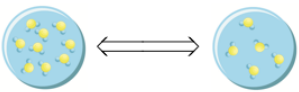
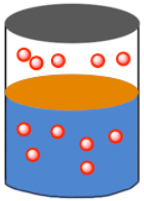
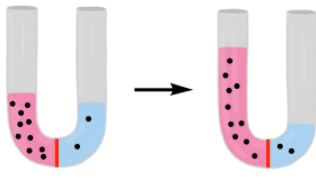


CONCEPT: THE COLLIGATIVE PROPERTIES

- The **4 Colligative Properties** discuss what happens to a _____ solvent as a solute is added to it.
 - As solute is added to a solvent some colligative properties _____ and others _____.
 - _____ Boiling Point and Osmotic Pressure.
 - _____ Freezing Point and Vapor Pressure.

Colligative Properties			
Boiling Point (BP) Temperature where a _____ & _____ are in equilibrium. 	Freezing Point (FP) Temperature where a _____ & _____ are in equilibrium. 	Vapor Pressure The pressure exerted by a _____ at the surface of a liquid. ☐ Measureable at equilibrium. 	Osmotic Pressure The force that drives osmosis from _____ concentration to _____ concentration. 

EXAMPLE: Pure benzene, C_6H_6 , has a boiling point of $80.1^\circ C$. What is a possible new boiling point once an unknown amount of glucose is added to the benzene solvent?

- a) $73.1^\circ C$ b) $51.9^\circ C$ c) $89.6^\circ C$ d) $80.1^\circ C$

- The Van't Hoff Factor (_____) equals the number of _____ produced from dissolving a soluble solute.

Van't Hoff Factor	
Ionic Solutes Ionic Compounds are composed of _____ and _____ ion. $NaOH \rightarrow$ _____ + _____ ions, so $i =$ _____ $(NH_4)_2CO_3 \rightarrow$ _____ + _____ ions, so $i =$ _____ $Al_2(SO_4)_3 \rightarrow$ _____ + _____ ions, so $i =$ _____	Covalent Solutes Covalent Compounds are composed of only nonmetals. ☐ They are _____ & _____. $Glucose, C_6H_{12}O_6$ Cl_2 CH_3OH $CO(NH_2)_2$ } _____ ions formed, so $i =$ _____

EXAMPLE: Which of the following compounds will have the largest value for the Van't Hoff factor?

- a) $AlCl_3$ b) CO_2 c) ZnO d) NH_3 e) P_2S_5

CONCEPT: THE COLLIGATIVE PROPERTIES

Solute Amount

- Solute amount added = number of _____ (i) x _____ of compound.

Osmolarity & Osmolality

Osmolarity (Solute) Formula

$$\text{Osmolarity (solute)} = \text{_____} \times \text{M of Compound}$$

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$$\text{Osmolality (solute)} = \text{_____} \times \text{m of Compound}$$

EXAMPLE: What is the ionic molality of potassium ions in 1.18 m solution of K_3PO_4 ?

- a) 1.18 b) 2.36 c) 9.44 d) 4.72 e) 3.54

PRACTICE: Which of the following compounds will have the **highest** boiling point?

- a) 0.10 M sucrose b) 0.10 M AgCl c) 0.25 M NH_4NO_3 e) 0.45 M pure water

PRACTICE: Which of the following compound will have the **highest** vapor pressure?

- a) 0.45 m dinitrogen pentoxide
b) 0.10 m aluminum chloride
c) 0.50 m iron (III) perchlorate
d) 0.15 m calcium phosphate
e) 0.30 m Potassium sulfide