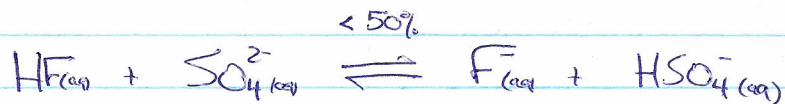
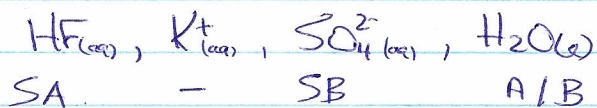
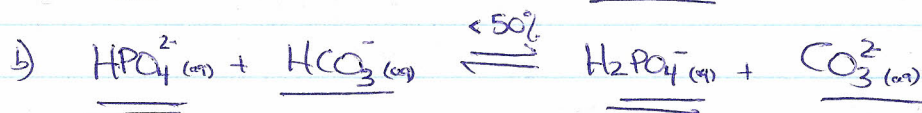
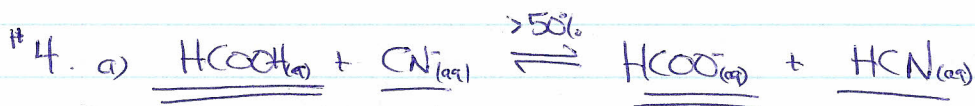
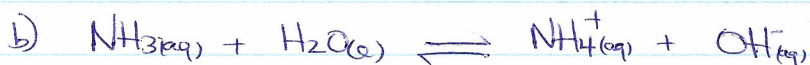
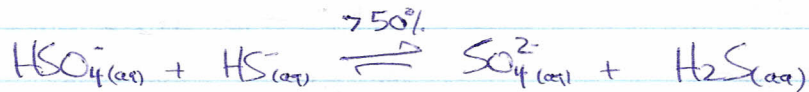
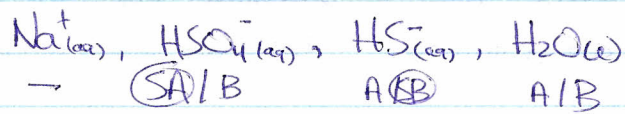


ACID-BASE REVIEW

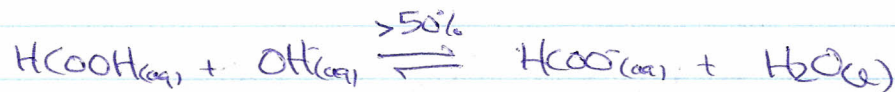
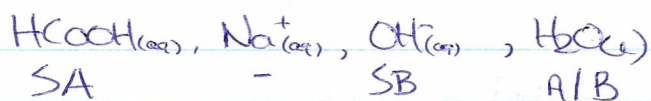
- # 1. Arrhenius concept - Acids have 'H'; Bases have 'OH'
Revised Arrhenius - Acids have 'H⁺'; Bases have 'OH⁻'
Bronsted-Lowry - Acids are proton donors; Bases are proton acceptors



b) $\text{NaHSO}_4(\text{aq})$ and $\text{NaHS}(\text{aq})$



c) $\text{HCOOH}(\text{aq})$ and $\text{NaOH}(\text{aq})$



#6. $[\text{OH}^-(\text{aq})] = 2.5 \times 10^{-7} \text{ mol/L}$

$$K_w = [\text{H}^+(\text{aq})][\text{OH}^-(\text{aq})]$$

$$[\text{H}^+(\text{aq})] = \frac{1.0 \times 10^{-14}}{2.5 \times 10^{-7}}$$

$$[\text{H}^+(\text{aq})] = 4.0 \times 10^{-8} \text{ M}$$

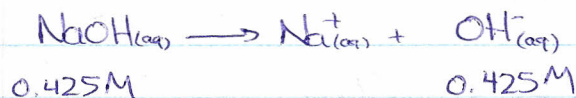
$$\text{pH} = -\log[\text{H}^+(\text{aq})]$$

$$\text{pH} = -\log[4.0 \times 10^{-8}]$$

$$\text{pH} = 7.40$$

#7. $8.50 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{40.00 \text{ g NaOH}} = 0.2125 \text{ mol NaOH}$

