

- Which intermolecular attraction should be most important in a solution containing KI dissolved in water?
  - ion-dipole
  - dipole-dipole
  - nonpolar
  - hydrogen bonding
  - London dispersion forces
- Which solute below is expected to be more soluble in  $\text{CCl}_4$  than in  $\text{H}_2\text{O}$ ?
  - $\text{NH}_4\text{NO}_3$
  - $\text{CH}_3\text{CH}_2\text{OH}$
  - $\text{HCl}$
  - $\text{NaCl}$
  - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- A certain aqueous solution is 70.0% nitric acid ( $\text{HNO}_3$ ) by mass. The density of this solution is  $1.42 \text{ g/cm}^3$ . What is the concentration of  $\text{HNO}_3$  expressed in molality?
  - 11.1 m
  - 0.559 m
  - 37.0 m
  - 8.62 m
  - 1.11 m
- Which of the solutions listed below, all at the same concentration of 0.010 m in an aqueous solution, would have the highest van't Hoff factor,  $i$ ?
  - $\text{CaCl}_2$
  - $\text{CH}_3\text{CH}_2\text{OH}$  (ethanol, a nonelectrolyte)
  - $\text{Na}_3\text{PO}_4$
  - $\text{NaCl}$
  - $(\text{NH}_4)_2\text{SO}_4$
- Which of the following is the best statement of Henry's law?
  - increasing the temperature always increases the solubility of solids in water.
  - increasing the temperature always increases the solubility of gases in water.
  - the solubility of a gas in a liquid is inversely proportional to the temperature.
  - the solubility of a gas in a liquid at a given temperature is directly proportional to the partial pressure of the gas above the solution.
  - the solubility of a gas in a liquid at a given temperature is inversely proportional to the partial pressure of the gas above the solution.
- The osmotic pressure of human blood is 7.6 atm at  $37^\circ\text{C}$ , which is normal body temperature. What mass of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ , molar mass = 180.2 g/mol) is required to make 1.00 L of aqueous solution for intravenous feeding if the solution must have the same osmotic pressure as blood at body temperature,  $37^\circ\text{C}$ ?
  30. g
  - 54 g
  - 450 g
  - 84 g
  - 22 g
- A solution was prepared by mixing 0.200 mol of acetone,  $\text{C}_3\text{H}_6\text{O}$ , with 0.600 mol of ethyl acetate,  $\text{C}_4\text{H}_8\text{O}_2$ . At  $30^\circ\text{C}$ , the vapor pressure of pure acetone is 285 torr and the vapor pressure of pure ethyl acetate is 118 torr. Hence, at  $30^\circ\text{C}$ , what is the total vapor pressure of the solution? (Assume the solution behaves as an ideal solution.)
  160. torr
  - 202 torr
  - 128 torr
  - 243 torr
  - 195 torr
- A solution was prepared by dissolving 1.000 g of an unknown non-electrolyte in 50.00 g of  $\text{CCl}_4$ . The freezing point of the solution was found to be  $-28.4^\circ\text{C}$ . What is the molar mass of this unknown solute? (The freezing point of pure  $\text{CCl}_4$  is  $-22.3^\circ\text{C}$ , and  $K_f$  for  $\text{CCl}_4$  is  $29.8^\circ\text{C}\cdot\text{kg/mol}$ .)
  - 98 g/mol
  - 21 g/mol
  - 12 g/mol
  - 240 g/mol
  - 3500 g/mol
- Assuming complete dissociation, which of the aqueous solutions below is expected to have the highest boiling point?
  - 0.080 m glucose (a non-electrolyte)
  - 0.060 m  $\text{Na}_3\text{PO}_4$
  - 0.15 m KCN
  - 0.10 m  $\text{LiClO}_4$
  - 0.12 m  $\text{Mg}(\text{NO}_3)_2$
- What is the mole fraction of  $\text{Na}_2\text{SO}_4$  (molar mass = 142.1 g/mol) in an aqueous solution which is 11.5%  $\text{Na}_2\text{SO}_4$  by mass?
  - 0.0809
  - 0.0914
  - 0.0745
  - 0.0162
  - 0.0173
- Which of the following solutions would have the lowest vapor pressure?
  - 1.0 m  $\text{MgCl}_2$
  - 1.0 m glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ , a nonelectrolyte)
  - 1.0 m  $\text{NaNO}_3$
  - 1.0 m NaBr
  - pure  $\text{H}_2\text{O}$

#### Answers

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|------|-------|-------|
| 1. A | 6. B  | 11. A |
| 2. E | 7. A  |       |
| 3. C | 8. A  |       |
| 4. C | 9. E  |       |
| 5. D | 10. D |       |