Check Homework - Worksheet

Mg^{2+} SO_4^{2-} K^+ PO_4^{3-}

(3) magnesium sulfate and potassium phosphate

$$MgSO_{4(aq)} + K_3PO_{4(aq)} \longrightarrow Mg_3(PO_4)_{2(s)} + K_2SO_{4(aq)}$$

$$Mg^{2+}_{(aq)} + SO_{4(aq)}^{2-} + K^+_{(aq)} + PO_{4(aq)}^{3-} \longrightarrow Mg_3(PO_4)_{2(s)} + K^+_{(aq)} + SO_{4(aq)}^{2-}$$

Spectator Ion(s)

$K^+_{(aq)}$, $SO_{4(aq)}^{2-}$

Net Ionic

$$3Mg^{2+}_{(aq)} + 2PO_{4(aq)}^{3-} \longrightarrow Mg_3(PO_4)_{2(s)}$$

Solutions

Solution - homogeneous (uniform) mixture of a solute and a solvent.

⇒solute - substance dissolved

⇒solvent - substance doing dissolving (liquid)

Ex. Salt water

If the amount of solute that can dissolve in a solvent is large, then the solute is said to have a*high solubility*.

If the amount of solute that can dissolve in a solvent is small, then the solute is said to have a*low solubility*.

Solid substances formed from reactions in solutions are known as **precipitates**.

Solubility Rules

- Polar solvents will dissolve ionic compounds and polar compounds
- Nonpolar solvent will dissolve nonpolar compounds

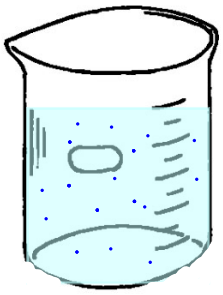
Ex. oil in gasoline

"Like dissolves like"

Concentration of a Solution

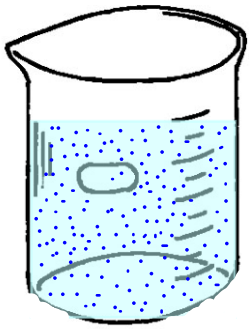
concentration - a numerical ratio comparing the quantity of solute to the quantity of solution.
⇒units: **g/L or g/mL** (solutes that are solids in pure form)

dilute - a solution that has a small amount of solute as compared to the amount of solvent



dilution - process of adding more solvent to cause a solution to become more dilute

concentrated - a solution that has a large amount of solute as compared to the amount of solvent



molar concentration (molarity)- the amount of moles of solute dissolved in one litre of solvent
⇒units: mol/L

Ex. An intravenous solution contains 90. g NaCl in 100.mL of solution. What is the molarity of this solution?

$m = 90.\ g$ NaCl

$V = 100.\ mL$

$C = ?$

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

$90.\ g\ NaCl \times \frac{1\ mol\ NaCl}{58.44\ g\ NaCl} = 1.540\ mol\ NaCl$

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

$C = \frac{1.540\ mol}{0.100\ L}$

$C = 15\ mol/L$

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

# of moles (mol)

volume (L)

molar concentration (mol/L)

molarity

Ex. What volume of solution is required to dissolve 1.75 mol to make a 0.95 mol/L solution of $CaCO_3$?

$V = ?$

$n = 1.75\ mol$

$C = 0.95\ mol/L$

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

$0.95\ mol/L = \frac{1.75\ mol}{V}$

$\frac{(0.95\ mol/L)V}{(0.95\ mol/L)} = \frac{1.75\ mol}{0.95\ mol/L}$

$V = 1.8\ L$

Ex. A sample of laboratory ammonia solution has a concentration of 14.8 mol/L. What mass of ammonia is present in a 25.0 mL sample of this solution?

NH_3

$C = 14.8\ mol/L$

$m = ?$

$V = 25.0\ mL$

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

$14.8\ mol/L = \frac{n}{0.0250\ L}$

$n = 0.370\ mol$

$0.370\ mol\ NH_3 \times \frac{17.04\ g\ NH_3}{1\ mol\ NH_3} = 6.30\ g\ NH_3$

Practice Problems

p. 481 #8,9

p. 483 #10,11