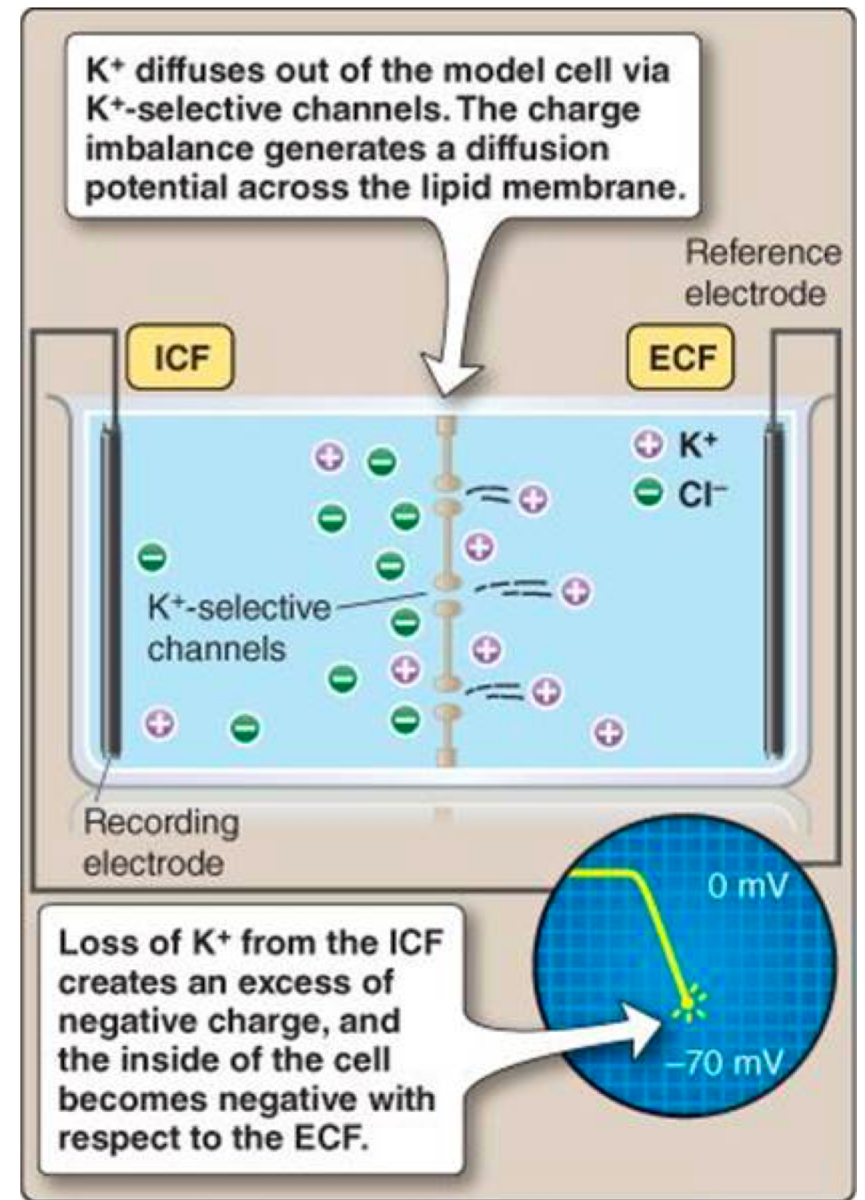
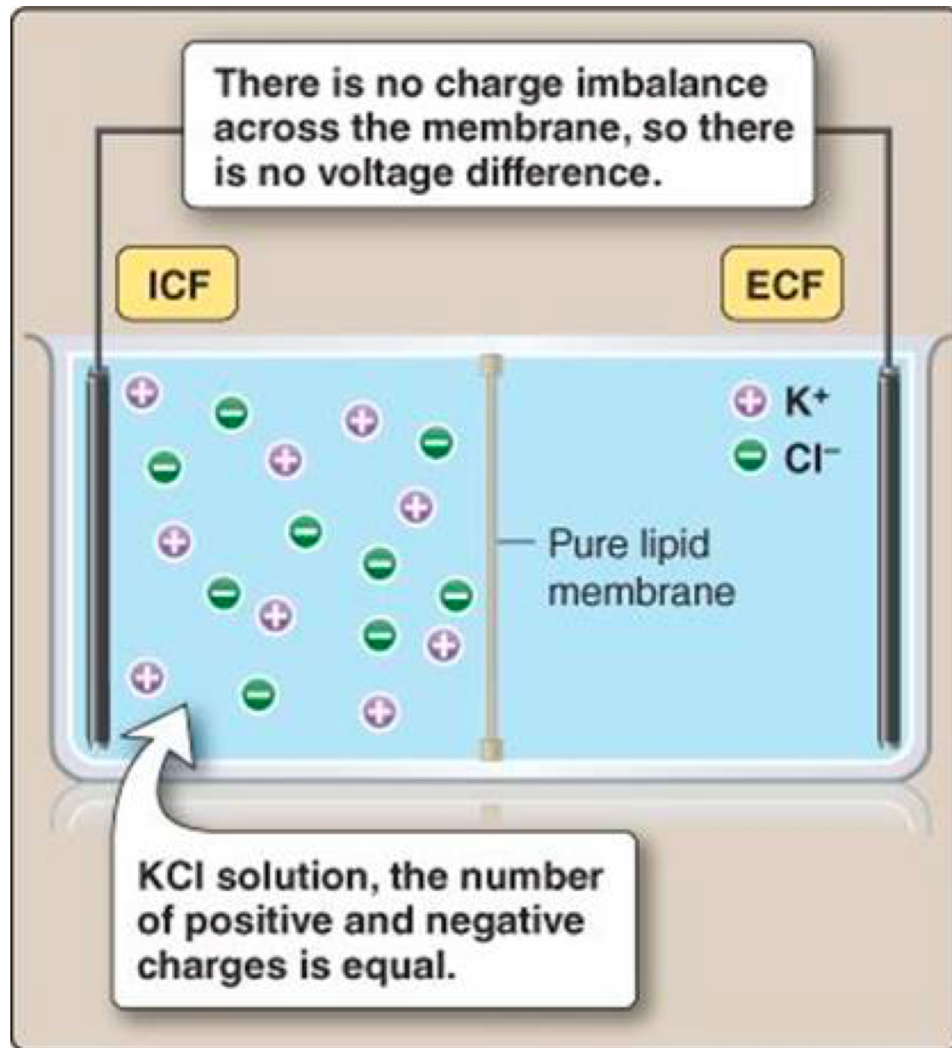
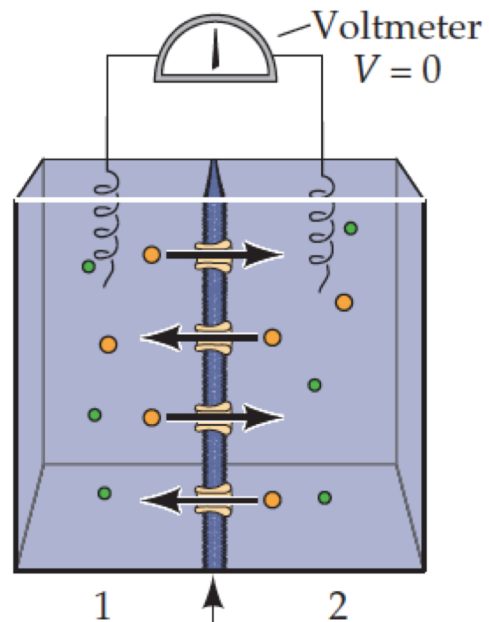




