**CH 117 Exam II** Mock Exam 2014 **Name**:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write the letter corresponding to the BEST answer in the line provided before each question.

Please keep your answers covered as you proceed through the exam. Each multiple choice question is worth 6 points.

\_\_\_ 1. What is the van ‘t Hoff factor for a solution made from Calcium Chloride?

a) 1

b) 2

c) 3

d) 4

e) 5

\_\_\_ 2. For a .8M HCl (strong acid) solution, the [H3O+] conc. at equilibrium is approximately.

a) .2

b) .4

c) .8

d) .1

e) Cannot be determined

\_\_\_ 3. The conjugate acid of (CH3)COO- is

a) (CH3)COOH

b) (CH3)COOH+

c) (CH3)COH

d) (CH3)COOH2

e) none of the above

\_\_\_ 4. 2. Calculate the enthalpy of forming a solution, given the following magnitudes for the enthalpies (You must deduce the signs of ΔH): solute-solvent 500 kJ/mol, solute-solute 300 kJ/mol, solvent-solvent 250 kJ/mol

a) 50 kj /mol

b) -50 kJ/mol

c) 550 kJ/mol

d) -550 kJ/mol

e) 450 kJ/mol

\_\_\_ 5. Calculate the Molarity of Li+ and PO43- in a solution prepared by dissolving 32.4g of Li3PO4 (115.794361 g/mol) in enough water to give a final volume of 250ml.

a) Li+ = 2.238 M, PO43- = 1.1193 M

b) Li+ = 1.5456M, PO43- = .8753 M

c) Li+ = .8753 M, PO43- = 1.5456 M

d) Li+ = 3.3578 M, PO43- = 1.1193 M

e) Li+ = 1.1193 M, PO43- = 1.1193 M

\_\_\_ 6. Calculate the pH of a .14 M solution (initial) of diethyl ammonium bromide. Kb is 1.85\*10-11

a) 4.56

b) 5.79

c) 11.45

d) 10.09

e) 8.67

\_\_\_ 7. Find the ∆T at freezing for a .3 M 500ml NaCl aqueous solution. Kf water = 1.86 °C/m. density of water: 1g/1ml

a) 1.116

b) .558

c) 2.232

d) .423

e) none of the above

\_\_\_ 8. The air pressure in Birmingham is 3 atm. If N2 makes up 80% of the air, what is the solubility of N2 at 25 C. KH of N2 at 25 C is 8.42\*10-7.

a) 1.4\*10^-3

b) 5.05\*10^-7

c) 2.5\*10^-6

d) 2.02\*10^-6

e) None of the above

\_\_\_ 9. Which of the following would NOT **increase** the boiling point temperature of a pure solvent.

a) Addition of a nonvolatile solute

b) Decrease in vapor pressure

c) Decrease in atmospheric pressure

d) Cannot be determined

e) None of the above

\_\_\_ 10. Which of the following Kb values belongs to the base with the strongest conjugate acid?

a) 7.0 x 108

b) 9.0 x 10−8

c) 2.0 x 10−4

d) 5.0 x 10−11

e) 42

Quadratic formula: x = [-b ± sqrt(b2 - 4ac)]/2a if x2 + bx + c = 0

Raoult's Law: Psolvent = Xsolvent P0solvent ; ΔT = K m i for freezing or boiling;

Kf = 1.86 °C/m for water, Kb = 0.51 °C/m for water

Π= cRTi (c is concentration in molarity)

R = 8.314 J/[mol K] R = 0.0821 [L atm]/[mol K] 1 atm = 760 torr

Henry's Law: Sg = kH Pg Kw = Ka Kb

Short answer: Answer in the space provided. Grading is not just based on the final answer, but how it is worked or reasoned.

11. An aqueous solution of insulin has an osmotic pressure of 2.50 torr at 25 °C. It is prepared by dissolving 0.100 g of insulin in enough water to make 125.0 mL of the solution. What is the molar mass of insulin? (15 pts)

12. 11% of a 1M NH4 (a weak base) solution ionized in water. Calculate the Ka, OH conc., and pH of the solution.