CHEM-1105   TEST 3   NAME:_____

Apr. 04,2003

PLEASE BE NEAT AND ORGANIZED

1.   Complete the table. (K_w = 1.00 x 10^{-14} at 25°C). **[3]**

PH	pOH	$[H_3O^+]$	$[OH^-]$
	3.25		
		0.200	

2.   Complete the table: **[3]**

ACIDS	NH_3	$H_2PO_4^-$	
BASE			CO_3^{2-}

3.   Calculate the pH for the following solutions.

a) 0.10 M Ca(OH)$_2$(aq) **[1]**   _____

b) A mixture of 100.0 mL of 0.10 M HBr(aq) and 50.0 mL of 0.20 M KOH. **[2]**

                                                            _____

4.   a) Calculate the pH, pOH, and % ionization of 0.150 M $HC_3H_5O_2$, propanoic acid. K_a = 1.3 x 10^{-5}. **[4]**

$HC_3H_5O_2(aq) + H_2O(l) \Leftrightarrow H_3O^+(aq) + C_3H_5O_2^-(aq)$
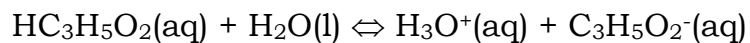
b) To 100.0 mL of 0.150 M of the acid in part **_a_** are added 0.96 g of $KC_3H_5O_2$ (MM = 96.0). Calculate the pH and % ionization of the acid. **[4]**

c) Calculate the pH of a solution made by mixing 250.0 mL of 0.20 M propanoic acid and 350.0 mL of 0.30 M sodium propanoate. **[4]**

d) A 25.00 mL of a 0.20 M propanoic acid solution is titrated with 0.20 M solution of KOH.

    i)   Calculate the pH after you have added only 10.00 mL of the KOH solution to 25.00 mL of the acid. **[4]**

    ii)   Calculate the pH at the equivalence point in the titration of 25.00 mL of the acid with KOH. **[4]**

5. The pH of a 0.100 M NH_3(aq) is found to be 11.13. **[2]**

NH_3(aq) + H_2O(l) $\Leftrightarrow$ NH_4^+(aq) + OH^-(aq)
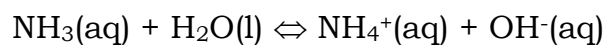
6. Thyroxine is a hormone that controls metabolism. A sample weighing 0.546 g was dissolved in 15.0 g of chloroform, and the freezing point depression was determined to be 0.240 ºC. Calculate the molar mass of thyroxine. K_f of chloroform is 4.70 ºC/m. **[4]**