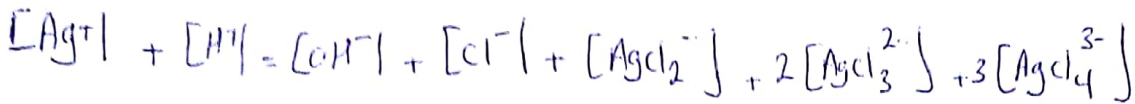


في حالة تقييد سعة التفاعل  
معطى

في حالة

1)



2)

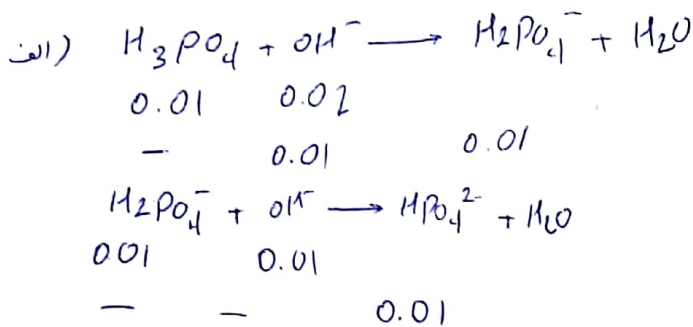
$$\alpha_{H_3PO_4} = \frac{[H^+]^3}{[H^+]^3 + [H^+]^2 K_1 + [H^+] K_1 K_2 + K_1 K_2 K_3} \times 100 = 7.72 \times 10^{-4} \%$$

$$\alpha_{H_2PO_4^-} = \frac{[H^+]^2 K_1}{[H^+]^3 + [H^+]^2 K_1 + [H^+] K_1 K_2 + K_1 K_2 K_3} \times 100 = 61.31 \%$$

$$\alpha_{HPO_4^{2-}} = \frac{[H^+] K_1 K_2}{[H^+]^3 + [H^+]^2 K_1 + [H^+] K_1 K_2 + K_1 K_2 K_3} \times 100 = 38.69 \%$$

$$\alpha_{PO_4^{3-}} = \frac{K_1 K_2 K_3}{[H^+]^3 + [H^+]^2 K_1 + [H^+] K_1 K_2 + K_1 K_2 K_3} \times 100 = 3.87 \times 10^{-4} \%$$

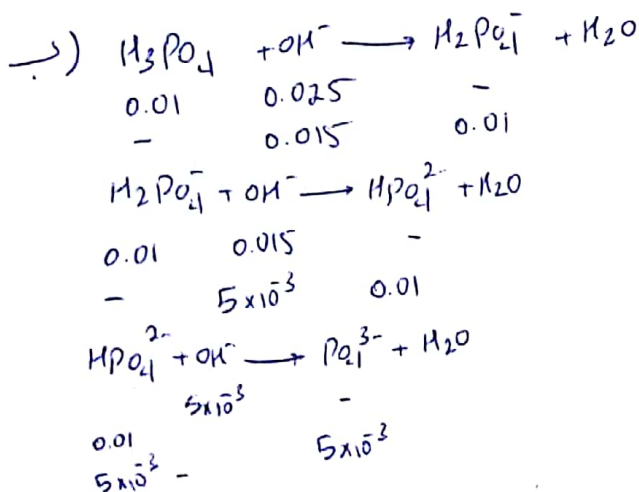
3)



$$[H^+] = \sqrt{\frac{K_3 C_0 + K_w}{1 + \frac{C_0}{K_2}}} = 3.55 \times 10^{-10} M$$

$$C_0 = 0.01 M$$

$$pH = 9.45$$



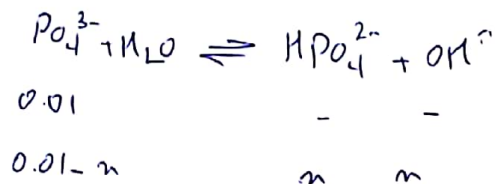
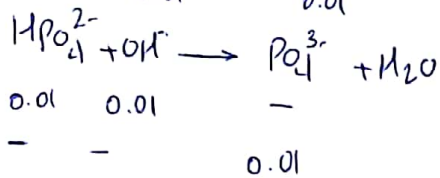
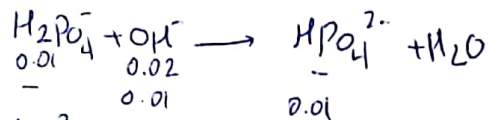
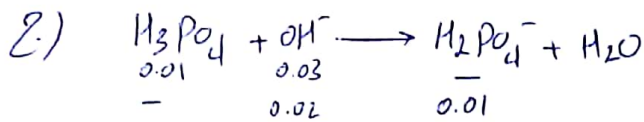
$$pH = 12 + \lg \frac{5 \times 10^{-3}}{5 \times 10^{-3}} = 12 \quad \frac{[OH^-]}{10^{-3.5}} = 1 > 0.01$$

