

*Acids & Bases*

Name \_\_\_\_\_

Slyter Box \_\_\_\_\_

Hour Examination 4

March 20, 2003

**General Chemistry (CHEM 122-01)**

*Acids & Bases*

*Dr. Bennett*

**Please do not open until instructed**

*Acids & Bases*Notes:

\* This exam consists of **5 questions on 5 pages** (including this cover page). Please check to make sure that you have a complete copy of the exam.

\* *Please do not simply give me answers. Give me well-supported answers. Numerical answers that are not backed by supporting calculations will receive minimal credit.*

\* Please write clearly; if I can't read your answer, I can't give you credit for your answer.

\* Please note that different questions are worth different numbers of points. Plan your time accordingly.

\* Remember to include units and significant figures where appropriate.

\* No books or notes are to be used on this exam.

\* Please do NOT share calculators; if you need a calculator but do not have one, please let me know!

\* *If you feel that you would be better able to answer **any** question if you had additional information, please do not hesitate to ask for it.* I will happily provide any information that I feel will help you answer the question without compromising the efficacy and fairness of the test.

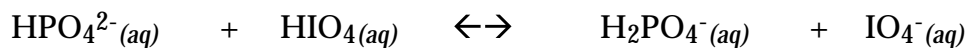
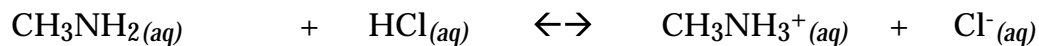
Question	Possible	Score
1	18	
2	14	
3	18	
4	10	
5	10	
<b>TOTAL</b>	70	
	percent:	

**The Quadratic Equation**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

## 1. SHORT ANSWER

- (a). Identify the conjugate acid-base pairs in the following chemical equations.



- (b). Classify the solutions of the following salts as acidic, basic or neutral.

$\text{Na}_2\text{CO}_3$  \_\_\_\_\_

$\text{Cu}(\text{NO}_3)_2$  \_\_\_\_\_

$\text{Na}_2\text{S}$  \_\_\_\_\_

$\text{KClO}_4$  \_\_\_\_\_

- (c) Rank the following substances in order of increasing acidity and explain your reasoning:

$\text{HOF}$        $\text{HOCl}$        $\text{HOBr}$        $\text{HOI}$

- (d) Rank the following substances in order of increasing acidity and explain your reasoning:

$\text{SiH}_4$        $\text{PH}_3$        $\text{H}_2\text{S}$        $\text{HCl}$

2. (Potassium fluoride dissolves in water to give a solution that is basic.

(a) Write the chemical equation that illustrates why the solution is basic.

(b) For an 0.25 M solution of potassium fluoride, calculate the pH at equilibrium. Note  $K_a(\text{HF}) = 6.8 \times 10^{-4}$ .

(c) Calculate the pOH at equilibrium.

3. Ascorbic acid,  $C_5H_7O_4COOH$ , also known as Vitamin C, is an essential nutrient for all mammals. In lab it can also be used to make buffers. The  $K_a$  of ascorbic acid is  $7.9 \times 10^{-5}$ .
- (a) Calculate the pH of a buffer solution which is made by mixing 0.250 moles of ascorbic acid and 0.200 moles of the conjugate base sodium ascorbate in a total volume of 0.750 liters.
- (b) Calculate the hydroxide ion concentration ( $[OH^-]$ ) of this solution.
- (c) Calculate the pH of the ascorbic acid/ascorbate buffer solution after 0.100 moles of nitric acid ( $HNO_3$ ) is added (assume no volume change).