(A)



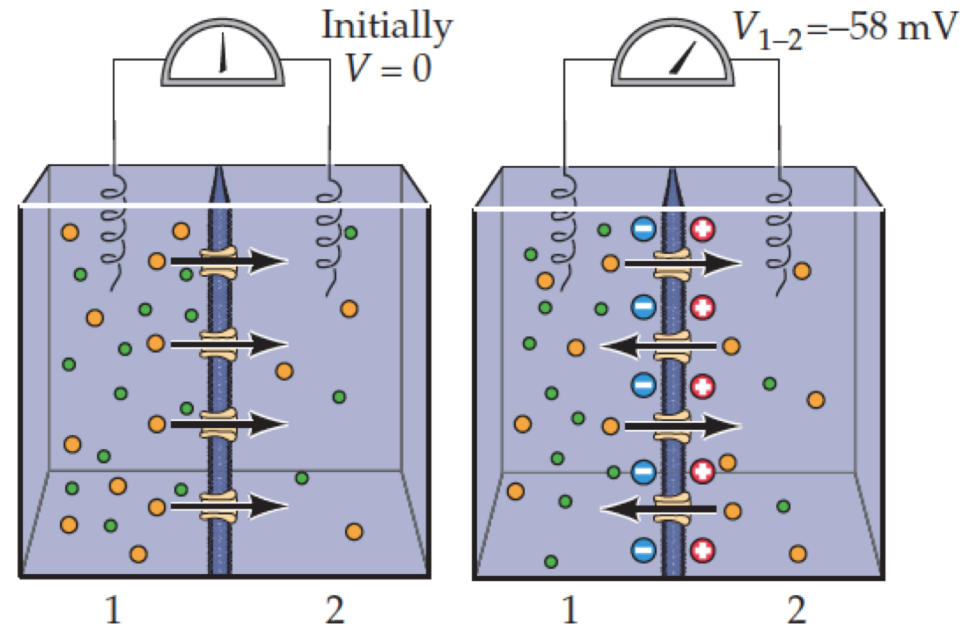
1 mM KCl 1 mM KCl

Permeable to K^+

No net flux of K^+

(B)

Initial conditions $\longrightarrow$ At equilibrium



10 mM KCl 1 mM KCl 10 mM KCl 1 mM KCl

Net flux of K^+
from 1 to 2

Flux of K^+ from 1 to 2
balanced by
opposing membrane
potential

The Origin of the Resting Membrane Potential

introduction

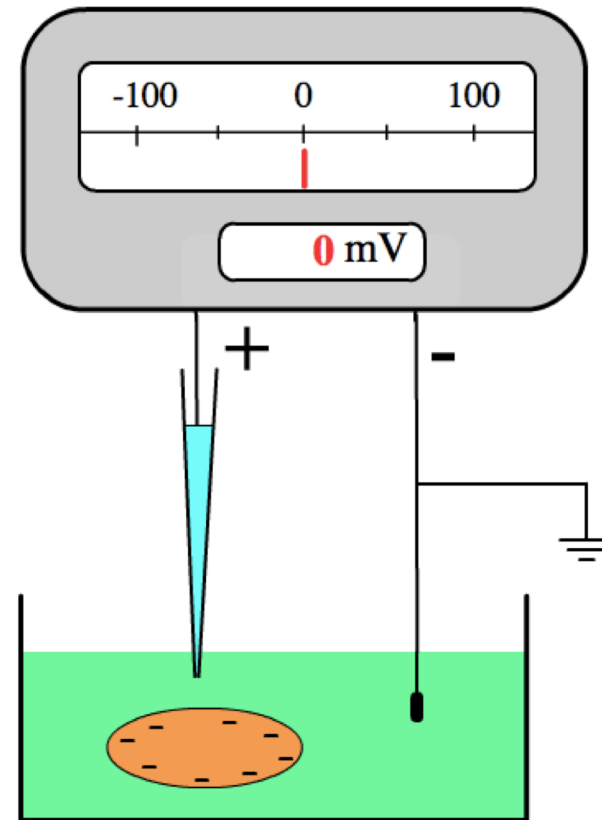
All living cells maintain a potential difference across their cell membranes, with the inside usually negative relative to the outside. In nerve cells the value of the resting membrane potential varies between about -40 and -90 mV.

