CHEM-111 **QUIZ-3** **Oct 13, 2004** CH # 14

ID #

1.0 Q.1 Define each of the following ?

i) Arrhenius acid produce H^+ ion in aquous solution

ii) Brønsted-Lowry acid Proton donor

0.5 Q.2 Which of the following value, a stronger conjugate base has

(a) $K_a < 1$ b) $K_a > 1$ c) $K_a = 1$

0.5 Q.3 Weak acids are :

(a) Partially dissociate with low k_a value, b) Fully dissociate with low K_a value ,

c) Partially dissociate with high k_a value d) Fully dissociate with high K_a value

1.0 Q.4 Write down the balance equation of the following acids and base in water.

a) $HClO_{4(aq)} + H_2O_{(aq)} \longrightarrow ClO_{4(aq)}^- + H_3O^+_{(aq)}$

b) $CH_3COOH_{(aq)} + H_2O_{(aq)} \rightleftharpoons CH_3COO^-_{(aq)} + H_3O^+_{(aq)}$

1.0 Q.5. Identified the acid(a), base(b) , the conjugate base(cb) and the conjugate acid(ca) of the following reactions.

a) $H_2SO_{4(aq)}$ (a) + (b) $H_2O_{(aq)} \rightleftharpoons H_3O^+_{(aq)}$ (ca) + $HSO_{4(aq)}^-$ (cb)

b) $HOCl_{(aq)}$ (a) + (b) $C_6H_5NH_{2(aq)} \rightleftharpoons OCl^-_{(aq)}$ (cb) + $C_6H_5NH_3^+$ (ca)

c) $H_2O_{(aq)}$ (b) + (a) $HONH_3^+_{(aq)} \rightleftharpoons HONH_{2\,(aq)}$ cb + $H_3O^+_{(aq)}$ ca

1.0 Q.6 Give the order from strongest to weakest strength, of the following chemicals.

H_2O, $K_a = 1.0 \times 10^{-14}$; HOCl, $K_a = 3.5 \times 10^{-8}$; HNO_3 , $K_a >> 1$

NH_4^+ $K_a = 5.6 \times 10^{-10}$

$HNO_3 > HOCl > NH_4^+ > H_2O$

0.5 Q.7 In this reaction

$HSO_4^-{}_{(aq)} + OH^-{}_{(aq)} \rightleftharpoons SO_4^{2-} + H_2O_{(l)}$

What are conjugate acid - base pairs:

$HSO_4^- - SO_4^{2-}$; $OH^- - H_2O$

0.5 Q.8 What is concentration of H^+ in a 2.5 M HCl solution

a) 0 M b) 1.25 M (c) 2.5 M d) 5.0 M

2.0 Q.9 Calculate the pH and $[OH^-]$ of 5×10^{-3} M of $HClO_4$ solution

$pH = -\log[H^+] = -\log[5 \times 10^{-3} M] = 2.3$

$OH^- = K_w / [H^+] = \frac{1 \times 10^{-14}}{5 \times 10^{-3}} = \boxed{2 \times 10^{-12} M}$

2.0 Q.10 Calculate the $[H^+]$ and $[OH^-]$ for solution, Identify each solution is acidic, neutral or basic. If; a) pH = -1.0 $[H^+] = 10^{-pH} = 10^{-(-1.0)} = 10^{1.0} = 10 M$ ✓

$pOH = 14.00 - (-1.0) = 15.00$, $[OH^-] = 10^{-15.00} = \boxed{1 \times 10^{-15} M}$ Acidic

b) pOH = 5.0

$pH = 14.00 - 5.00 = \boxed{9.00}$ Basic

$[H^+] = 10^{-9.00} = \boxed{1 \times 10^{-9} M}$

$[OH^-] = K_w / [H^+] = \frac{1 \times 10^{-14}}{1 \times 10^{-9}} = \boxed{1 \times 10^{-5} M}$