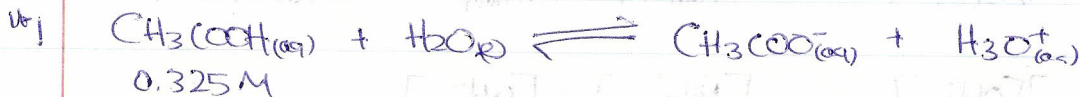


WEAK ACIDS AND BASES WORKSHEET



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

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

$$1.8 \times 10^{-5} = \frac{[\text{H}_3\text{O}^+_{(aq)}]^2}{[0.325]}$$

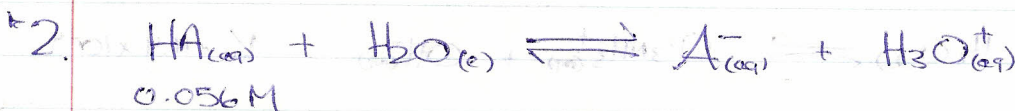
$$[\text{H}_3\text{O}^+_{(aq)}] = \sqrt{(1.8 \times 10^{-5})(0.325)}$$

$$[\text{H}_3\text{O}^+_{(aq)}] = 2.42 \times 10^{-3} \text{ M}$$

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

$$\text{pH} = -\log[2.42 \times 10^{-3}]$$

$$\text{pH} = 2.616$$



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

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

$$1.4 \times 10^{-5} = \frac{[\text{H}_3\text{O}^+_{(aq)}]^2}{[0.056]}$$

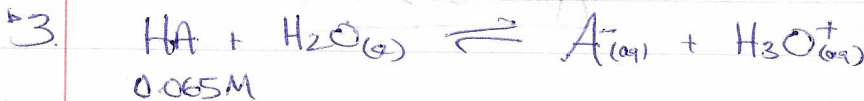
$$[\text{H}_3\text{O}^+_{(aq)}] = \sqrt{(1.4 \times 10^{-5})(0.056)}$$

$$[\text{H}_3\text{O}^+_{(aq)}] = 8.9 \times 10^{-4} \text{ M}$$

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

$$\text{pH} = -\log[8.9 \times 10^{-4}]$$

$$\text{pH} = 3.05$$



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

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

$$1.8 \times 10^{-4} = \frac{[\text{H}_3\text{O}^+_{(aq)}]^2}{[0.065]}$$

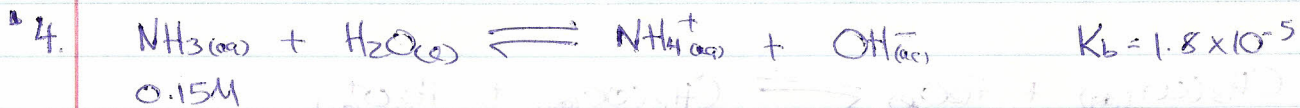
$$[\text{H}_3\text{O}^+_{(aq)}] = \sqrt{(1.8 \times 10^{-4})(0.065)}$$

$$[\text{H}_3\text{O}^+_{(aq)}] = 3.4 \times 10^{-3}$$

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

$$\text{pH} = -\log[3.4 \times 10^{-3}]$$

$$\text{pH} = 2.47$$



$$K_b = \frac{[\text{NH}_4^+(\text{aq})][\text{OH}^-(\text{aq})]}{[\text{NH}_3(\text{aq})]}, \quad [\text{NH}_4^+(\text{aq})] = [\text{OH}^-(\text{aq})]$$

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

$$1.8 \times 10^{-5} = \frac{[\text{OH}^-(\text{aq})]^2}{[0.15]}$$

$$[\text{OH}^-(\text{aq})] = \sqrt{(1.8 \times 10^{-5})(0.15)}$$

$$[\text{OH}^-(\text{aq})] = 1.6 \times 10^{-3} \text{ M}$$

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

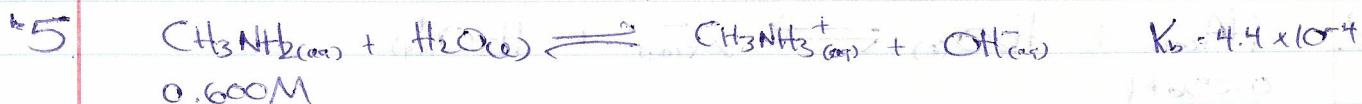
$$\text{pOH} = -\log[1.6 \times 10^{-3}]$$

$$\text{pOH} = 2.80$$

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

$$\text{pH} = 14.00 - 2.80$$

$$\boxed{\text{pH} = 11.20}$$



$$K_b = \frac{[\text{CH}_3\text{NH}_3^+(\text{aq})][\text{OH}^-(\text{aq})]}{[\text{CH}_3\text{NH}_2(\text{aq})]}, \quad [\text{CH}_3\text{NH}_3^+(\text{aq})] = [\text{OH}^-(\text{aq})]$$

$$K_b = \frac{[\text{OH}^-(\text{aq})]^2}{[\text{CH}_3\text{NH}_2(\text{aq})]}$$

$$4.4 \times 10^{-4} = \frac{[\text{OH}^-(\text{aq})]^2}{[0.600]}$$

$$[\text{OH}^-(\text{aq})] = \sqrt{(4.4 \times 10^{-4})(0.600)}$$

$$[\text{OH}^-(\text{aq})] = 0.0162 \text{ M}$$

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

$$\text{pOH} = -\log[0.0162]$$

$$\text{pOH} = 1.790$$

$$\text{pH} + \text{pOH} = 14.000$$

$$\text{pH} = 14.000 - 1.790$$

$$\boxed{\text{pH} = 12.210}$$