**Concentration –**

**STATING THE CONCENTRATION OF SOLUTIONS**

**1. MASS/VOLUME PERCENT - *percent (m/v)***

- often used when describing unsaturated solutions

mass/volume percent

= Mass of solute (in g) X 100%

 Volume of solution (in mL)

e.g. intravenous fluid is 0.9% (m/v) NaCl

0.9 g of NaCl dissolved in 100 mL of solution

**Do page 305 ( 1a,2,3,4 )**

**2. MASS/MASS PERCENT**

- ***mass percent* or *percent (m/m*)**

- often used for solutions of a solid dissolved in a liquid

- often incorrectly stated on products as (w/w) percent

mass/mass percent

= Mass of solute (in g) X 100%

 Mass of solution (in g)

e.g. the concentration of Mg2+ in seawater is 0.129 % (m/m)

0.129 g of Mg2+ dissolved in 100 g of seawater

**Do page 308 ( 5a,6,8 )**

**3. VOLUME/VOLUME PERCENT**

- ***volume percent, percent by volume, percent (v/v)***

- used when both solute and solvent are liquids

volume/volume percent

= volume of solute (in mL) X 100%

 volume of solution (in mL)

e.g. rubbing alcohol is 70% (v/v) solution

 70 mL of alcohol (30 mL water) in 100 mL of solution

**page 310 ( 10, 12, 14 )**

Solve problems : parts per million and parts per billion . Do page 312 ( 15, 17, 18 ); molar concentration problems . Do page 316 ( 19a, 20a, 21,22,23,24 ). assignment page 318 (1-3).

 **PARTS PER MILLION and PARTS PER BILLION**

- a mass/mass relationship describing very small quantities of a solid in a

 solution

 ppm = Mass of solute X 106

 Mass of solution

 Mass of solute = x grams

 Mass of solution 106 g of solution

ppb = Mass of solute X 109

 Mass of solution

e.g. If a person has 10 ppm of a substance in their body and their body mass is 50 kg, what mass of the substance are they carrying?

ppm = Mass of solute X 106

 Mass of solution

 mass of solute =

#### Ex. 2 The maximum acceptable concentration of fluoride ions in municipal water supplies is 1.5 ppm.  What is the maximum mass of fluoride ions you would get from a 0.250 L glass of water?

Ex. 3 An Olympic bound athlete tested positive for the anabolic steriod 'nandrolone'.  The athlete's urine test results showed one thousand times the maximum acceptable level of 2 mg/L.  What was the test result concentation in parts per million?

#### Do page 312 ( 15, 17, 18 )