

Name

Exploring Colligative Properties

Total questions: 15

Worksheet time: 8mins

Instructor name: Dr. Ramanathan Saitechinfo

Class

Date

- What is vapor pressure lowering and how does it occur?
 - Vapor pressure lowering is the decrease in vapor pressure of a solvent when a non-volatile solute is added.
 - Vapor pressure lowering occurs when a volatile solute is added to a solvent.
 - Vapor pressure lowering increases the vapor pressure of a solvent.
 - Vapor pressure lowering is the increase in temperature of a solvent when a solute is added.
- Explain the relationship between solute concentration and boiling point elevation.
 - The boiling point is unaffected by solute concentration.
 - Boiling point elevation decreases with higher solute concentration.
 - The boiling point elevation is directly proportional to the solute concentration.
 - Boiling point elevation is inversely proportional to solute concentration.
- What is the formula for calculating freezing point depression?
 - $\Delta T_f = K_f + m$
 - $\Delta T_f = i * K_f * m$
 - $\Delta T_f = K_f - i * m$
 - $\Delta T_f = i / K_f * m$
- Define osmotic pressure and its significance in solutions.
 - Osmotic pressure is the pressure needed to stop the flow of solvent into a solution through a semipermeable membrane, and it is crucial for maintaining cellular functions and processes in solutions.
 - Osmotic pressure is the force exerted by solute particles in a vacuum.
 - Osmotic pressure is the temperature at which a solution boils.
 - Osmotic pressure is the amount of energy required to dissolve a solute in a solvent.

5. How do you calculate the mole fraction of a solute in a solution?
- a) Mole fraction = moles of solute / moles of solvent
- b) Mole fraction = moles of solvent / (moles of solute + moles of solvent)
- c) Mole fraction = moles of solute / (moles of solute + moles of solvent)
- d) Mole fraction = moles of solute + moles of solvent
6. Describe a real-world application of boiling point elevation.
- a) Making ice cream with salt
- b) Cooking pasta in saltwater
- c) Distillation of crude oil
- d) Antifreeze solutions in vehicles.
7. What factors affect vapor pressure in a solution?
- a) Pressure of the surrounding atmosphere
- b) Humidity level in the air
- c) Factors affecting vapor pressure in a solution include solute concentration, temperature, and the nature of solute and solvent.
- d) Color of the solute
8. How does the presence of a non-volatile solute influence freezing point?
- a) A non-volatile solute has no effect on the freezing point of a solvent.
- b) A non-volatile solute raises the freezing point of a solvent.
- c) A non-volatile solute increases the boiling point of a solvent.
- d) A non-volatile solute lowers the freezing point of a solvent.
9. What is the van 't Hoff factor and its role in colligative properties?
- a) The van 't Hoff factor is only relevant for ionic compounds.
- b) The van 't Hoff factor indicates the color of a solute in solution.
- c) The van 't Hoff factor measures the temperature of a solution.
- d) The van 't Hoff factor is a measure of the number of particles a solute produces in solution, influencing colligative properties.

10. Explain how osmotic pressure can be used in medical applications.
- a) Osmotic pressure is used in IV fluids, drug delivery systems, and dialysis.
 - b) Osmotic pressure is used to measure blood pressure.
 - c) Osmotic pressure is applied in surgical procedures to close wounds.
 - d) Osmotic pressure is utilized in physical therapy for muscle relaxation.
11. What is the difference between ideal and non-ideal solutions regarding colligative properties?
- a) Ideal solutions have no molecular interactions, while non-ideal solutions do.
 - b) Non-ideal solutions always follow Raoult's law perfectly.
 - c) Colligative properties are only relevant for ideal solutions, not non-ideal ones.
 - d) Ideal solutions exhibit colligative properties as predicted by Raoult's law, while non-ideal solutions show deviations due to molecular interactions.
12. How does temperature affect the vapor pressure of a solvent?
- a) Higher temperature decreases vapor pressure.
 - b) Temperature has no effect on vapor pressure.
 - c) Temperature increases vapor pressure of a solvent.
 - d) Vapor pressure is independent of temperature.
13. Provide an example of a colligative property in everyday life.
- a) The boiling point elevation of water when sugar is added.
 - b) The density of water when heated.
 - c) The color change of litmus paper in acidic solutions.
 - d) The freezing point depression of water when salt is added.
14. What is the significance of colligative properties in chemical reactions?
- a) Colligative properties only apply to gases.
 - b) They are irrelevant to the concentration of solutions.
 - c) Colligative properties are significant as they affect the physical properties of solutions, influencing reaction conditions and outcomes.
 - d) Colligative properties are solely determined by temperature.

15. How can you experimentally determine the boiling point elevation of a solution?

- a) Measure the boiling point of pure solvent and the solution, then calculate the difference.
- b) Measure the freezing point of the solution and the solvent.
- c) Use a thermometer to measure the temperature of the solution at room temperature.
- d) Calculate the mass of solute and divide by the volume of solvent.

Answer Keys

1. a) Vapor pressure lowering is the decrease in vapor pressure of a solvent when a non-volatile solute is added.
2. c) The boiling point elevation is directly proportional to the solute concentration.
3. b) $\Delta T_f = i \cdot K_f \cdot m$
4. a) Osmotic pressure is the pressure needed to stop the flow of solvent into a solution through a semipermeable membrane, and it is crucial for maintaining cellular functions and processes in solutions.
5. c) Mole fraction = moles of solute / (moles of solute + moles of solvent)
6. d) Antifreeze solutions in vehicles.
7. c) Factors affecting vapor pressure in a solution include solute concentration, temperature, and the nature of solute and solvent.
8. d) A non-volatile solute lowers the freezing point of a solvent.
9. d) The van 't Hoff factor is a measure of the number of particles a solute produces in solution, influencing colligative properties.
10. a) Osmotic pressure is used in IV fluids, drug delivery systems, and dialysis.
11. d) Ideal solutions exhibit colligative properties as predicted by Raoult's law, while non-ideal solutions show deviations due to molecular interactions.
12. c) Temperature increases vapor pressure of a solvent.
13. d) The freezing point depression of water when salt is added.
14. c) Colligative properties are significant as they affect the physical properties of solutions, influencing reaction conditions and outcomes.
15. a) Measure the boiling point of pure solvent and the solution, then calculate the difference.

