Name Key

Acids and Bases Problem Stations

Complete as many problem stations as you can.
Show all work for all math problems.
Include units where appropriate.

$M_AV_A = M_BV_B$

1. $M_A = ?$
   $V_A = 25.00\,mL$
   $M_B = 0.70\,M$
   $V_B = 17.40\,mL$

$$M_A = \frac{M_BV_B}{V_A} = \frac{(0.70\,M)(17.40\,mL)}{(25.00\,mL)}$$

$M_A = \boxed{0.49\,M}$

moles acid = moles base

2. $n_{HCl} = \frac{2.031\,g}{36.46\,g} \left| \frac{1\,mole\,HCl}{NCl} \right.$

$= 0.5570$ moles HCl = moles base

$V_b = 27.15\,mL = 0.02715\,mL$

$$M_b = \frac{\text{moles base}}{V_b\,(L)} = \frac{0.5570\ \text{moles NaOH}}{0.02715\ \text{Liters}} = \boxed{2.052\ \text{Molar NaOH}}$$

3.

a. $[OH^-] = \frac{K_w}{[H^+]} = \frac{1 \times 10^{-14}}{0.00175\,M} = \boxed{5.71 \times 10^{-12}\,M}$

b. $pH = -\log[H^+] = -\log[0.0175\,M] = \boxed{2.76}$

c. $pOH = -\log[OH^-] = -\log[5.71 \times 10^{-12}\,M] = \boxed{11.24}$

OR

$pOH = 14 - pH = \boxed{11.24}$

4.

a. Basic

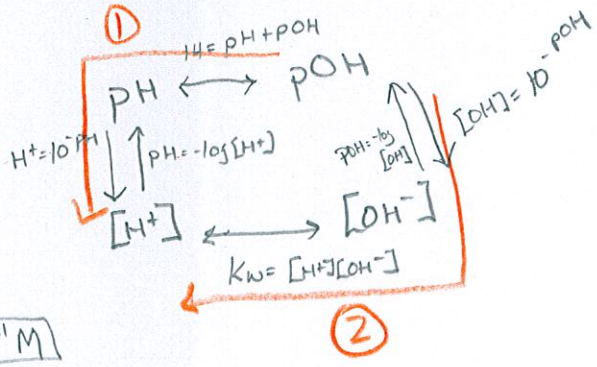
b. 2 ways to solve

① $pH = 14 - pOH = 14 - 3.45 = 10.55$

b. $[H^+] = 10^{-pH} = 10^{-10.55} = \boxed{2.8 \times 10^{-11}\ M}$

② $[OH] = 10^{-pOH} = 10^{-3.45} = 3.54 \times 10^{-4}\ M$

$[H^+] = \frac{K_W}{[OH^-]} = \frac{1 \times 10^{-14}}{3.54 \times 10^{-4}\ M} = \boxed{2.8 \times 10^{-11}\ M}$



5.

a. monoprotic acid

b. triprotic acid

c. Bronsted - Lowry base

d. Amphoteric

e. Arrhenius base

6.

a. $H_2O + NH_3 \leftrightarrows NH_4^+ + OH^-$

A B CA CB

b. $H_2O + HCl \leftrightarrows H_3O^+ + Cl^-$

B A CA CB

7. $HC_2H_3O_2 + NH_3 \leftrightarrows C_2H_3O_2^- + NH_4$

A B CB CA

8. $HF + H_2O \leftrightarrows F^- + H_3O^+$

A B CB CA

9. $2H_3PO_4 + 3Mg(OH)_2 \leftrightarrows Mg_3(PO_4)_2 + 6H_2O$

10. $H_2SO_4 + 2KOH \leftrightarrows K_2SO_4 + 2H_2O$