The membrane potential can be measured by penetrating the cell with a microelectrode. This is connected to a device for displaying voltage such as a specialized oscilloscope or voltmeter.

[Click the button below to demonstrate.](#)

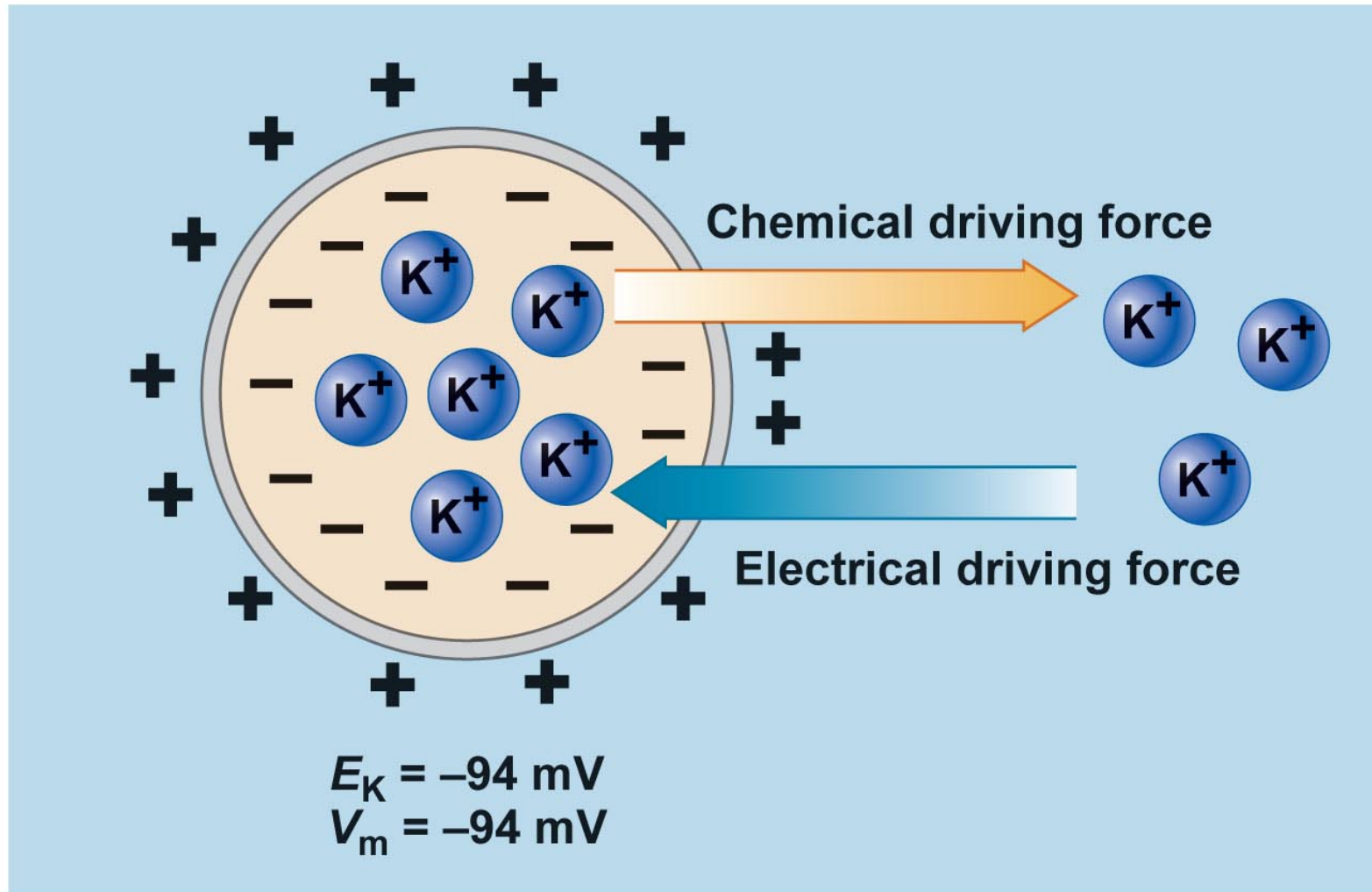
penetrate

<https://www.st-andrews.ac.uk/~wjh/neurotut/mempot.html>



Not mandatory

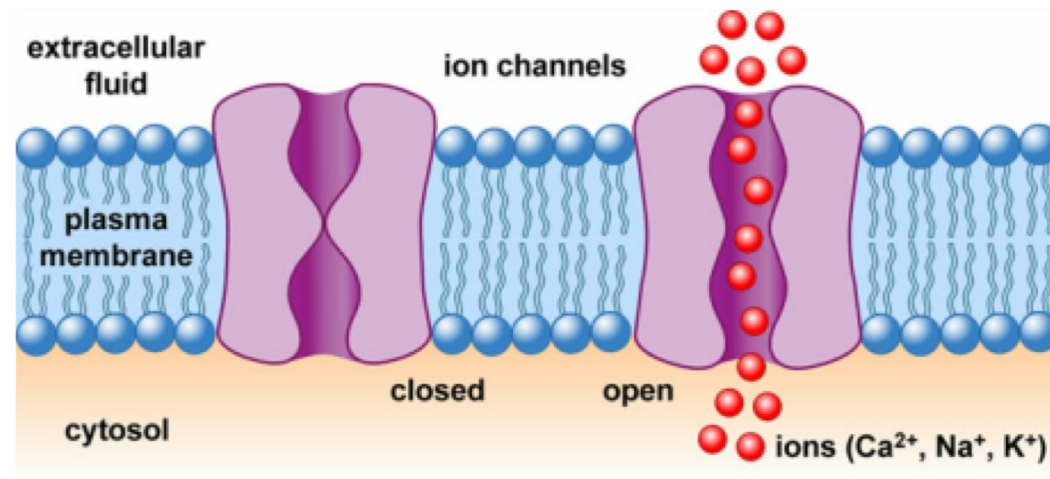
[back](#) [contents](#) [next](#)



(a)

An ion channel can be closed or open.

Leakage channels are channels open most of the time.



For BIO-105, ions channels are specific for a single ions.

