

Colligative Properties Worksheet

11 Practice Problems

Organic Chemistry Tutor

1. 20 g of NaOH was dissolved in 200 g of water. Calculate the boiling point of the solution. The K_b for water is 0.51.

3. Which of the following solutions has the highest boiling point?

A) 0.35 m AlBr_3

B) 0.75 m $\text{C}_6\text{H}_{12}\text{O}_6$

C) 0.50 m CaCl_2

D) 0.80 m NaCl

2. Determine the freezing point of a solution if 400.0 g of AlCl_3 was dissolved in 1,600. g of water. The K_f for water is 1.86.

4. Which of the following solutions has the highest freezing point? (Assume ideal conditions)

A) 0.90 m KI

B) 0.50 m $\text{Al}_2(\text{SO}_4)_3$

C) 0.60 m $\text{C}_6\text{H}_{12}\text{O}_6$

D) 0.60 m FeCl_3

5. Which of the following is not a colligative property?

- A. Boiling Point Elevation
- B. Osmotic Pressure
- C. Vapor Pressure
- D. Freezing Point Depression
- E. Solubility

7. 200. g of a non-dissociating solute is dissolved in 500. g of water. The freezing point of the solution is -12°C . What is the molar mass of the solute? (K_f for water is -1.86°C/m)

6. What mass of Ethylene Glycol ($\text{C}_2\text{H}_6\text{O}_2$ – antifreeze) must be added to 1.0 L of water ($d = 1\text{ g/mL}$) to produce a solution with a freezing point of -25°C ?

8. 150.0 g of a non-dissociating solute is dissolved in 750.0 g of water. The boiling point of the solution is 101°C . What is the molar mass of the solute? (K_b for water is 0.51°C/m)

9. 30.0 g of one of the solutes listed below is dissolved in 1.4 L of water. The freezing point of the solution is -1.196°C . Which of the following could be the solute? (K_f for water is -1.86°C/m)

- A. GaF_3
- B. AlBr_3
- C. AlCl_3
- D. GaCl_3
- E. InBr_3

11. 9.0 g of a nonelectrolyte solute was dissolved in enough water to produce a 500 mL solution. The osmotic pressure was measured to be 187.1 torr at 300 K. What is the molar mass of the solute?

10. Calculate the osmotic pressure of a 300 mL solution made by dissolving 8.00 g of NaOH in water at 27°C .

Answers:

1. 102.6° C
2. -14.0° C
3. D
4. C
5. E
6. 834 g
7. 62 g/mol
8. 102 g/mol
9. C
10. 32.8 atm
11. 180 g/mol