CH1102 ASSIGNMENT - 05

Q1. **Buffer capacity**: The amount of acid or base that can be added to a volume of a buffer solution before its pH changes sufficiently.

→ Buffers are said to be ~~effective~~ efficient when the amount of acid and conjugate base are equal. The related amount of acid and base should not differ by more than 10 fold. In other words, the effective ratio should be anywhere b/w 10:1 and 1:10.

Q2. The buffer which is present in blood plasma and maintains pH around 7.4 is the carbonic acid and bicarbonate buffer, (H_2CO_3) and ($HCO_3^{\ominus}$).

Q3. **Ionization constant** (K_a) = 2×10^{-5}

Butyrate ion hydrolyses in solution into butyric acid and $OH^{\ominus}$ ions.

Let x mole of butyrate ion be hydrolysed

$$C_3H_7COO^{\ominus} + H_2O \longrightarrow C_3H_7COOH + OH^{\ominus}$$
$$(0.2 - x) \qquad\qquad (x) \qquad (x)$$

$$\rightarrow 4 - \frac{x^2}{(0.2-x)} = \frac{x^2}{0.2} \quad (x \text{ being very small, is neglected})$$

We know,

$$K_h = \frac{K_w}{K_a} \rightarrow \frac{K_w}{K_a} = \frac{x^2}{(0.2)} \Rightarrow \frac{10^{-14}}{2 \times 10^{-5}} = \frac{x^2}{0.2}$$

$$x = 10^{-5} \text{ mol } L^{-1}$$

$[OH^{\ominus}] = 10^{-5}\ M$

$$[H^{\oplus}] = \frac{10^{-14}}{10^{-5}} = 10^{-9}\ M$$

$$pH = -\log [H^{\oplus}] = -\log [10^{-9}] = (9)\ \underline{\text{ans.}}$$