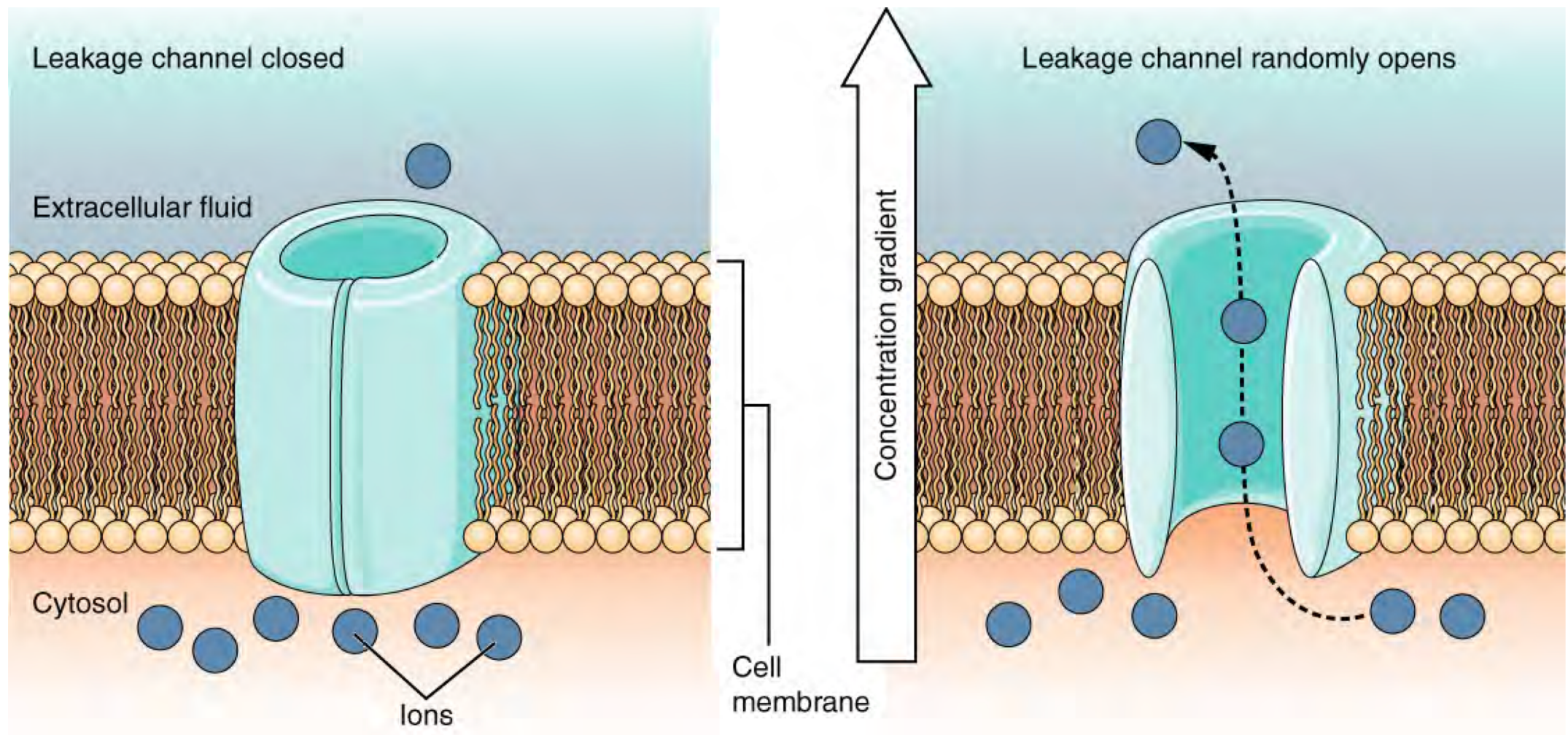