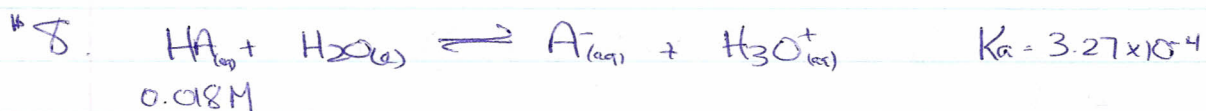
$$C = \frac{n}{V} = \frac{0.2125 \text{ mol}}{0.500 \text{ L}} = 0.425 \text{ M}$$



$$\text{pOH} = -\log[\text{OH}^-(\text{aq})]$$

$$\text{pOH} = -\log[0.425]$$

$$\text{pOH} = 0.372$$



$$K_a = \frac{[\text{A}^-_{(aq)}][\text{H}_3\text{O}^+_{(aq)}]}{[\text{HA}_{(aq)}]}, \quad [\text{A}^-_{(aq)}] = [\text{H}_3\text{O}^+_{(aq)}]$$

$$K_a = \frac{[\text{H}_3\text{O}^+_{(aq)}]^2}{[\text{HA}_{(aq)}]}$$

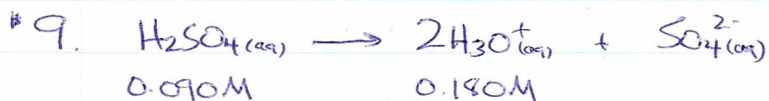
$$[\text{H}_3\text{O}^+_{(aq)}] = \sqrt{(3.27 \times 10^{-4})(0.018)}$$

$$[\text{H}_3\text{O}^+_{(aq)}] = 0.00243 \text{ M}$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+_{(aq)}]$$

$$\text{pH} = -\log [0.00243]$$

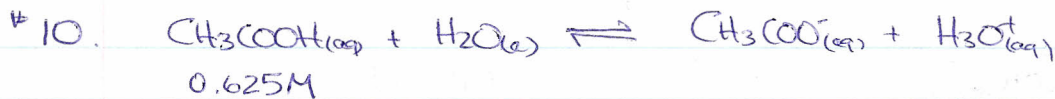
$$\text{pH} = 2.62$$



$$\text{pH} = -\log [\text{H}_3\text{O}^+_{(aq)}]$$

$$\text{pH} = -\log [0.180]$$

$$\text{pH} = 0.74$$



$$K_a = \frac{[\text{CH}_3\text{COO}^-_{(aq)}][\text{H}_3\text{O}^+_{(aq)}]}{[\text{CH}_3\text{COOH}_{(aq)}]}, \quad [\text{CH}_3\text{COO}^-_{(aq)}] = [\text{H}_3\text{O}^+_{(aq)}]$$

$$K_a = \frac{[\text{H}_3\text{O}^+_{(aq)}]^2}{[\text{CH}_3\text{COOH}_{(aq)}]}$$

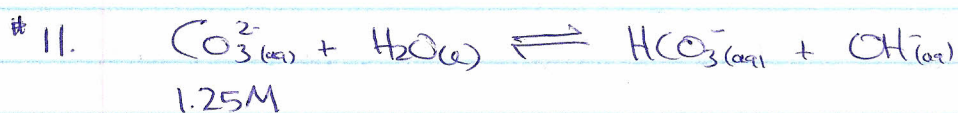
$$[\text{H}_3\text{O}^+_{(aq)}] = \sqrt{(1.8 \times 10^{-5})(0.625)}$$

$$[\text{H}_3\text{O}^+_{(aq)}] = 0.00335 \text{ M}$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+_{(aq)}]$$

$$\text{pH} = -\log [0.00335]$$

$$\text{pH} = 2.475$$



$$K_b = \frac{[\text{HCO}_3^{-}(\text{aq})][\text{OH}^{-}(\text{aq})]}{[\text{CO}_3^{2-}(\text{aq})]}, \quad [\text{HCO}_3^{-}(\text{aq})] = [\text{OH}^{-}(\text{aq})]$$

$$K_b = \frac{[\text{OH}^{-}(\text{aq})]^2}{[\text{CO}_3^{2-}(\text{aq})]}$$

$$[\text{OH}^{-}(\text{aq})] = \sqrt{(2.13 \times 10^{-4})(1.25)}$$

$$[\text{OH}^{-}(\text{aq})] = 0.0163 \text{ M}$$

$$\text{pOH} = -\log[\text{OH}^{-}(\text{aq})]$$

$$\text{pOH} = -\log[0.0163]$$

$$\text{pOH} = 1.79$$

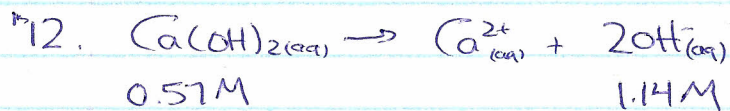
$$K_a K_b = K_w$$

$$K_b = \frac{1.0 \times 10^{-14}}{4.7 \times 10^{-11}} = 2.13 \times 10^{-4}$$

$$\text{pH} + \text{pOH} = 14.00$$

$$\text{pH} = 14.00 - 1.79$$

$$\text{pH} = 12.21$$



$$\text{pOH} = -\log[\text{OH}^{-}(\text{aq})]$$

$$\text{pOH} = -\log[1.14]$$

$$\text{pOH} = -0.06$$

$$\text{pH} + \text{pOH} = 14.00$$

$$\text{pH} = 14.00 - (-0.06)$$

$$\text{pH} = 14.06$$