Concentration of Solutions

Molarity (M)

$$\frac{\#\text{moles of substance } (n)}{\text{liter of solution } (V)}$$

units: $\frac{mol}{L}$ or M

$$M = \frac{n}{V}$$

Ex) Calculate the concentration (M) of a solution made by dissolving 2.50 mol $C_{12}H_{22}O_{11}$ (n) in .750 L (V) of solution?

$$M = \frac{2.50\ mol}{.750\ L} = 3.33\ \frac{mol}{L}$$

Ex) Calculate concentration (M) of a solution made of .333 mol (n) HCl in .900 L (V) of solution.

$$M = \frac{.333\ mol}{.900\ L} = .370\ \frac{mol}{L}$$

Ex) Calculate the molarity (M) when 1.78 mol (n) of NaCl are dissolved in 500. mL (.500 L) (V) of solution.

$M = \frac{n}{V}$

$$M = \frac{1.78\ mol}{.500\ L} = 3.56\ \frac{mol}{L}$$

Ex) Calculate the concentration (M) when 25.0 g NaCl are dissolved in 620. mL (.620 L) of solution.

$$n = 25.0\ g\ NaCl\left(\frac{1\ mol}{58.436\ g}\right) = .428\ mol$$

$$M = \frac{n}{V} = \frac{.428\ mol}{.620\ L} = .690\ M$$

(5) How many moles are in 63.5mL of a 2.46 Molar $CaCO_3$ solution?

$M = 2.46\ mol/L$
$n = ?$
$V = 63.5mL = .0635L$

$n = M \cdot V$
$= 2.46\ mol/L \cdot .0635\ L$
$= .156 mol$

(6) What mass of NaOH was used to create 50.0mL of a .850 Molar solution?

$M = .850\ mol/L$
$n = ?$
$V = 50.0mL = .0500L$

$n = .850\ mol/L \cdot .0500L$
$n = .00425 mol\ NaOH$

$.00425 mol \left(\frac{39.9968 g}{1 mol}\right) = 1.70g$