

4 a). Diketahui : Volume eter 100 mL
Volume air 500 mL
ekstraksi dilakukan sebanyak 5 kali

$$K_D = \frac{C_{et}}{C_{aq}} = 0,3$$

Ekstraksi Pertama

$$K_D = 3,0 = \frac{(4 - x_1) / 0,1}{x_1 / 0,5}$$

$$3,0 = \frac{4 - x_1}{0,1} \times \frac{0,5}{x_1}$$

$$3,0 = \frac{2 - 0,5 x_1}{0,1 x_1}$$

$$0,3 x_1 = 2 - 0,5 x_1$$

$$0,3 x_1 + 0,5 x_1 = 2$$

$$x_1 = \frac{2}{0,8}$$

$$x_1 = 2,5 \text{ gram}$$

↳ 2,5 gram berat didapatkan air dan
1,5 gram didapatkan eter.

Ekstraksi II

$$K_D = 3,0 = \frac{(2,5 - x_2) / 0,1}{x_2 / 0,5}$$

$$3,0 = \frac{2,5 - x_2}{0,1} \times \frac{0,5}{x_2}$$

$$3,0 = \frac{1,25 - 0,5x_2}{0,1x_2}$$

$$0,3x_2 = 1,25 - 0,5x_2$$

$$0,3x_2 - 0,5x_2 = 1,25$$

$$x_2 = \frac{1,25}{0,8}$$

$$x_2 = 1,56 \text{ gram}$$

↳ sisa as. butirat dilapisan air $\times 0,94$
sisa as. butirat di lapisan eter

Ekstraksi III

$$K_D = 3,0 = \frac{(1,56 - x_3) / 0,1}{x_3 / 0,5}$$

$$3,0 = \frac{1,56 - x_3}{0,1} \times \frac{0,5}{x_3}$$

$$3,0 = \frac{0,78 - 0,5x_3}{0,1x_3}$$

$$0,3x_3 = 0,78 - 0,5x_3$$

$$0,3x_3 + 0,5x_3 = 0,78$$

$$x_3 = \frac{0,78}{0,8}$$

$x_3 = 0,975 \text{ g} \rightarrow$ sisa asam dilapisan air
 $\times 0,585 \text{ g}$ dilapisan eter.

Ekstraksi Keempat (IV)

$$K_D = 3,0 = \frac{(0,975 - x_4)/0,1}{x_4/0,5}$$

$$3,0 = \frac{0,975 - x_4}{0,1} \times \frac{0,5}{x_4}$$

$$3,0 = \frac{0,4875 - 0,5 x_4}{0,1 x_4}$$

$$0,3 x_4 = 0,4875 - 0,5 x_4$$

$$0,3 x_4 + 0,5 x_4 = 0,4875$$

$$x_4 = \frac{0,4875}{0,8}$$

$$x_4 = 0,609 \text{ gram}$$

↳ Sisa as. butirat di lapisan air dan 0,09 gram di lapisan eter.

Ekstraksi kelima (V)

$$K_D = 3,0 = \frac{(0,609 - x_5)/0,1}{x_5/0,5}$$

$$3,0 = \frac{0,609 - x_5}{0,1} \times \frac{0,5}{x_5}$$

$$3,0 = \frac{0,3045 - 0,5 x_5}{0,1 x_5}$$

$$0,3 x_5 = 0,3045 - 0,5 x_5$$

$$0,8 x_5 = 0,3045$$

$$x_5 = \frac{0,3045}{0,8} = 0,38 \text{ gram}$$

↳ Sisa as. butirat di lapisan air & 0,23 gram di lapisan eter

Jadi, total asam butirat yang terekstraksi pada pelarut eter yaitu $1,5 \text{ gram} + 0,94 \text{ gram} + 0,585 \text{ gram} + 0,366 \text{ gram} + 0,23 \text{ gram}$

Selengkapnya 3,61 gram

b). Berdasarkan perhitungan yang telah dilakukan maka dapat disimpulkan bahwa semakin banyak eter yang digunakan sebagai pelarut maka asam butirat yang terekstraksi semakin banyak dan sebaliknya.

5. Contoh 3-3

$$K_D = \frac{C_B}{C_A} \quad W_A = C_A V_A \quad W_0 = W_A + W_B$$

$$W_B = C_B V_B$$

$$\text{Fraksi } A = \frac{W_A}{W_0} = \frac{C_A V_A}{W_A + W_B} = \frac{C_A V_A}{C_A V_A + C_B V_B}$$

$$= \frac{V_A}{V_A + \frac{C_B}{C_A} V_B} = \frac{V_A}{V_A + K_D V_B}$$

$$W_{A1} = W_0 \left(\frac{V_A}{V_A + K_D V_B} \right)^5$$

$$W_{A1} = 4 \left(\frac{500 \text{ mL}}{500 \text{ mL} + 3(100 \text{ mL})} \right)^5$$

$$= 4 \left(\frac{500 \text{ mL}}{800 \text{ mL}} \right)^5$$

$$= 4(0,625)^5 = 4(0,095)$$

0,38 asam butirat yang terekstraksi pada lapisan air.