10/3/2018

Exam 1 average: 78%

Using molarity in calculations

Use molarity as a conversion factor

mol solute $\leftrightarrow$ L soln.

ex: 0.125M NaCl(aq) means $\rightarrow$ 0.125 mol NaCl = 1 L soln

$$\frac{0.125\ \text{mol NaCl}}{1\ \text{L soln}} \qquad \frac{1\ \text{L soln}}{0.125\ \text{mol NaCl}}$$

(*) KEY (*)

ex: What vol of this 0.125M NaCl(aq) soln contains 0.255 mol NaCl?

$$0.255\ \text{mol NaCl} \times \frac{1\ \text{L}}{0.125\ \text{mol NaCl}} = 2.04\ \text{L NaCl soln}$$

ex: How many mol NaCl are in 375 mL of this same soln?

$$375\ \text{mL} \times \frac{1\ \text{L}}{1000\ \text{mL}} \times \frac{0.125\ \text{mol NaCl}}{1\ \text{L}} = 0.0469\ \text{mol NaCl}$$

or $\times \frac{1 \times 10^{-3}\ \text{L}}{1\ \text{mL}}$

ex: 0.250 M KCl(aq). $0.250\ mol\ KCl = 1\ L$

Q1. How many moles of KCl are in 0.182 L of soln?

Q2. How many milliliters of this soln contain 0.100 mol KCl?

A1. $0.182\ \cancel{L} \times \frac{0.250\ mol\ KCl}{1\ \cancel{L}} = 0.0455\ mol\ KCl$

A2. $0.100\ \cancel{mol\ KCl} \times \frac{1\ L}{0.250\ \cancel{mol\ KCl}} \times \frac{1000\ mL}{1\ L} = 400.\ mL$

$= 4.00 \times 10^2\ mL$

Solution dilution

Often purchase concentrated (stock) solns + add H_2O to dilute.

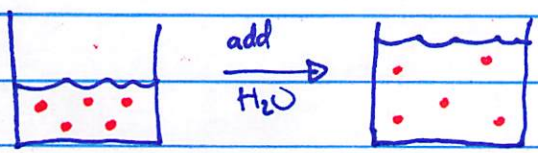
In order to calculate diluted conc/volume, we use the "DILUTION EQUATION"

initial conc → $M_1 V_1 = M_2 V_2$ ← final vol

initial vol → $M_1 V_1$; final conc. → $M_2 V_2$

$M_1 V_1$: #mol solute before

$M_2 V_2$: #mol solute after



V_2 M_2

Ex: Suppose we need 3.00 L of a 0.500 M $CaCl_2$(aq).
- how do we make this from a stock soln that is 10.0 M ?

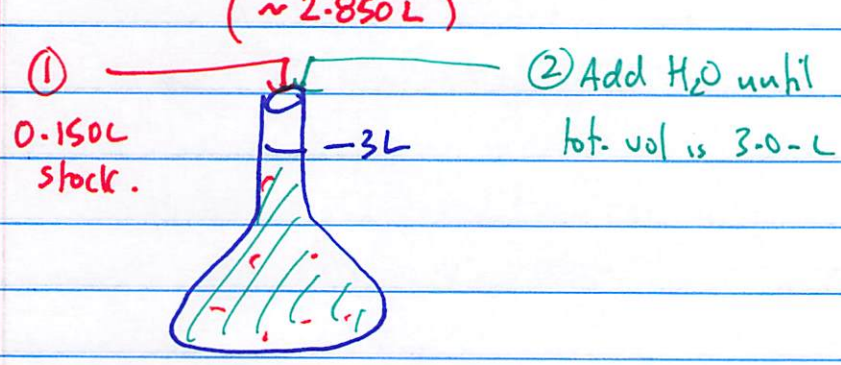
M_1

$$M_1V_1 = M_2V_2 \Rightarrow V_1 = \frac{M_2V_2}{M_1} = \frac{0.500\,M \times 3.00\,L}{10.0\,M}$$

$$= 0.150\ L$$

(V_1)

Take 0.150 L of stock soln
+ then add H_2O until tot vol is 3.00 L



Solution stoichiometry