

Mutiara P. Tampak Edla

1813023038

B.

3.1. Diketahui : % E = 99,9 %

$$V_a = 50 \text{ mL}$$

$$V_o = 50 \text{ mL}$$

$$n = 5$$

$$W_A = 100\% - 99,9\% = 0,1\% = 0,001 \text{ gr}$$

Dit : K_D .. ?

Jwb :

$$W_A = W_o \left(\frac{V_A}{V_A + K_D \cdot V_o} \right)^n$$

$$0,001 \text{ gr} = 1 \text{ gr} \left(\frac{50 \text{ mL}}{50 \text{ mL} + K_D \cdot 50 \text{ mL}} \right)^5$$

$$\left(0,001 \text{ gr} = 1 \text{ gr} \left(\frac{1}{1 + K_D} \right)^5 \right)^{\frac{1}{5}}$$

$$(0,001 \text{ gr})^{\frac{1}{5}} = \left(\frac{1}{1 + K_D} \right)$$

$$0,2511 \cdot (1 + K_D) = 1$$

$$0,2511 + 0,2511 K_D = 1$$

$$0,2511 K_D = 1 - 0,2511$$

$$K_D = \frac{0,7489}{0,2511}$$

$$K_D = 2,98 \approx 3$$

3.2 Diket : % E = 90%

$V_a = 100 \text{ ml}$

$V_o = 90 \text{ ml}$

$n = 5$

$W_o = 1 \text{ gr}$

$W_a = 100\% - 90\% = 10\% \times 1 \text{ gr} = 0.1 \text{ gr}$

dit : X (fraksi) zat terlarut yg dihilangkan ?

dijwb :

$$[W_a = W_o \left(\frac{V_n}{V_n + K_D \cdot V_a} \right)^n] \times \frac{1}{n}$$

$$W_a^{1/n} = 1 \left(\frac{V_n}{V_n + V_a \cdot K_D} \right)$$

$$(V_n + V_a K_D) = \frac{V_n}{W_a^{1/n}}$$

$$K_D = \left(\frac{\frac{V_n}{W_a^{1/n}} - V_n}{V_a} \right)$$

% E = 90%

$$K_D = \frac{\frac{100}{0.1^{1/5}} - 100}{90}$$

$$K_D = \frac{\frac{100}{0.1631} - 100}{90}$$

$$K_D = \frac{150.45 - 100}{90}$$

$K_D = 0.64966$

% E untuk 10 kali :

$(100\% - X\%) = 0.01 \text{ gr}$

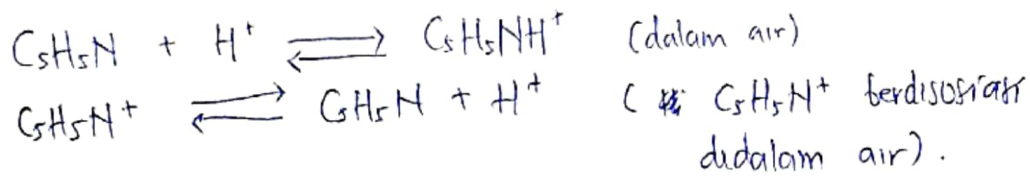
$\frac{100}{100} - X\% = 0.01 \text{ gr}$

$X\% = 1 - 0.01 \text{ gr}$

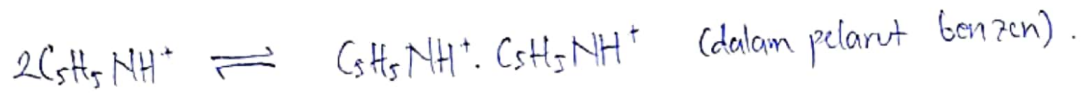
$X\% = 0.99$

$X = 99\%$

3.3.



$$K_a = \frac{[\text{H}^+][\text{C}_5\text{H}_5\text{N}]}{[\text{C}_5\text{H}_5\text{NH}^+]}$$



$$K_d = \frac{[\text{C}_5\text{H}_5\text{NH}^+ \cdot \text{C}_5\text{H}_5\text{NH}^+]}{[\text{C}_5\text{H}_5\text{NH}^+]^2}$$

$$D = \frac{\text{konentrasi total piridin dlm pelarut benzen}}{\text{konentrasi total piridin dlm pelarut air}}$$

$$D = \frac{[\text{C}_5\text{H}_5\text{NH}^+]_{\text{benzen}} + 2[\text{C}_5\text{H}_5\text{NH}^+ \cdot \text{C}_5\text{H}_5\text{NH}^+]_{\text{benzen}}}{[\text{C}_5\text{H}_5\text{NH}^+]_{\text{air}} + [\text{C}_5\text{H}_5\text{N}]_{\text{air}}}$$

$$\left\{ \begin{aligned} [\text{C}_5\text{H}_5\text{N}] &= K_a \frac{[\text{C}_5\text{H}_5\text{NH}^+]}{[\text{H}^+]} \\ [\text{C}_5\text{H}_5\text{NH}^+ \cdot \text{C}_5\text{H}_5\text{NH}^+] &= K_d [\text{C}_5\text{H}_5\text{NH}^+]^2 \end{aligned} \right.$$

dari kedua persamaan diatas, disubstitusikan ke pers D:

$$D = \frac{[\text{C}_5\text{H}_5\text{NH}^+]_{\text{benzen}} + 2K_d [\text{C}_5\text{H}_5\text{NH}^+]_{\text{benzen}}^2}{[\text{C}_5\text{H}_5\text{NH}^+]_{\text{air}} + K_a \frac{[\text{C}_5\text{H}_5\text{NH}^+]}{[\text{H}^+]}}$$

$$D = \frac{[\text{C}_5\text{H}_5\text{NH}^+]_{\text{benzen}} (1 + 2K_d [\text{C}_5\text{H}_5\text{NH}^+])}{[\text{C}_5\text{H}_5\text{NH}^+]_{\text{air}} (1 + K_a / [\text{H}^+])}$$

$$D = \frac{K_d (1 + 2K_d [\text{C}_5\text{H}_5\text{NH}^+])}{1 + K_a / [\text{H}^+]}$$