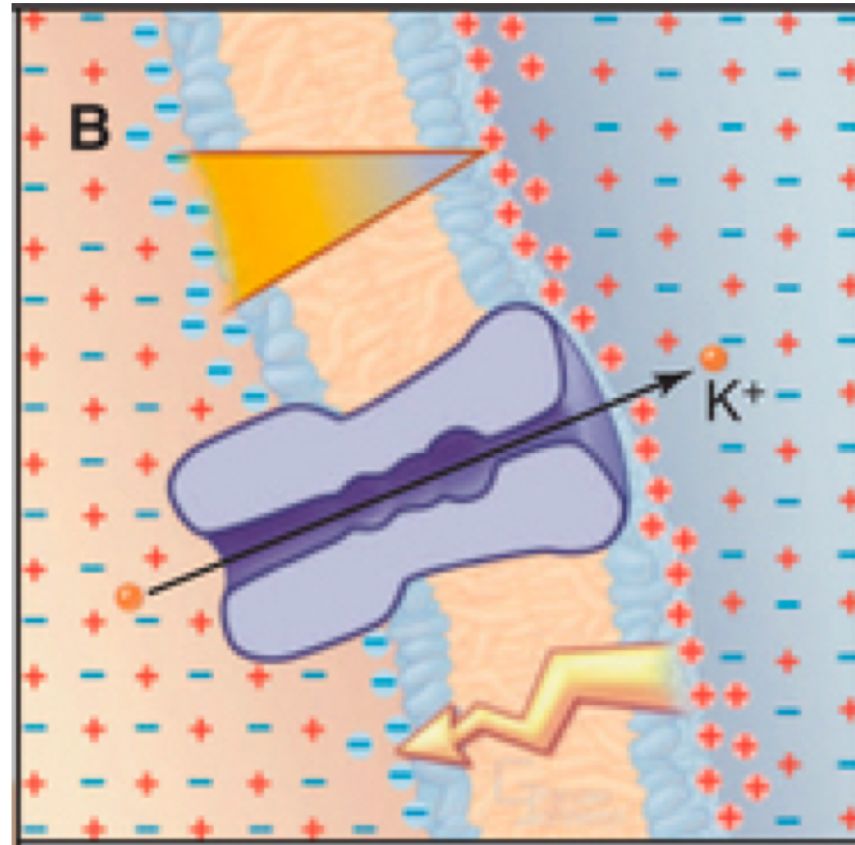


