Aim: To learn Solution making and dilution

Making stock solutions and proper dilutions of the stock solutions are involved in carrying out almost all the type of experimental work in a research laboratory. The accuracy in the preparation of stock or standard solution and proper dilution reflects accuracy of the results.

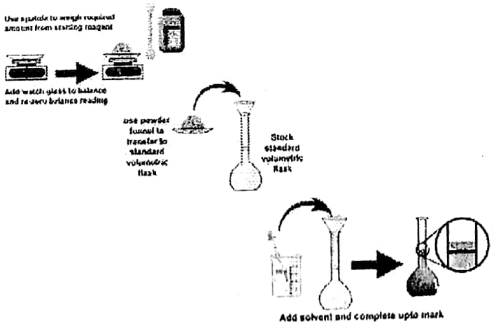
Solution making

A solution of known concentration is prepared by measuring an appropriate amount of solute and placing it in a volumetric flask. Enough solvent is added to dissolve the solute, and further solvent is added until an accurately calibrated final volume is reached. The solution is then shaken until it is uniformly mixed.

How to prepare a solution:

Concentration is a general measurement unit stating the amount of solute present in a known amount of solution:

$$\text{Concentration} = \frac{\text{Amount of Solute}}{\text{Amount of Solution}}$$



Common Practical Units for Reporting Concentration

Name	Units	Symbol
Molarity	$\frac{\text{moles of solute}}{\text{liters of solution}}$	**M**
Formality	$\frac{\text{moles of FWs solute}}{\text{liters of solution}}$	**F**
Normality	$\frac{\text{Number of EWs solute}}{\text{Liters of solution}}$	**N**
molality	$\frac{\text{moles of solute}}{\text{Kg of solvent}}$	**M**
Weight %	$\frac{\text{g of solute}}{\text{00 g of solution}}$	**% w/w**
Volume %	$\frac{\text{mL of solute}}{\text{100 mL of solution}}$	**% v/v**
Weight-to-Volume %	$\frac{\text{g of solute}}{\text{100 mL of solution}}$	**% w/v**

Both molarity and formality express concentration as moles of solute per liter of solution (1 mole = 6.023×10^{23}, Avogadro's no.)

Dilution of the concentrated solution

Dilution is one of the main preparation processes which used daily in all laboratories.

Concentrated Solution + Solvent ⟶ Diluted Solution

The key fact to remember when diluting a concentrated solution is that the number of moles of solute is constant; only the volume is changed by adding more solvent.

Moles of solute (constant) = Volume x conc. (e.g., Molarity)

$= V1 \times S1 = V2 \times S2$

where S1 is the initial molarity, V1 is the initial volume, S2 is the final molarity, and V2 is the final volume after dilution. Rearranging this equation into a more useful form shows that the molar concentration after dilution (S2) can be found by multiplying the initial concentration (S1) by the ratio of initial and final volumes (V1/V2):

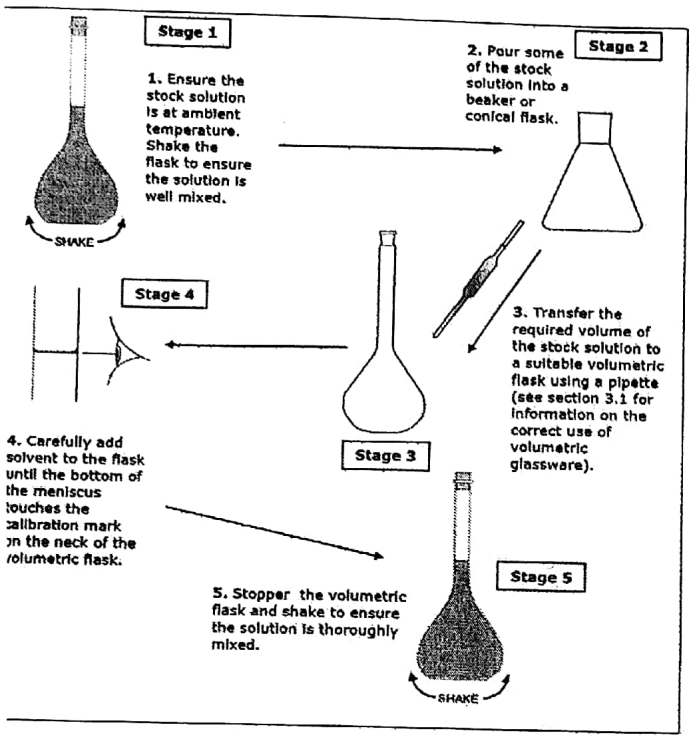
S2=S1xV1/V2

Part (V1/V2) called dilution factor: Dilution Factor (DF) = S2/S1

S2=S1xDF

S1=S2/DF

low to dilute a solution?



› 111: Exercise for

ıke 10 ml of NaCl stock solutions of following concentrations as specified for each group. (By molarity of NaCl ution here we mean the molarity of $[Na^+]$ ions).

›. 1: Make 3 M NaCl
›. 2: Make 2 M NaCl
›. 3: Make 4 M NaCl
›. 4 : Make 1 M NaCl
›. 5: Make 5 M NaCl
›. 6: Make 3 M NaCl
›. 7: Make 1 M NaCl
. 8: Make 2 M NaCl
. 9: Make 4 M NaCl
. 10: Make 3 M NaCl
. 11: Make 2 M NaCl
. 12: Make 4 M NaCl

ıte the stock solution 25 times to make the final volume 50 ml and calculate the molarity of the solution r dilution.