CH 302 Practice Quiz 4.

1. Consider 0.01m aqueous solutions of each of the following:
   a) KCl
   b) CaCl$_2$
   c) CaCO$_3$
   d) urea (a water soluble non-ionizable molecule)

   Arrange the solutions in order of decreasing change in the freezing point of the solution.

   1. d, a, b, c  
   2. a, b, c, d  
   3. d, c, b, a  
   4. c, b, a, d  
   5. a, d, b, c  
   6. c, b, d, a  
   7. b, a, d, c **correct**  
   8. c, d, a, b  
   9. None of these 

2. What mass of ethylene glycol ((CH$_2$OH)$_2$ with molecular weight 62 g/mol) must be added to 1.00 L of H$_2$O (of mass 1 kg) to raise the boiling point to 100.8°C? $K_b$ H$_2$O = 0.512.

   1. 97 g **correct**  
   2. 330 g  
   3. 123 g  
   4. 66 g  
   5. 25 g 

3. Estimate the osmotic pressure associated with 100.0 grams of polymer of molecular weight $1.0 \times 10^6$ dissolved in enough water to make 80 mL of solution at 300 K. Select the closest answer.

   1. $3 \times 10^{-2}$ atm **correct**  
   2. 2.87 atm  
   3. $5 \times 10^{-4}$ atm  
   4. $3 \times 10^{-2}$ atm 

4. Which of the following statements about heats of vaporization is true?
   1. Vapor pressures of liquids decreases with increasing temperature.  
   2. Vapor pressures of liquids increase with increasing strengths of intermolecular forces.  
   3. Vapor pressures of liquids are affected by increases in surface area.  
   4. Vapor pressures of solutions decrease with increasing concentrations of non volatile solutes. **Correct**
5. Several interesting observations from the world around you are listed below. Which of these is explained by a colligative property?

1. At high altitude it takes longer to cook spaghetti.
2. The pH of neutral water is not always 7.
3. Water beads up on car windshields.
4. Ice is less dense than water.
5. A lobster will die when placed in fresh water. correct

6. Take a cold can of carbonated soda from the refrigerator. Open it and set it on the table. The soda goes flat, in other words, the CO₂ leaves the container. The best explanation is that:
   1. the temperature increases
   2. the pressure of CO₂ increases
   3. the water evaporates
   4. the temperature increases and the CO₂ pressure decreases
   5. the effect of temperature and pressure depend on the identity of the gas.

7. Which of the following compounds is likely to be more soluble in hexane?
   1. C₄H₉OH
   2. C₄H₉SH
   3. CHCl₃
   4. C₄H₁₀ correct

8. Consider an aqueous solution of NaCl and the following statements:
   Z1) The Crystal lattice energy increases with the charge density of the ions in the crystal.  
   Z2) The oxygen ends of water molecules are attracted toward Cl⁻ ions.  
   Z3) The hydrogen ends of water molecules are attracted toward Na⁺ ions.

Which response contains all of the statements that are true and no false statements?

1. Z1 correct  
2. Z2  
3. Z3  
4. Z1 and Z2  
5. Z1, Z2, and Z3