Figure 12.21 Leakage Channels In certain situations, ions need to move across the membrane randomly. The particular electrical properties of certain cells are modified by the presence of this type of channel.

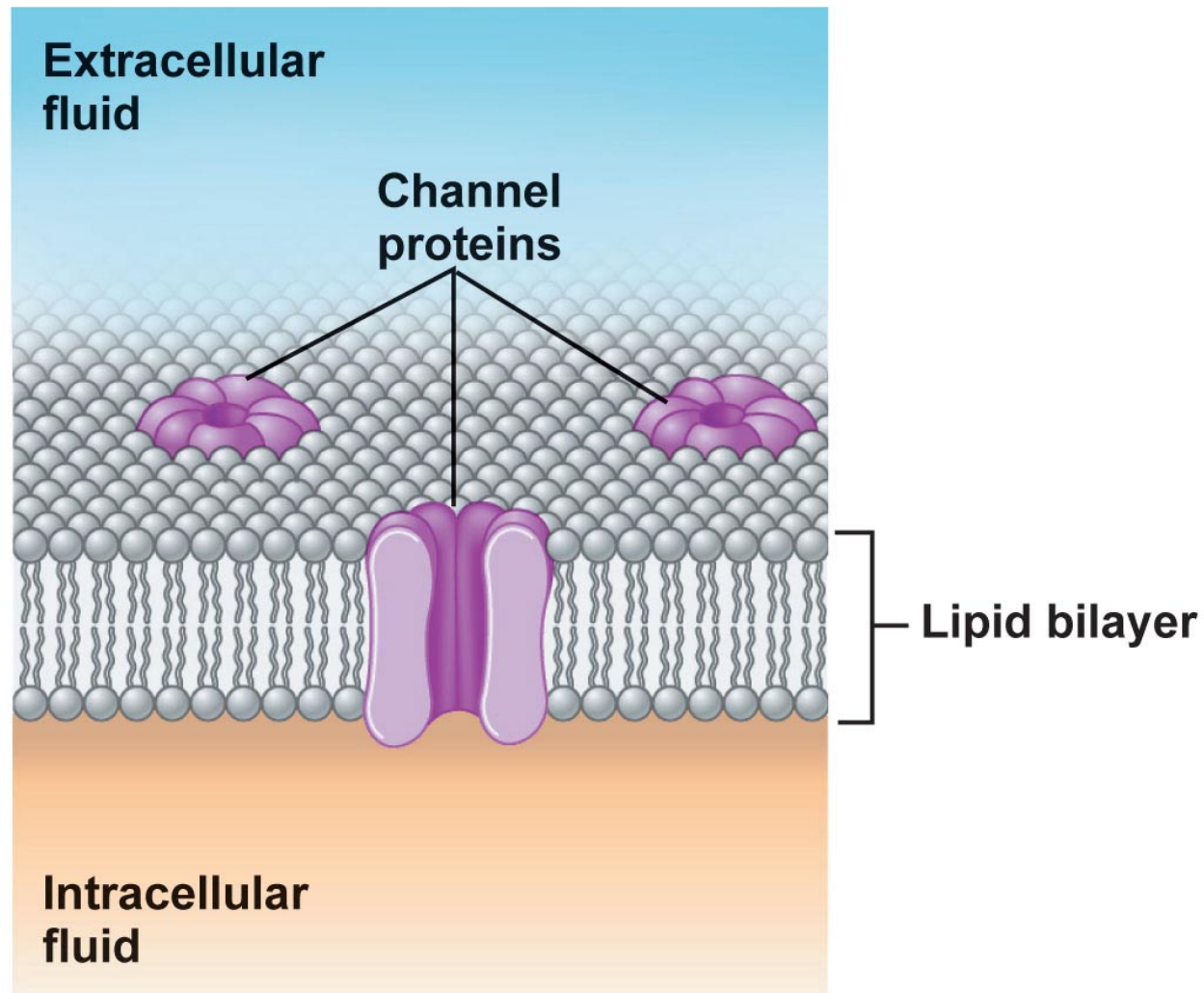
Potassium channels play a key role in resting membrane potential.



