

Chemistry 114  
Final Exam- non comprehensive part

Name: \_\_\_\_\_

1. A (10 points) I have a .05M solution of an acid, and have determined that the acid is 1.37% dissociated. What is the  $K_a$  of this acid?

B (10 points) What is the pH of the above solution?

2. (10 points) What is the pH of a  $1 \times 10^{-8}$  M solution of HCl?

3. (10 points) Would the following salts make an acidic (A) basic (B) or neutral solution (N)

$\text{NH}_4\text{Cl}$  \_\_\_\_\_

$\text{NaCl}$  \_\_\_\_\_

$\text{FeCl}_3$  \_\_\_\_\_

$\text{CaCl}_2$  \_\_\_\_\_

$\text{LiBr}$  \_\_\_\_\_

$\text{NH}_4\text{NO}_3$  \_\_\_\_\_

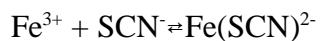
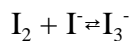
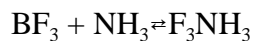
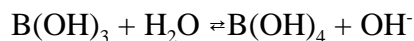
$\text{Na}_2\text{O}$  \_\_\_\_\_

$\text{P}_4\text{O}_{10}$  \_\_\_\_\_

$\text{Cl}_2\text{O}$  \_\_\_\_\_

$\text{NaNO}_2$  \_\_\_\_\_  
(Hint  $\text{HNO}_2$  has a  $K_a$  of  $4 \times 10^{-4}$ )

4. (10 points) Identify the Lewis acids and bases in the following reactions:



5. Define:

(5 points) Entropy

(5 points) Positional Entropy

(5 points) Free energy

5. (15 points) At what temperatures will the following processes

A. be spontaneous?

B. be at equilibrium?

C. be non-spontaneous?

(Note: never and always might be acceptable answers)

$$\Delta H = +25 \text{ kJ}, \quad \Delta S = +5.0 \text{ J/K}$$

$$\Delta H = +20 \text{ kJ}, \quad \Delta S = -10.0 \text{ J/K}$$

$$\Delta H = -25 \text{ kJ}, \quad \Delta S = +20.0 \text{ J/K}$$

$$\Delta H = -5 \text{ kJ}, \quad \Delta S = -5.0 \text{ J/K}$$

6. (20 points) Ammonia ( $\text{NH}_3$ ) has an enthalpy of fusion of 5.65 kJ/mol and an entropy of fusion of 28.9 J/K·mol. What is the freezing point of ammonia?