CH 223 Exam Prep I Worksheet Name: _____

Worksheet due dates: **Mon, 4/27, 1:10 PM** *(L1)* **, Wed, 4/29 1:10 PM** *(L2)*. To complete, show ***detailed*** *steps* on how to get the given answer for each problem. *Failure to use this form for work and answers will result in a point penalty.*

Problem 1: Consider the following equilibrium: **2 NOCl(g) $\rightleftharpoons$ 2 NO(g) + Cl_2(g)** *where* **K = 1.6 * 10^{-5}**
1.0 mol of pure NOCl ***and*** 1.0 mol of pure Cl_2 are placed in a 1.00 L container. Calculate the equilibrium concentration of NO(g) and Cl_2(g). *To receive credit, show a complete ICE table.*

Answer to Problem #1: **[NO(g)] = 4.0 * 10^{-3} M, [Cl_2(g)] = 1.0 M**

Problem 2: How many moles of benzoic acid, a monoprotic acid with K_a = 6.4 * 10^{-5}, must be dissolved in 500. mL of H_2O to produce a solution with pH = 2.50?

Answer to Problem #2: **7.9 * 10^{-2} mol** *(answers ±0.1 ok, depends on method used to solve)*

Problem 3: Complete the following problems using correct significant figures:

$[H^+]$ = 0.001501 M, and pH = _____ pK_b = 10.35, and K_b = _____

Problem 4: Given that $\Delta G°_f$ for NH_3 = -16.67 kJ/mol, calculate the equilibrium constant for the following reaction at 298 K:

$$\mathbf{N_2(g) + 3\ H_2(g) \rightleftharpoons 2\ NH_3(g)}$$

Answer to Problem #4: **$6.98 * 10^5$**

Problem 5: What is the pH of a solution that results when 0.010 mol HNO_3 is added to 500. mL of a buffered solution that is 0.10 M in aqueous ammonia and 0.20 M in ammonium nitrate? Assume no volume change, and K_b for NH_3 = $1.8 * 10^{-5}$)

Answer to Problem #5: **pH = 8.82**

Problem 6: *Three pH problems:*

Calculate the pH of a 0.200 M NaOH solution.	Calculate the pH of a 0.200 M acetic acid solution. $K_a = 1.8 \times 10^{-5}$	Calculate the pH of a 0.117 M ammonia solution. $K_b = 1.8 \times 10^{-5}$
pH = _____	pH = _____	pH = _____

Answer to Problem #6: **13.301, 2.72 and 11.16**