

# Quiz 14 – Solutions

## AP Chemistry

**This quiz must be completed and brought to my room before the start of first period on Tuesday. Failure to do so will incur a 25% penalty unless there is a legal reason.**

**You must show all work in order to receive credit.**

1. An aqueous antifreeze solution is 40.0% ethylene glycol ( $\text{C}_2\text{H}_6\text{O}_2$ ) by mass. The density of the solution is  $1.05 \text{ g/cm}^3$ . Calculate the molality, molarity, and mole fraction of the ethylene glycol.
2. Which solvent, water or hexane would you choose to dissolve KCl, HF,  $\text{C}_8\text{H}_{18}$  and  $(\text{NH}_4)_2\text{SO}_4$
3. The vapor pressure of a solution containing 53.6 g of glycerin ( $\text{C}_3\text{H}_8\text{O}_3$ ) in 133.7 g ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ) is 113 torr at  $40^\circ\text{C}$ . Calculate the vapor pressure of pure ethanol at  $40^\circ\text{C}$  assuming that glycerin is a nonvolatile, nonelectrolyte solute in ethanol.
4. What volume of ethylene glycol ( $\text{C}_2\text{H}_6\text{O}_2$ ), a nonelectrolyte, must be added to 15.0 L of water to produce an antifreeze solution with a freezing point of  $-30.0^\circ\text{C}$ ? (The density of ethylene glycol is  $1.11 \text{ g/cm}^3$ , and the density of water is  $1.00 \text{ g/cm}^3$ )
5. Calculate the boiling point of .050 m  $\text{FeCl}_3$  using the correct Van't Hoff factor on pg 542 of the text. Explain why the Van't Hoff factor is not as expected.
6. A solid mixture contains  $\text{MgCl}_2$  and NaCl. When .5000g of this solid is dissolved in enough water to form 1.000L of solution, the osmotic pressure at  $25.0^\circ\text{C}$  is observed to be .3950 atm. What is the mass percent of  $\text{MgCl}_2$  in the solid mixture?