

CH1010 Exam 3 Name _____

November 29, 2000 SSN _____ Seat No _____

In solving problems, you must show all work. Little or no credit will be given for a correct answer with no work shown.

1. a. Given the following acids and their K_a s, arrange the acids in order of increasing acidity. (5%)

Acid	K_a
HNO_2	4.47×10^{-4}
H_2CO_3	4.45×10^{-7}
HCOOH	1.78×10^{-4}

b. Calculate the $\text{p}K_a$ of HCOOH (5%)

c. Write the equation for the acid-base reaction which occurs when HNO_2 is dissolved in water. Identify the acids (A), bases (B), conjugate acids (CA), and conjugate bases (CB) by putting the appropriate symbol under the reactant or product. (5%)

d. Write the equation for the acid-base reaction of HCOOH with excess KOH . (5%)

e. NO_2^- is a base. Write the equation for its reaction with water. (5%)

f. Write the expression for the K_b of NO_2^- . (5%)

g. Calculate the K_b of NO_2^- . (5%)

2. a. Calculate the pH of a 2.17×10^{-3} M solution of HCl in water. (5%)

b. Calculate how many mL of .01 M KOH will be required to neutralize 100 mL of the above HCl solution. (5%)

3. Draw 3 dimensional representations of all the isomeric dichlorocyclobutanes (don't forget cis and trans forms). (10%)

4. a. Write the equation for the production of ozone in the stratosphere. (4%)

b. Write the equations for the destruction of ozone by CCl_2F_2 in the stratosphere. (6%)

5. Draw the 3 dimensional structure of cyclohexane showing all the carbon-hydrogen bonds. (5%)

6. a. Calculate the molarity of a solution of 2.7 g of sodium acetate ($\text{Na}^+ \text{CH}_3\text{COO}^-$) in 1 L water. (5%)

b. When 3.4 g of acetic acid (CH_3COOH) is added to the above solution, what is the molarity of the acetic acid. (5%)

c. A solution prepared in this way is a buffer solution. Given the fact that acetic acid has $pK_a = 4.76$, calculate the pH of this buffer. (5%)

7. a. Carbon-14 is a β emitter. Write the equation for this nuclear reaction. (5%)

b. Carbon-14 has a half-life of 5730 years, Calculate the percent of carbon-14 remaining in a sample after 25,000 years. (10%)

1. a-d _____ 1. e-g _____

2. _____ 3-5 _____

6. _____ 7. _____

Total minus _____ Grade _____

Name _____