U.S. HW. 5 FITCH ①

1. .625 g Na_2CO_3 with 30.8 mL HCl TO NEUTRAL. M of HCl?

$$(.625\,g)\left(\frac{1\ mol\ Na_2CO_3}{105.99\,g}\right) = .006\ mol\ Na_2CO_3$$

$$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2CO_3$$

$$(.006\ mol\ Na_2CO_3)\left(\frac{2\ mol\ HCl}{1\ mol\ Na_2CO_3}\right) = .012\ mol\ HCl$$

$$\frac{.012\ mol\ HCl}{.0308\ L} = \boxed{.389\ M\ HCl}$$

2. .0245 L KOH, .0357 L of .11 M H_2SO_4

$$2KOH + H_2SO_4 \rightarrow K_2SO_4 + 2H_2O$$

$$(.0357\ L)\left(\frac{.11\ mol}{L}\right) = .004\ mol$$

$$(.004\ \cancel{mol\ H_2SO_4})\left(\frac{2\ mol\ KOH}{1\ \cancel{mol\ H_2SO_4}}\right) = .008\ mol\ KOH$$

$$\frac{.008\ mol\ KOH}{.0245\ L} = .33\ M\ KOH$$

3. .125 M NaOH 28.5 mL .155 M H_2SO_4
WHAT VOL. NaOH WAS USED?

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

$(.0285\,L)\left(\frac{.155\ mol}{L}\right) = .0044\ mol\ H_2SO_4$

$(.0044\ mol\ H_2SO_4)\left(\frac{2\ mol\ NaOH}{1\ mol\ H_2SO_4}\right) = .0088\ mol\ NaOH$

$\frac{.0088\ mol\ NaOH}{\frac{.125\ mol}{L}} = .0704\ L = 70.4\ mL\ NaOH$

4. a. $-\log 1\times10^{-9} = 9 = pH$, $pOH = 5$
b. $pH = 11.7$ $pOH = 2.3$
c. $pH = 6.7$ $pOH = 7.3$

5. a. $pH = 4.6$ $pOH = 9.4$
b. $pH = 3.1$ $pOH = 10.9$
c. $pH = 3.4$ $pOH = 10.6$

6. a. pH 6 – 5.5
b. AT pH'S OF >6, (WHEN H^+ ION CONCENTRATION IS DECREASING UNDER 1×10^{-6} M, pH RAISES) THE SOLUTION BECOMES BASIC. BASES TASTE BITTER.

7. pH of 3.2×10^{-6} M [H+] = 5.5, pOH = 8.5

1×10^{-10} M [H+] = 10 pOH = 4

8. $[H^+] = 10^{-pH}$

a. 6.3×10^{-5} M = [H+]

b. 2.5×10^{-13} M = [H+]

c. 3.2×10^{-3} M

d. .01 M = [H+]

e. 1.7×10^{-4} M

f. 3.4×10^{-6} M

9. a. 1×10^{-5} M OH^-

b. 2.5×10^{-10} M OH^-

c. 5×10^{-9} M

d. 1.6×10^{-6} M

e. pH = 3.4 pOH = 10.6

$= 2.5 \times 10^{-11}$ M OH^-

10. .2 g NaOH 5.7 ml HCl $\{NaOH + HCl \rightarrow NaCl + H_2O\}$

a. $\left(.2 \text{ g NaOH} \times \frac{1 \text{ mol}}{40 \text{ g}}\right) = .005$ mol NaOH

1:1 ∴ .005 mol HCl

$\frac{.005 \text{ mol HCl}}{.0057 \text{ L}} = 1.88$ M HCl

$$\frac{1}{2}\left(1.013\ \frac{g}{mol}\ HCl\right)\left(5.7\ mol\right) = 5.77\ g\ HCl$$
(soln)

$$\left(.005\ mol\ HCl\right)\left(\frac{36.46\ g}{mol}\right) = .18\ g\ HCl$$

$$\%\ \text{CONCENTRATION (MASS)} = \frac{\text{mass solute}}{\text{mass soln}} \times 100$$

$$= \frac{.18\ g}{5.77\ g} \times 100 = 3.12\%$$