SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES
Sathy Main Road, SNS Kalvi Nagar,
Saravanampatti Post, Coimbatore - 641 035,
Tamil Nadu.

Calculation Involved in Dispensing

- The imperial System
- The metric system

IMPERIAL SYSTEM

- It is an old system of weights & measures

- Measurement of weight in imperial system: weight is a measure of the gravitational force acting on a body & is directly proportional to its mass.

- The imperial system divided into 2 parts

a. Avoirdupois System

b. Apothecaries System

Avoirdupois System

- In this pound is standard unit for weight.
- All the measures of mass are derived from the imperial standard pond (Lb),

1 Lb= 16 OZ (Avoir)

1 OZ (Avoir) = 7000/16 grains

= 437.5 grains

1 Lb= 7000 grains

Apothecaries System

-It is also called as Troy system.

-In that grain is the standard weight in this system & all others weights are derived from it.

20 grains(gr) = 1 scruple

60 grains = 1 drachm

480 grains = 1 ounce (apothe)

12 ounces = 1 pound (Lb)

5760 grains = 1 pound (apothe)

Measurement of capacity in Imperial system

- Gallon is the standard unit use for the measurement for capacity in both the avoirdupois & apothecaries system.

160 fluid ounce = 1 gallon

1 quart = 1/4th of a gallon

40 fl ounce = 1 quart

The Metric System

- The metric system is used in the IP for the measurements of weight & capacity.
- The metric system in India was implemented from 1st April 1964 in pharmacy profession.

- Measurements of weight in metric system:

A kilogram is the standard unit for measurements of weight & all other measures derived from it.

- Measurements of capacity : A liter is the standard unit for measurement of capacity & all measures of capacity are derived from it.

Calculations

- **Calculation based on density:**

Density: It is defined as the mass of a substance per unit volume.

Specific gravity: It is defined as the ratio of the mass of a substance in air to that of an equal volume of water.

In the metric system, both density & specific gravity are numerically equal.

Density = Weight/ Volume Weight = Density x Volume Volume = Weight/ Density

Alcohol Dilution

- E.g. calculate the amount of 95 percent alcohol required to prepare 400 ml of 45 per cent alcohol
- Ans: Volume required= 400ml

  Percentage of alcohol required = 45

  Percentage of alcohol used = 95

Alligation Method

- **When the calculation involves mixing of two similar preparations of different strength, the alligation method is used. The method is recommended for the purpose of checking the calculations.**

Calculate the volume of each 90%,60%,30% & water are required to produce 500ml of 50% alcohol.

Ans.

When 50 parts of 90% alcohol, 20 parts of 60% alcohol, 10 parts of 30 % alcohol & 40 parts of water are mixed together, the resulting solution will produce 50% alcohol.

1. **Volume of 90% alcohol required= 120 parts: 500 ml: : 50 parts : v so, v = 500 x 50/ 120 = 2500/12 = 208.33 ml**
2. **Volume of 60% alcohol required = 120 parts: 500 ml: : 20 parts : v so, v = 500 x 20/120 = 1000/120 = 83.33 ml**
3. **Volume of 30% alcohol required = 120 parts: 500 ml: : 10 parts : v**

so, v = 500 x 10/ 120 = 500/12 = 41.67 ml

4. Volume of water required = 500 – 208.33 + 83.33 + 41.67 ml = 166.67 ml

Isotonic Solutions

- If a red blood cell is in contact with a solution that has the same osmotic pressure as that of blood plasma, the cell wall neither swell nor shrink i.e it will retain its tone & therefore the solution is said to be isotonic.
- To determine whether or not a solution is isotonic with erythrocytes, it is necessary to determine the conc. Of the solute at which the cells retain their normal size & shape.
- The parental & ophthalmic preparations need adjustment to iso-osmoticity & iso-tonicity.
- The solutions having the same osmotic pressure are called iso- osmotic solutions.

- A solution containing 0.9% of sodium chloride is therefore practically isotonic & solution containing higher than 0.9 % sodium chloride those called hypertonic solutions & solution containing less than 0.9% sodium chloride those called hypotonic solution.

General principles for adjustment to isotonicity

- Solutions for iv injections : isotonicity desirable
- Solutions for sc injections : isotonicity is needed but it is not essential bec. They are injected into fatty tissues.
- Solutions for im injection: the aq. Solution slightly hypertonic to promote rapid absorption.
- Solution for intra-cutaneous injection: required isotonicity. For diagnostic purpose.
- Solution used for nasal drops: it required isotonic solution.
- Solutions used for eye drops & eye lotion: for eye lotion it is essential to for isotonic solution but for eye drops its not be required bec. A small volume is used.

Temperature Measurements

- The temperature is generally measured in pharmacy by using either Fahrenheit or Centigrade thermometers.
- The relationship of Centigrade (C) & Fahrenheit (F) degree is

  $9(^0C) = 5(^0F) - 160$

  Where, ^0C is the number of degree centigrade.

  ^0F is the number of degree Fahrenheit.
- E.g. Convert 120^0 F into ^{0} C
- Ans.

  $9(^0C) = 5(^0F) - 160$

  $= 5\ (120) - 160$

  $= 600\text{-}160 = 440$

  $^0C = 440 / 9 = 48.9^0$ C