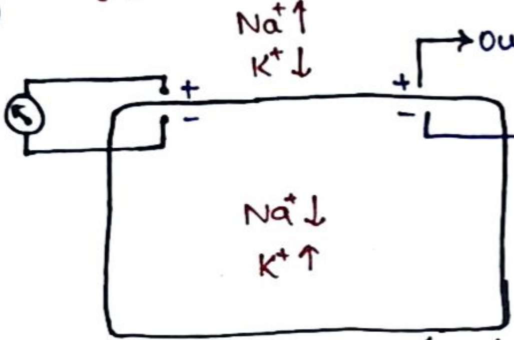
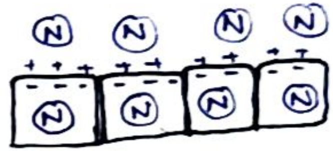
Resting Membrane Potential

Equilibrium pot. :→
(Nernst pot.)



→ outside pot = 'Reference = 0'

→ Inside pot = 'Membrane potential'



Assume:- Cell is permeable for K^+ only:-

Electro - chemical gradient

K^+ ratio = $\frac{x}{35x}$

d/t proteins/ phosphates

Diffusion potential = −94 mV

K/a

(Equilibrium potential)

(Nernst potential) (E_{K^+})

⇓

opposes further diffusion

@ −94 mV pot ⇒ No net diffusion of K^+ ion

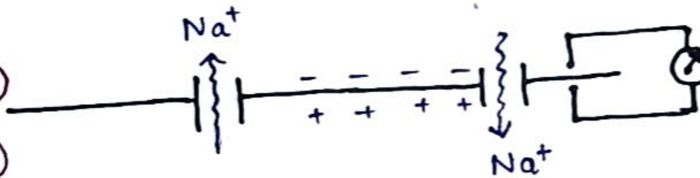
Nernst Equation =

$$EMF_{K^+} \ (mV) = \pm \frac{61}{z} \times \log \frac{\text{conc. Inside}}{\text{conc. outside}}$$

$$= \pm \frac{61}{1} \times \log \frac{35}{1} \approx -94 \text{ mV}$$

Assume :- Cell is permeable for Na^+ only :-

Na^+ ratio $= \dfrac{10x}{x}$



Diffusion potential = +61 mV

k/a

(Equilibrium potential)

(Nerst potential) (E_{Na^+})

$\Downarrow$

No net diffusion takes place

$EMF_{Na^+} = +61 \text{ mV}$

When cell is permeable for several ions :-

Diffusion potential of cell depends on →

① polarity of electric charge of each ion (z)
② conc. of ion (inside : outside)

} Nernst Equation

③ permeability of membrane to each ion (P)

Goldman equation =

$$\underset{(mV)}{EMF} = -\frac{61}{z} \times \log \frac{C_{Na^+_i} P_{Na^+} + C_{K^+_i} P_{K^+} + \overbrace{C_{Cl^-_i} P_{Cl^-}}}{C_{Na^+_o} P_{Na^+} + C_{K^+_o} P_{K^+} + C_{Cl^-_o} P_{Cl^-}}$$

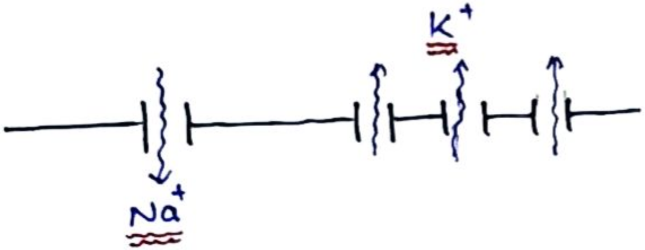
→ Role in skeletal muscle

Resting Membrane Potential :-

Def = Relatively stable membrane potential (inside of cell memb.) of a cell in unstimulated state.

Nerve, muscles communicates among themselves via Action potential.

When remains at rest then they have RMP.



$DP_{K^+} = -94\,mV$

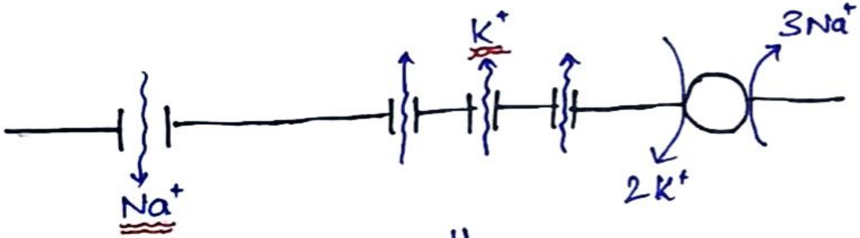
No net diffusion

$DP_{Na^+} = +61\,mV$

$P_{K^+} > P_{Na^+}$

$$RMP \propto \left(\underset{(\uparrow)}{DP_{K^+}}\ \underset{(\uparrow)}{P_{K^+}}\right)\left(DP_{Na^+}\ P_{Na^+}\right)$$

$RMP = -86\,mV$



$+61\,mV \times P_{Na^+}$

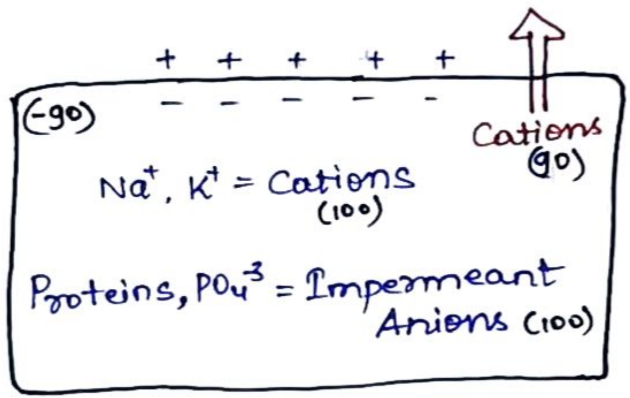
$-94\,mV \times P_{K^+}$

$-86\,mV$

$-4\,mV$

$\underline{RMP = -90\,mV}$
(of neurons)

Gibbs-Donnan Phenomenon :-



- Impermeant anions contribute to the negative charge inside the cell when there is a net deficit of positively charged ions