

$$pH = -\log [H^+] \quad pOH = -\log [OH^-]$$

$$pH + pOH = 14$$

1. $0.1 \text{ M HCl} \Rightarrow HCl \rightarrow H^+ + Cl^- \therefore [H^+] = 0.1 \text{ M}$

$$-\log .1 = 1 = pH \quad pOH = 14 - 1 = 13$$

$$pOH = 13$$

2. $0.01 \text{ M KOH} \Rightarrow KOH \rightarrow K^+ + OH^- \therefore [OH^-] = 0.01 \text{ M}$

$$-\log .001 = 3 = pOH \quad pH = 14 - 3 = 11$$

$$pH = 11$$

3. $0.005 \text{ M HNO}_3 \Rightarrow HNO_3 \rightarrow H^+ + NO_3^- \therefore [H^+] = 0.005 \text{ M}$

$$-\log .005 = 2.3 = pH \quad pOH = 14 - 2.3 = 11.7$$

$$pOH = 11.7$$

4. $0.005 \text{ M LiOH} \Rightarrow LiOH \rightarrow Li^+ + OH^- \therefore [OH^-] = 0.005 \text{ M}$

$$-\log .005 = 2.3 = pOH \quad pH = 11.7$$

5. $0.0003 \text{ M NaOH} \Rightarrow NaOH \rightarrow Na^+ + OH^- \therefore [OH^-] = 0.0003 \text{ M}$

$$-\log .0003 = 3.5 = pOH \quad pH = 10.5$$

6. $0.0003 \text{ M HCl} \Rightarrow [OH^-] = 0.0003 - \text{SEE \#5}$

$$-\log .0003 = 3.5 = pOH \quad pH = 10.5$$

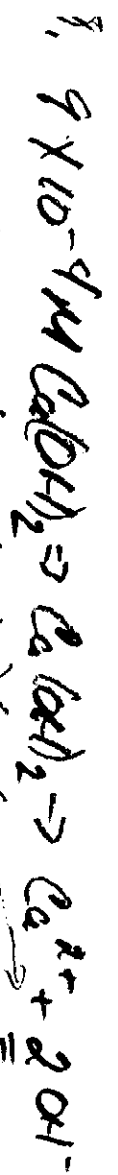
7. $7 \times 10^{-6} \text{ M H}_2\text{SO}_4 \Rightarrow H_2SO_4 \rightarrow 2H^+ + SO_4^{2-} \therefore [H^+] = 1.4 \times 10^{-5} \text{ M}$

$$-\log 1.4 \times 10^{-5} = 4.9 = pH \quad pOH = 9.1$$

SEE #8 TOO

U7 H101 PHAT III (cont)

(2)



$$(9 \times 10^{-4} \text{ M Ca(OH)}_2) \times \frac{2 \text{ mol OH}^-}{1 \text{ mol Ca(OH)}_2} = 1.8 \times 10^{-3} \text{ M OH}^-$$

$$- \log 1.8 \times 10^{-3} = \boxed{pOH = 2.74} \quad \boxed{pH = 11.26}$$

9. 5 mol HCl in 10 L 50 mL

$$\frac{(5 \text{ mol})}{10 \text{ L}} = .5 \text{ M HCl} \Rightarrow \text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$$

$$[\text{H}^+] = .5 \text{ M}$$

$$- \log .5 = .3 = \text{pH} \quad \text{pOH} = 13.7$$

10. 25 g LiOH in 200 mL 50 mL

$$\frac{25 \text{ g}}{3.95} = 6.33 \text{ mol}$$

$$\frac{(6.33 \text{ mol LiOH})(1 \text{ mol})}{200 \text{ mL}} = 1.04 \text{ mol LiOH}$$

$$\frac{1.04 \text{ mol LiOH}}{2 \text{ L}} = .52 \text{ M solid}$$



$$\frac{(1.52 \text{ M})(1 \text{ mol OH}^-)}{1 \text{ mol LiOH}} = .52 \text{ M OH}^- = [\text{OH}^-]$$

$$\text{pOH} = - \log .52 = 1.28 = \text{pOH} \quad \boxed{\text{pH} = 13.72}$$

11. $pH = 2$

$$[OH^-] = 10^{-pOH} = 10^{-2} = 1.01 \mu M$$

$$[OH^-] = 10^{-pOH} = 10^{-12} = 1 \times 10^{-12} M$$

12. $pH = 5.4$

$$[H^+] = 10^{-5.4} = 3.98 \times 10^{-6} M$$

$$[OH^-] = 10^{-8.6} = 2.51 \times 10^{-9} M$$

13. $pOH = 7$ $pH = 7$

$$[OH^-] = 10^{-7} = 1 \times 10^{-7} M$$

$$[H^+] = 10^{-7} = 1 \times 10^{-7} M$$

14. $pH = 5$ $pOH = 9$

$$[H^+] = 10^{-5} = 1 \times 10^{-5} M$$

$$[OH^-] = 10^{-9} = 1 \times 10^{-9} M$$

15. $[H^+] = 1 \times 10^{-5} M$

$$4.50 \mu \rightarrow 2 H^+ + SO_4^{2-}$$

$$(1 \times 10^{-5} \text{ mol } H^+) (1 L) = 1 \times 10^{-5} \text{ mol } H^+$$

$$\frac{(1 \times 10^{-5} \text{ mol } H^+) (1 \text{ mol } H_2SO_4)}{(1 \times 10^{-5} \text{ mol } H^+) (1 \text{ mol } H_2SO_4)}$$

$$5 \times 10^{-6} M$$

$$1.65 \times 10^{-4}$$

$$(5 \times 10^{-6} \text{ mol } / L) (1 L) = 5 \times 10^{-6} \text{ mol } H_2SO_4$$