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**/\IS Chemistry 10 Points (Extra Credit)**

**Acid & Base Extra Credit Problems**

Complete the following. (Extra credit. Up to 2 points each). Show all work.

1. Determine the pH of a solution made from dissolving 18.0 g of sodium hydroxide in enough water to make 1.00 L of solution.

[NaOH] = $\frac{\frac{18.0g}{22.989g+15.999g+1.008g}}{1.00L}$ pOH = $-log\_{10}0.450$ = 0.347

[NaOH] = 0.450 $^{mol}/\_{L}$ pH + pOH = 14 → pH = 14 - pOH

[OH-] = 0.450 $×1=0.450$ pH = 14 – 0.347 = **13.653**

2. In a titration, 26.5 mL of 0.650 M KOH were required to neutralize 14.6 mL of HNO3 of unknown concentration. Determine the concentration of the HNO3 solution.

$$\left(M\_{1}\right)\left(V\_{1}\right)\left(n\_{1}\right)=\left(M\_{2}\right)\left(V\_{2}\right)\left(n\_{2}\right)$$

$$\left(0.650^{mol}/\_{L}\right)\left(26.5 mL\right)\left(1\right)=\left(M\_{2}\right)\left(14.6 mL\right)\left(1\right)$$

$$M\_{2}=\frac{\left(0.650^{mol}/\_{L}\right)\left(26.5 mL\right)\left(1\right)}{\left(14.6 mL\right)\left(1\right)}=1.18 ^{mol}/\_{L}$$

3. A solution of Ca(OH)2 has a pH of 11.745. Find the mass of Ca(OH)2 present in 300 mL of this solution.

pH + pOH = 14 → pOH = 14 – pH [Ca(OH)2] = $\frac{5.56 × 10^{-3}}{2}=2.78 × 10^{-3}$

pOH = 14 – 11.745 = 2.255 $2.78 × 10^{-3}$ = $\frac{\frac{g}{40.08g+2(15.999g+1.008g)}}{\frac{300mL}{1}×\frac{1}{10^{3}mL}}$

[OH-] = $10^{-pOH}=10^{-2.255}=5.56 × 10^{-3}$ $g=6.18×10^{-2}g Ca\left(OH\right)\_{2}$

4. A solution of HCl has a concentration of 0.0280 M. Determine the following: [H+], [OH-], pH, and pOH.

**[H+]** = 0.0280 × 1 = **0.0280** **[OH-]** = $\frac{1.00 × 10^{-14}}{0.0280}$ = **3.57 × 10-13**

KW = [H+][OH-] **pH** = $-log\_{10}(0.0280)$ = **1.553**

[OH-] = $\frac{K\_{W}}{[H+]}$ **pOH** = $-log\_{10}(3.57×10^{-13})$ = **12.447**

5. Determine the number of ClO3- ions present in 150. mL of a solution of HClO3 with a pH of 2.165.

[H+] = 10-pH

[H+] = 10-2.165 = 6.84

[HClO3-] = $\frac{6.84}{1}=6.84$

6.84 = $\frac{mol}{\frac{150. mL}{1} × \frac{1}{10^{3} mL}}$

mol = 6.84 $×$ ($\frac{150. mL}{1}×\frac{1}{10^{3} mL} $)

mol = 1.03

$$HClO\_{3}\rightarrow H^{+}+ClO\_{3}^{-} $$

$$\frac{1.03 mol HClO\_{3}}{1}×\frac{1 mol ClO\_{3}^{-} }{1 mol HClO\_{3}}×\left(6.022×10^{23}\right)=6.20×10^{23} ion ClO\_{3}^{-} $$