

# HW02 - Colligative Properties

🔒 This is a preview of the published version of the quiz

Started: Sep 14 at 5:46pm

## Quiz Instructions

### Homework 02

### Colligative Properties

#### Question 1

2 pts

Some distilled water is added to an empty beaker. A gram of copper (II) nitrate is added to the beaker and while the water is being stirred. After a few minutes, what is in the beaker?

- solid copper (II), nitrate, and water
- solid copper, nitrate ions, and water
- nitrogen gas, copper atoms, electrons, and water
- copper ions, nitrate ions, and water

#### Question 2

2 pts

In which of the following pairs do both compounds have a van't Hoff factor ( $i$ ) of 2?

- sodium sulfate and potassium chloride
- perchloric acid and barium hydroxide
- sodium chloride and magnesium sulfate
- glucose and sodium chloride

#### Question 3

2 pts

For solutions of a non-electrolyte, the van't Hoff factor is:

- $i = 0$
- $i = 2$
- $i = 3$
- $i = 1$

#### Question 4

2 pts

How many moles of ions are contained in 1.27 L of a 1.75 M solution of  $\text{Mg}(\text{NO}_3)_2$ ?

- 4.45 mol
- 6.67 mol
- 0.741 mol
- 2.22 mol

**Question 5**

2 pts

Theoretically, it should be harder to dissolve (  $\text{NaCl}$  /  $\text{Al}_2\text{S}_3$  ) in water because the (higher / lower) the charge density of a substance, the lower its solubility.

- $\text{Al}_2\text{S}_3$ , higher
- $\text{Al}_2\text{S}_3$ , lower
- $\text{NaCl}$ , higher
- $\text{NaCl}$ , lower

**Question 6**

3 pts

The freezing point of seawater is about  $-1.85^\circ\text{C}$ . Assume that seawater is an aqueous solution of sodium chloride and then calculate the molality of  $\text{NaCl}$  in seawater. The  $K_f$  for water is 1.86 K/m.

- 0.497 m
- 0.995 m
- 1.99 m
- 0.497 m

**Question 7**

3 pts

What will be the freezing point of a solution of 8 moles of sodium dichromate ( $\text{Na}_2\text{Cr}_2\text{O}_7$ ) dissolved in 16 kg of water? Use the following values:

$$K_b = 0.512 \text{ K/m}$$

$$K_f = 1.86 \text{ K/m}$$

- 270.2 K
- $2.8^\circ\text{C}$
- 275.8 K
- 272.2 K

## Question 8

3 pts

Calculate the vapor pressure at 20°C of a solution containing 0.61g of naphthalene in 16g of chloroform (CHCl<sub>3</sub>). Naphthalene (C<sub>10</sub>H<sub>8</sub>) has a low vapor pressure and may be assumed to be nonvolatile. The vapor pressure of chloroform at 20°C is 156 torr.

- 20.90 torr
- The vapor pressure would not change as naphthalene is considered non-volatile.
- 28.10 torr
- 150.65 torr

## Question 9

2 pts

Rank the following aqueous solutions from lowest to highest boiling point: 0.5 m NaCl, 1 m KCl, 0.5 m BaCl<sub>2</sub>, and 1 m Ba(NO<sub>3</sub>)<sub>2</sub>. All salt are dissolved in water.

- 1 m KCl < 1 m Ba(NO<sub>3</sub>)<sub>2</sub> < 0.5 m NaCl < 0.5 m BaCl<sub>2</sub>
- 0.5 m NaCl < 0.5 m BaCl<sub>2</sub> < 1 m KCl < 1 m Ba(NO<sub>3</sub>)<sub>2</sub>
- 1 m Ba(NO<sub>3</sub>)<sub>2</sub> < 0.5 m NaCl < 0.5 m BaCl<sub>2</sub> < 1 m KCl
- 0.5 m BaCl<sub>2</sub> < 1 m KCl < 1 m Ba(NO<sub>3</sub>)<sub>2</sub> < 0.5 m NaCl

## Question 10

2 pts

A semi-permeable membrane can withstand an osmotic pressure of 0.75 atm. What molarity of aqueous magnesium bromide solution would reach the limit for this membrane? (Assume  $RT = 25 \text{ L} \cdot \text{atm} \cdot \text{mol}^{-1}$ )

- 0.03 M
- 0.01 M
- 0.01 mM
- 0.03 mM

## Question 11

3 pts

Catalase (a liver enzyme) dissolves in water. A 14mL solution containing 0.166g of catalase exhibits an osmotic pressure of 1.2 Torr at 20°C. What is the molar mass of catalase?

- $1.49 \times 10^5 \text{ g/mol}$
- $2.81 \times 10^5 \text{ g/mol}$
- $1.81 \times 10^5 \text{ g/mol}$
- $1.69 \times 10^5 \text{ g/mol}$

**Question 12****2 pts**

Two aqueous solutions are separated by a semi-permeable membrane:

Solution A = 0.34 M KCl

Solution B = 0.34 M MgCl<sub>2</sub>

Which of the following statements is TRUE?

- There is a net flow of Cl<sup>-</sup> ions from solution B to solution A.
- There is a net flow of H<sub>2</sub>O molecules from solution A to solution B.
- There is no net flow of H<sub>2</sub>O molecules from one solution to another.
- There is a net flow of H<sub>2</sub>O molecules from solution B to solution A.

**Question 13****2 pts**

Red blood cells contain Na<sup>+</sup> ions, K<sup>+</sup> ions, and water. If we place some red blood cells into a beaker full of pure water, what will happen to them?

- they will swell and burst
- nothing
- they will shrivel and collapse
- they will wiggle around rapidly

Not saved

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