AlKarkh University of Science
College of science
Department of Microbiology
First year level
General chemistry Labs

Supervisor: Dr. Mohammed Abdul Baset

Lab -4-

Preparation of standard solution from liquid solutions

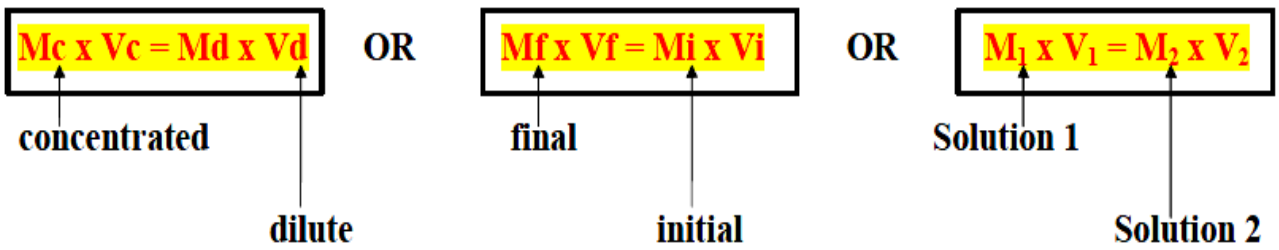
Diluting Solutions

- Many laboratory chemicals such as acids are purchased as concentrated solutions (stock solutions).
- More dilute solutions are prepared by taking a certain quantity of the stock solution and diluting it with water.
- A **standard solution** is one with an accurate, known concentration. This is also known as a stock solution.
  - These are used as reactant solutions.
  - They usually have a higher concentration than is needed for creating solutions and therefore must be **diluted**.
- After diluting a solution, the concentration of the solution changes.
- Relationship between molarity, density and weight percent is:

$$M = \frac{\left(\frac{Wt\ \%}{100}\right) \times d \times 1000}{Mw}$$

Where M: molarity (mol/L), d: density (g/ml), Wt: weight percent (%) and Mw: molecular weight.

- When a solution is diluted, the concentration of the new solution can be found using:



Don't forget the equation for molar concentration! (c = n/V)
C = concentration in moles per litre
n = number of moles
V = volume in litres

How to make 0.1 M Sulfuric Acid (H_2SO_4) Solution from concentrated one

- Use a pipet to deliver a volume (V_x) of the concentrated solution (H_2SO_4) (M_x) to prepare (diluted) 100, 250 and 500 ml of 0.1 M sulfuric acid solution.
- Add solvent (distilled water) to the line on the neck of the volumetric flask.
- Mix well.
- Mathematically the relationship of diluting solution can be shown in the equation:

$$M(C)_1 \times V_1 = M(C)_2 \times V_2$$

1 = initial (concentrated) 2 = final (diluted)

Where:
$M(C)_1$ = Initial concentration or molarity M (mol/L).
V_1 = Initial volume (ml)
$M(C)_1$ = Final concentration or molarity M (mol/L).
V_1 = Final volume (ml)

(a) A volume (V_s) containing the desired moles of solute (M_s) is measured from a stock solution of known concentration.

(b) The measured volume of stock solution is transferred to a second volumetric flask.

(c) The measured volume in the second flask is then diluted with solvent up to the volumetric mark [$(V_s)(M_s) = (V_d)(M_d)$].

Why is acid always added to water, and not the reverse?

- A large amount of heat is released when strong acids are mixed with water. Adding more acid releases more heat.
- ***If you add water to acid***, you form an extremely concentrated solution of acid initially. So much heat is released that the solution may boil very violently, splashing concentrated acid out of the container!
- ***If you add acid to water***, the solution that forms is very dilute and the small amount of heat released is not enough to vaporize and spatter it. So **Always Add Acid to water**, and never the reverse.