Gilleth

CHM152 Quiz 4 25 Pts Spring 2017 Name: Key

Turn off all cell phones. Show all work.

1. (8 Pts) Determine the pH and the pOH of 10.0 mL of 0.0020 M HCl?

Strong acid $HCl + H_2O \rightarrow H_3O^+ + Cl^-$

$pH = -\log 0.0020 = \boxed{2.70}$ $\boxed{pOH = 11.30}$

b. Determine the concentration of H_3O^+ and OH^- of the above solution.

$[H_3O^+] = 0.0020$ $[OH^-] = 10^{-11.30} = 5.0 \times 10^{-12}$

2. (4 Pts) What is the pH of a 0.30 M solution of HOCl ($K_a = 3.5 \times 10^{-8}$)

weak acid

$HOCl + H_2O \rightleftharpoons H_3O^+ + OCl^-$

	HOCl	H_2O	H_3O^+	OCl^-
I	0.30	NA	0	0
C	$-x$		$+x$	$+x$
E	$0.30-x$		x	x

$3.5 \times 10^{-8} \approx \frac{x^2}{0.30-x}$ ← try dropping (5% rule)

$x = [H_3O^+] = 1.025 \times 10^{-4}$

$pH = -\log [H_3O^+] = \boxed{3.99}$

3. (4 Pts) a. What is the conjugate base of HCO_3^- CO_3^{2-}

b. What is the conjugate acid of $H_2PO_4^{1-}$ H_3PO_4

4. (5 Pts) What is the pH of a 0.15 M solution of the weak base aniline ($C_6H_5NH_2$; $K_b = 3.8 \times 10^{-10}$)

$C_6H_5NH_2 + H_2O \rightleftharpoons C_6H_5NH_3^+ + OH^-$

	$C_6H_5NH_2$	H_2O	$C_6H_5NH_3^+$	OH^-
I	0.15	NA	0	0
C	$-x$		$+x$	$+x$
E	$0.15-x$		x	x

$3.8 \times 10^{-10} = \frac{x^2}{0.15-x}$ drop 5% rule

$x = [OH^-] = 7.55 \times 10^{-6}$

$pOH = 5.12$

$pH = 14 - 5.12 = \boxed{8.88}$

5. (4 Pts) What is the pH of a 0.001 M $Ca(OH)_2$ solution?

$Ca(OH)_2 \xrightarrow{H_2O} Ca^{2+} + 2OH^-$

$[OH^-] = 2 \times 0.001 = 0.002$

$pOH = 2.70$ $pH = 14 - 2.70 = \boxed{11.30}$