تدريبات هندسة حل باع عنقود است

$$10^{-2} = K_{b1} = \frac{(5 \times 10^{-3} + n) m}{5 \times 10^{-3} - n}$$

$$m = 2.807 \times 10^{-3} M = [OH^-]$$

$$pH = 11.45$$



$$10^{-2} = \frac{x^2}{0.01 - x}$$

$$\rightarrow x = [\text{OH}^-] = 6.18 \times 10^{-3} \text{ M}$$

$$\rightarrow \boxed{\text{pH} = 11.791}$$

$$\text{pH} = \text{pK}_a + \lg \frac{[\text{OAc}^-]}{[\text{HOAc}]} \rightarrow \frac{[\text{OAc}^-]}{[\text{HOAc}]} = 0.575 = \frac{0.3 \times V_{\text{OAc}^-}}{\frac{0.2 \times V_{\text{HOAc}}}{2.5}} \rightarrow \frac{V_{\text{OAc}^-}}{V_{\text{HOAc}}} = 0.384$$

$$V_{\text{HOAc}} + V_{\text{OAc}^-} = 2.5 \text{ L}$$

$$V_{\text{HOAc}} = 1.81 \text{ L} \quad V_{\text{OAc}^-} = 0.69 \text{ L}$$

$$C_{\text{HCOOH}} = \frac{10 \times 3 \times 1.004}{46} = 0.655 \text{ M}$$

$$10^{-1.97} = [\text{H}^+], [\text{HCOO}^-] = C_0 \times \frac{K_a}{K_a + [\text{H}^+]} \rightarrow K_{a, \text{HCOOH}} = 1.78 \times 10^{-4}$$

$$\alpha_{\text{HCOO}^-} = \frac{K_a}{K_a + [\text{H}^+]} = 0.0164$$

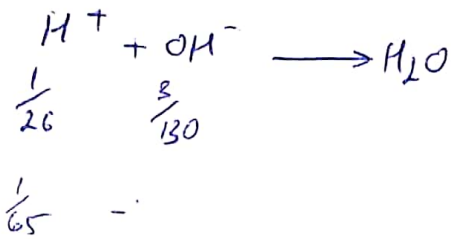
$$\alpha' = 0.164$$

$$K_a = \frac{[\text{HCOO}^-][\text{H}^+]}{[\text{HCOOH}]} = \frac{(C' \alpha')^2}{C' (1 - \alpha')} \rightarrow C' = \frac{5.57 \times 10^{-3}}{0.164} \quad C_1 V_1 = C' V' \quad \frac{V'}{V_1} = \frac{C_1}{C'}$$

$$117.61 \leftarrow \alpha' = 10$$

$$145.15 \leftarrow \alpha' = 11$$

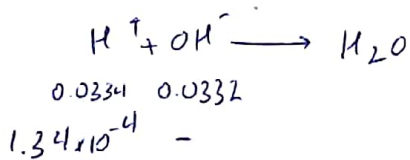
(6)



$$\begin{aligned}
 C_{\text{H}^+} &= \frac{50 \times 0.05}{50 + 15} = \frac{1}{26} \text{ M} \\
 C_{\text{OH}^-} &= \frac{15 \times 0.1}{65} = \frac{3}{130} \text{ M}
 \end{aligned}$$

(الف)

$$[\text{H}^+] = \frac{1}{65} = 0.0154 \text{ M} \longrightarrow \boxed{\text{pH} = 1.81}$$

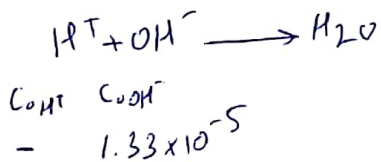


$$C_{\text{H}^+} = \frac{50 \times 0.05}{74.9} = 0.0334 \text{ M}$$

$$C_{\text{OH}^-} = \frac{24.9 \times 0.1}{74.9} = 0.0332 \text{ M}$$

(بـ)

$$\longrightarrow \text{pH} = -\lg [\text{H}^+] = -\lg 1.34 \times 10^{-4} = \boxed{3.87}$$



$$\begin{aligned}
 C_{\text{H}^+} &= 0.033329 \text{ M} \\
 C_{\text{OH}^-} &= 0.033342 \text{ M}
 \end{aligned}$$

(جـ)

$$\text{pH} = 14 + \lg 1.33 \times 10^{-5} = \boxed{9.12}$$