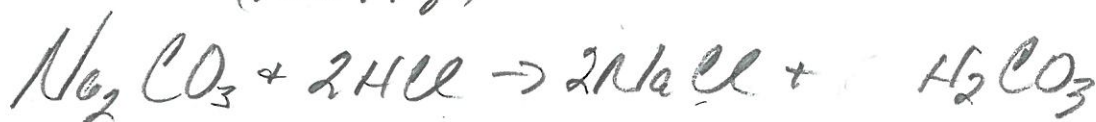


U.S. HW. 3

FITCH ①

1. .625 g  $\text{Na}_2\text{CO}_3$  with 30.8 ml HCl to NEUTRAL. M of HCl

$$(.625 \text{ g}) \left( \frac{1 \text{ mol Na}_2\text{CO}_3}{105.99 \text{ g}} \right) = .006 \text{ mol Na}_2\text{CO}_3$$



$$(.006 \text{ mol Na}_2\text{CO}_3) \left( \frac{2 \text{ mol HCl}}{1 \text{ mol Na}_2\text{CO}_3} \right) = .012 \text{ mol HCl}$$

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

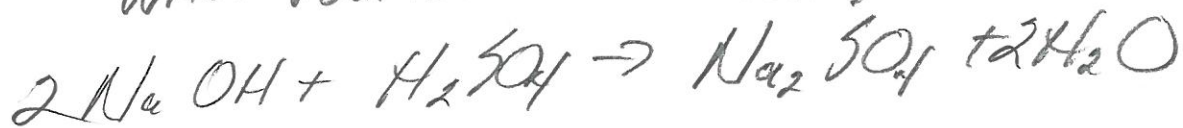
2. .0245 L KOH, .0357 L of .11 M  $\text{H}_2\text{SO}_4$ 

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

$$(.004 \text{ mol H}_2\text{SO}_4) \left( \frac{2 \text{ mol KOH}}{1 \text{ mol H}_2\text{SO}_4} \right) = .008 \text{ mol KOH}$$

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

3. 125 M NaOH 28.5 ml . 155 M H<sub>2</sub>SO<sub>4</sub> (2)  
WHAT VOL. NaOH WAS USED?



$$(0.285 \text{ L}) \left( \frac{0.155 \text{ mol}}{\text{L}} \right) = 0.0044 \text{ mol H}_2\text{SO}_4$$

$$(0.0044 \text{ mol H}_2\text{SO}_4) \left( \frac{2 \text{ mol NaOH}}{1 \text{ mol H}_2\text{SO}_4} \right) = 0.0088 \text{ mol NaOH}$$

$$\frac{0.0088 \text{ mol NaOH}}{0.125 \text{ mol/L}} = \boxed{0.0704 \text{ L} = 70.4 \text{ mL NaOH}}$$

4. a.  $-\log 1 \times 10^{-9} = 9 = \text{pH}$ ;  $\text{pOH} = 5$

b.  $\text{pH} = 11.7$   $\text{pOH} = 2.3$

c.  $\text{pH} = 6.7$   $\text{pOH} = 7.3$

5. a.  $\text{pH} = 4.6$   $\text{pOH} = 9.4$

b.  $\text{pH} = 3.1$   $\text{pOH} = 10.9$

c.  $\text{pH} = 3.4$   $\text{pOH} = 10.6$

b. a.  $\text{pH} 6 - 5.5$

b. AT pH'S OF  $> 6$ , (when H<sup>+</sup> ion concentration is DECREASING UNDER  $1 \times 10^{-6}$  M, pH RANGES) THE SOLUTION BECOMES BASIC. BASES TASTE BITTER.



7. pH OF  $3.2 \times 10^{-6} \text{ M } [\text{H}^+] = 5.5$ ,  $\text{pOH} = 8.5$   
 $1 \times 10^{-10} \text{ M } [\text{H}^+] = 10$   $\text{pOH} = 4$

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

a.  $6.3 \times 10^{-6} \text{ M} = [\text{H}^+]$

b.  $2.5 \times 10^{-10} \text{ M} = [\text{H}^+]$

c.  $3.2 \times 10^{-3} \text{ M}$

d.  $.01 \text{ M} = [\text{H}^+]$

e.  $1.7 \times 10^{-4} \text{ M}$

f.  $3.4 \times 10^{-6} \text{ M}$

9. a.  $1 \times 10^{-5} \text{ M OH}^-$

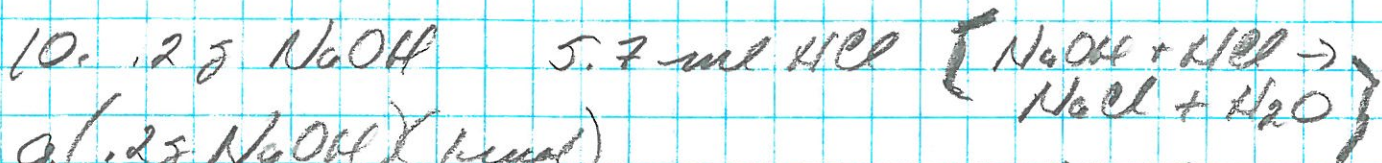
b.  $2.5 \times 10^{-10} \text{ M OH}^-$

c.  $5 \times 10^{-9} \text{ M}$

d.  $1.6 \times 10^{-6} \text{ M}$

e.  $\text{pH} = 3.4$   $\text{pOH} = 10.6$

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



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

1:1  $\therefore .005 \text{ mol HCl}$

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



$$\Delta (1.013 \text{ g/ml HCl}) (5.7 \text{ ml}) = 5.775 \text{ g HCl sol'n}$$

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

$$\% \text{ CONCENTRATION (W/W)} = \frac{\text{mass solute}}{\text{mass sol'n}} \times 100$$

$$= \frac{.18 \text{ g}}{5.775 \text{ g}} \times 100 = 3.12 \%$$