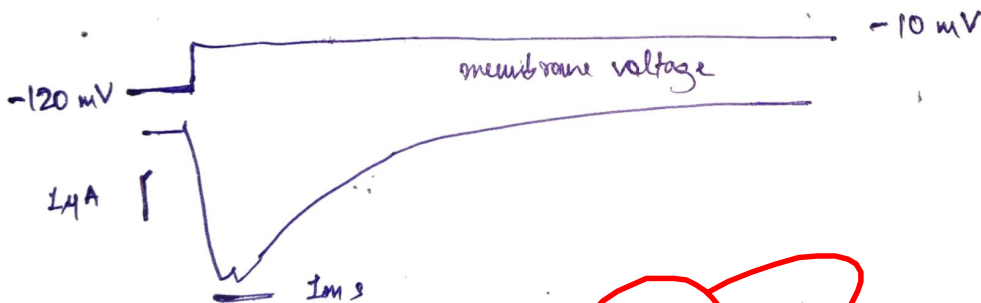
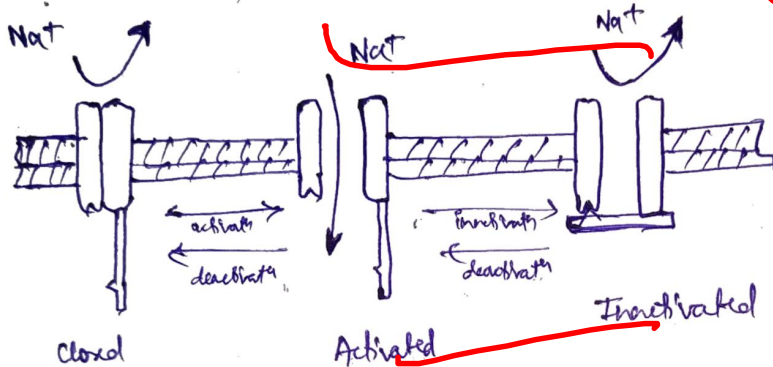


92

2

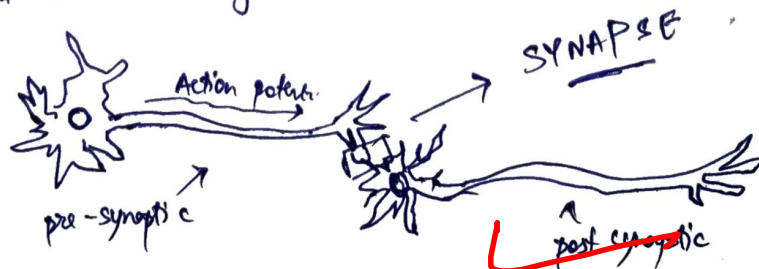
Voltage gated sodium channels initiate action potentials in nerve, muscle, and other excitable cells.



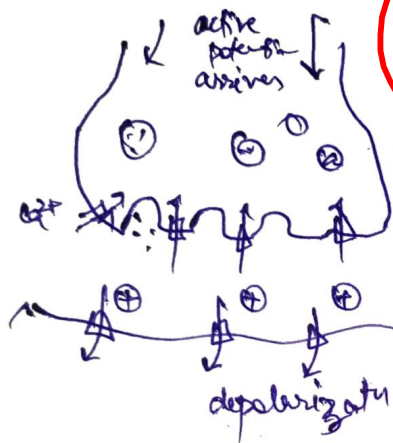
The sodium current deactivates within 1-2 milliseconds, and electrical signalling is terminated by activation of current.

3

The action happens at a synapse, the point of communication b/w two neurons or between a neuron and a target cell, like a muscle or gland.



At the synapse, the firing of an action potential in one neuron — the presynaptic, or sending neuron — causes the transmission of a signal to another neuron — the postsynaptic, or receiving neuron — making postsynaptic more or less likely to fire its own potential.



① action potential reaches axon terminal and depolarizes membrane.

② voltage-gated  $\text{Ca}^{2+}$  channels open and  $\text{Ca}^{2+}$  ions flow in.

③  $\text{Ca}^{2+}$  influx triggers synaptic vesicles to release neurotransmitters.

④ neurotransmitter binds to receptors on target cell.

⑭ Nernst eqn for equilibrium potentials :-

$$E_{\text{ion}} = \frac{RT}{zF} \times \ln \left( \frac{[\text{ion}]_{\text{out}}}{[\text{ion}]_{\text{in}}} \right)$$

temperature in  $T \rightarrow K$

$F \rightarrow$  Faraday's constant

where  $z \rightarrow$  valence of ion,  $R \rightarrow$  gas constant. (98.485),  
(8.315  $\text{JK}^{-1}\text{mol}^{-1}$ )

It allows the electrical potential across the membrane at equilibrium to be predicted exactly and accurately.

[5] Ion channels are membrane proteins, which play a principle in regular cellular excitability. They are found in virtually all cells, and are of crucial physiological importance.

channels differ in the no. of types of ions they will pass. ∴ so it can be characterised into:

- ① SELECTIVITY → internal structure determines what ions will pass through the molecular filter.
- ② GATING → mechanisms what causes channels to open, it can be open (permanently open) and gated (requires form of activation to open).

[6] Hypopolarization is when membrane potential becomes more negative at a particular spot on the neuron's membrane. It occurs when ion channels in the membrane open or close, altering the ~~ability of~~ particular types of ions to enter or exit.

↳ The opening of channels that let positive ions to flow out of the cell (or negative ions flow in) can cause hypopolarization.

Ex: opening of channels that let  $K^+$  out of the cell or  $Cl^-$  into the cell.