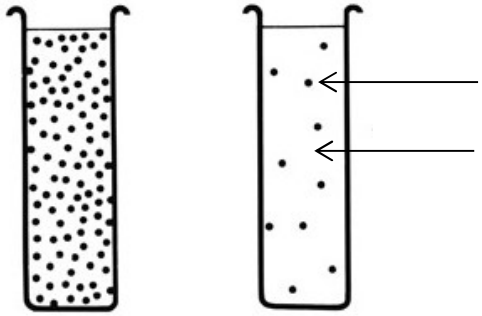
Name: _____ **Unit 10: Solutions**

LESSON 10.1: Types of Solutions (homogeneous mixtures)



A. Saturated- Contains _____ amount of dissolved solute. Additional solute will precipitate.

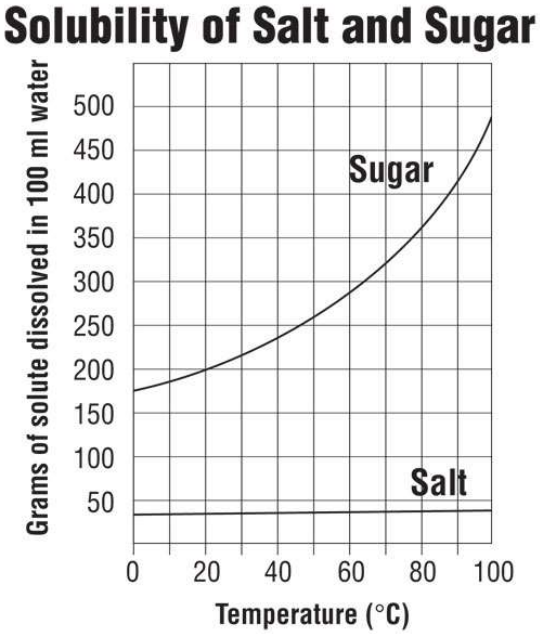
B. Unsaturated- More _____ can be dissolved in solution.

C. Supersaturated- Contains _____ than the maximum amount of solute allowed. Very _____.

D. Solubility Curve (Table G)- line represents the maximum amount of solute that can be dissolved in 100 mL of water at a given temperature.

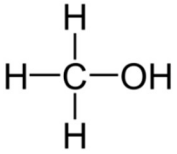
-any point **s**itting on the line is _____
-any point **u**nder the line is _____
-any point **flies above** the line is _____

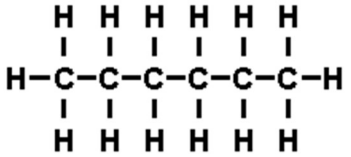
-200g sugar dissolved in 100ml water at 20°C _____
-100g salt dissolved in 100ml water at 50°C _____
-250g sugar dissolved in 100ml water at 100°C _____



LESSON 10.2: Factors Affecting Solubility

A. Nature of solvent and solute "Like dissolves like"





To make sure ionic things will definitely dissolve, see Table F

1. $MgSO_4$ 2. $PbCl_2$ 3. $BaCO_3$ 4. NaOH

More challenging: $NaCl(aq) + AgNO_3(aq) \rightarrow$ _____ + _____

B. Temperature (for solid and gas in a liquid)

**What does Table G tell you?

C. Pressure (only affects gases in liquid)

LESSON 10.3: Calculating Concentration

A. **% Concentration**

-Formula:

-Ex) 6 grams of NaCl were dissolved in water to make a 50 gram solution. What is the concentration of this solution?

B. **Parts per Million (ppm)** – used for very _____ solutions.

-Formula (See Table T):

Ex 1) A certain gas has a concentration in water of 0.006 grams per 100 grams of solution. What is the concentration of the gas in parts per million?

Ex 2) What is the concentration, in ppm, of CO_2 if 0.0972g is dissolved in a 100g solution?

Ex 3) If 0.00030 g of Helium gas is dissolved in 200 g of water, express this concentration in parts per million.

Ex 4) A sample of 300.0 g of drinking water is found to contain 0.038 g of lead (Ah!). What is this concentration in parts per million?

C. **Molarity (M)-** The number of moles of solute per liter solution. Units = mol/L = M

Formula (See Table T):

Ex 1) A student adds 4.0 moles of NaCl to 8.0 liters of solution. What is the molarity of the solution?

Ex 2) A student has 300 ml of a 6.0M sucrose solution. How many moles of sucrose are in the sample?

Ex 3) A student puts 116.0 grams of NaCl into 4.0 liters and mixes until the salt is dissolved. What is the molarity of the solution?

Helpful Hints:

$$\text{\% composition by mass} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100$$

$$\text{\% composition by volume} = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100$$

$$\text{parts per million} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 1{,}000{,}000$$

Mixed Concentration Practice (in-class)

1) a) Show the correct numerical setup for calculating the total number of moles of

$Ca(NO_3)_2$ needed to make 0.250 liter of the 0.200 M $Ca(NO_3)_2$ solution. SOLVE.

b) In order to prepare the described solution in the laboratory, two quantities must be measured accurately. One of these quantities is the volume of the solution. What other quantity must be measured to prepare this solution?

3) How many liters of a 1.2 M solution can be prepared with 0.50 moles of $C_6H_{12}O_6$.

4) What is the molarity of a 450.0 ml solution that contains 88.0 grams of dissolved CO_2?

5) An aqueous solution has 0.0070 gram of oxygen dissolved in 1000. grams of water. Calculate the dissolved oxygen concentration of this solution in parts per million. Your response must include both a correct numerical setup and the calculated result.

6) An aqueous solution contains 300. parts per million of KOH. Determine the number of grams of KOH present in 1000. grams of this solution.

LESSON 10.4: Properties of Solutions

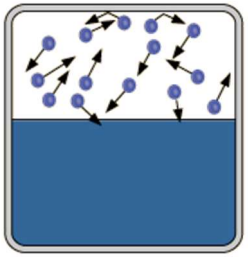
A. Colligative Properties- depend on # of dissolved particles. The more dissociation (breaking up into ions), the more the properties will change.

Examples) $C_6H_{12}O_6(s)$ NaCl(s) $CaCl_2(s)$

1) Boiling Point _____ because…

2) Freezing Point _____ because…

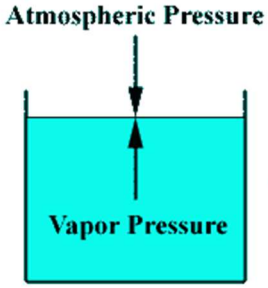
3) Conductivity- if it breaks up into ions, it's an _____ (conducts electricity).
- if it doesn't dissociate, it's a _____ (doesn't conduct).



B. Vapor Pressure- When a liquid turns into a gas and exerts pressure on the container.

1) _____ IMFs → evaporate _____ → _____ vapor pressure

2) _____ temp → evaporates _____ → _____ vapor pressure



3) _____ air pressure → evaporates _____ → _____ boiling point
(vapor pressure = atmospheric pressure)

4) Table H: tells us the vapor pressure and BP's of water and other solutions