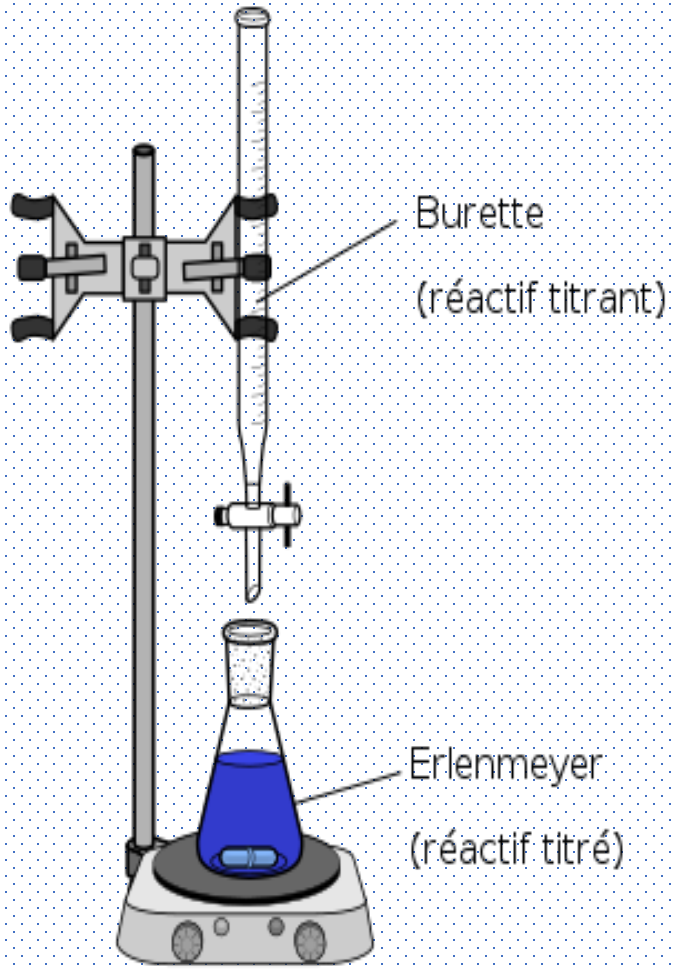
Burettes

- A **Burette** is a **long, graduated glass tube with a valve at the bottom used to deliver precise volumes of liquid**.
- A **burette** is a **volumetric laboratory instrument used to accurately measure and dispense variable amounts of liquid**, especially during titration experiments.
- **Main Uses**

  1.Titration experiments in analytical chemistry.

  2.Accurate measurement of liquid volume delivered during reactions.

  3.Controlled addition of a reagent to another solution.



Slab and spatula

- **A slab** is a smooth flat surface made of glass, porcelain for **mixing and preparing compounds**
- **spatula** is a small flat metal or plastic tool used for mixing and spreading materials.
- **Main Uses**
  1. **Mixing ointments and creams** in pharmaceutical compounding.
  2. **Blending powders with bases** to prepare semi-solid formulations.
  3. **Transferring and spreading substances** during preparation.

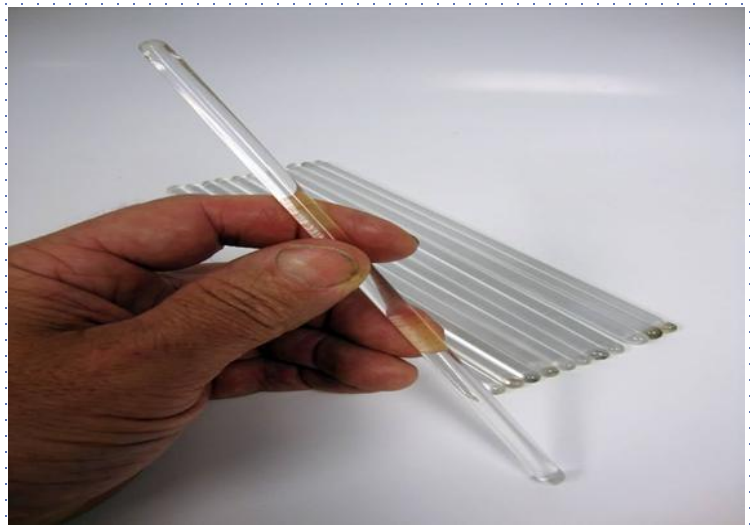




Stirrer

- used to **mix** chemicals and liquids for **laboratory** purposes.
- They are usually made of solid **glass**, about the thickness and slightly longer than a drinking straw, with rounded ends.





Balance

- A balance determines the **mass** of something, such as a dry chemical.
- There are two type of balance :
  - **Manual balance**
  - **Electronic balance**





Thermometer

- Used to measure the **temperature** of the solutions , or work conditions

