Colligative Properties – Set 2 Sample Questions

20) The magnitudes of K_f and of K_b depend on the identity of the _____.

A) solvent
B) solute and solvent
C) solution
D) solvent and on temperature
E) solute

Answer: **A) Solvent**

10. Consider the following

0.010 *m* Na_3PO_4 in water

0.020 *m* $CaBr_2$ in water

0.020 *m* KCl in water

0.020 *m* HF in water (HF is a weak acid)

1. Assuming complete dissociation of soluble salts, which solution(s) would have the same boiling point as 0.040 *m* $C_6H_{12}O_6$ in water? (non-polar electrolyte).

   Na_3PO_4 and KCl

$\Delta t_b = i K_b m$

$C_6H_{12}O_6$ is a covalent, non-dissociating solute, therefore the i value = 1

You are choosing a solution that will have the same impact (per concentration and i) on boiling pt. – Na_3PO_4 (i= 4) x 0.010 m
KCl (i = 2) x 0.020 m

2. Which solution would have the largest freezing point depression?

   $CaBr_2$.

$CaBr_2$ Soln.
(i = 3) x 0.020 m = 0.060 m solute Particles
*highest concentration of solutions given

12) What is the change in the boiling point of a solution made by dissolving 14.7 g of $C_6H_{12}O_6$ into 150.0 ml of water? The density of water is 1.00 g/mL and K_b = 0.512°C/m.

A) 0.502°C
B) 5.22°C
C) 0.0418°C
D) 0.279°C
E) none of the above

Answer: D

13. Classify each per the behavior the solute shows in solution:
Dissociates (D) Ionizes (I) Neither (N)

_____ N_2O_5

_____ HF

_____ $Sr(NO_3)_2$

_____ H_2SO_4

_____ O_2

Soluble Ionic – Dissociate

Covalent Molecular – Do not dissociate or ionize

Acids – ionize

Answers:
N
I
D
I
N

14. Strong or Weak Acid?

H_2SO_4
H_2CrO_4
H_2S
H_2CO_3
HI
HNO_3

Know your 6 strong acids . . . if a given acid is not one of the six strong acids, then it is a weak acid.

Answers:
Strong Acid
Weak Acid
Weak Acid
Weak Acid
Strong Acid
Strong Acid

15. Create the ionization reaction equation for HBr and $HClO_2$.

$HBr_{(aq)} + H_2O_{(l)} \rightarrow H_3O^+_{(aq)} + Br^-_{(aq)}$

$HClO_{2(aq)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + ClO_2^-{}_{(aq)}$