The triangle represents the concentration difference of K⁺ across the membrane.

The zigzag arrow represents the membrane potential, negative inside.

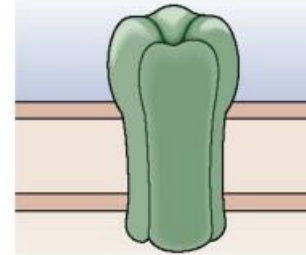
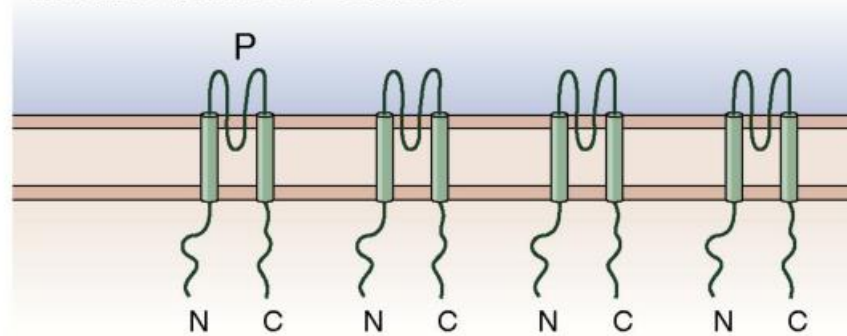
Note the electrical neutrality everywhere except very close to the cell membrane.



(a)

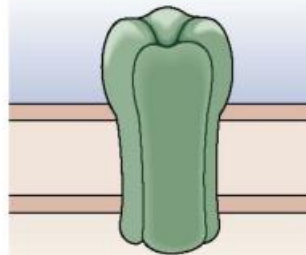
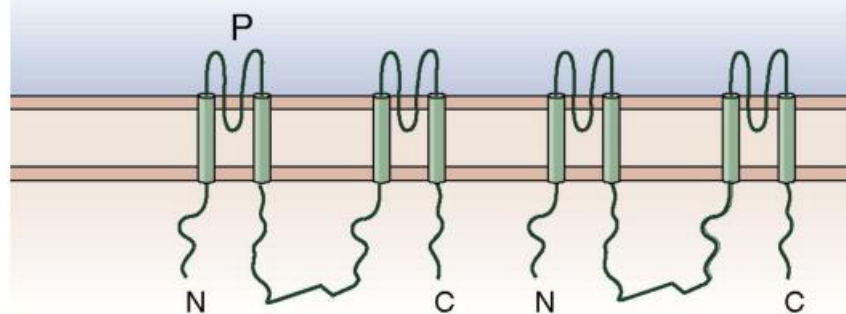
Leakage K⁺ Channels Are Dimers of Subunits With Two P-Loops Each

Inward rectifier K⁺ channel



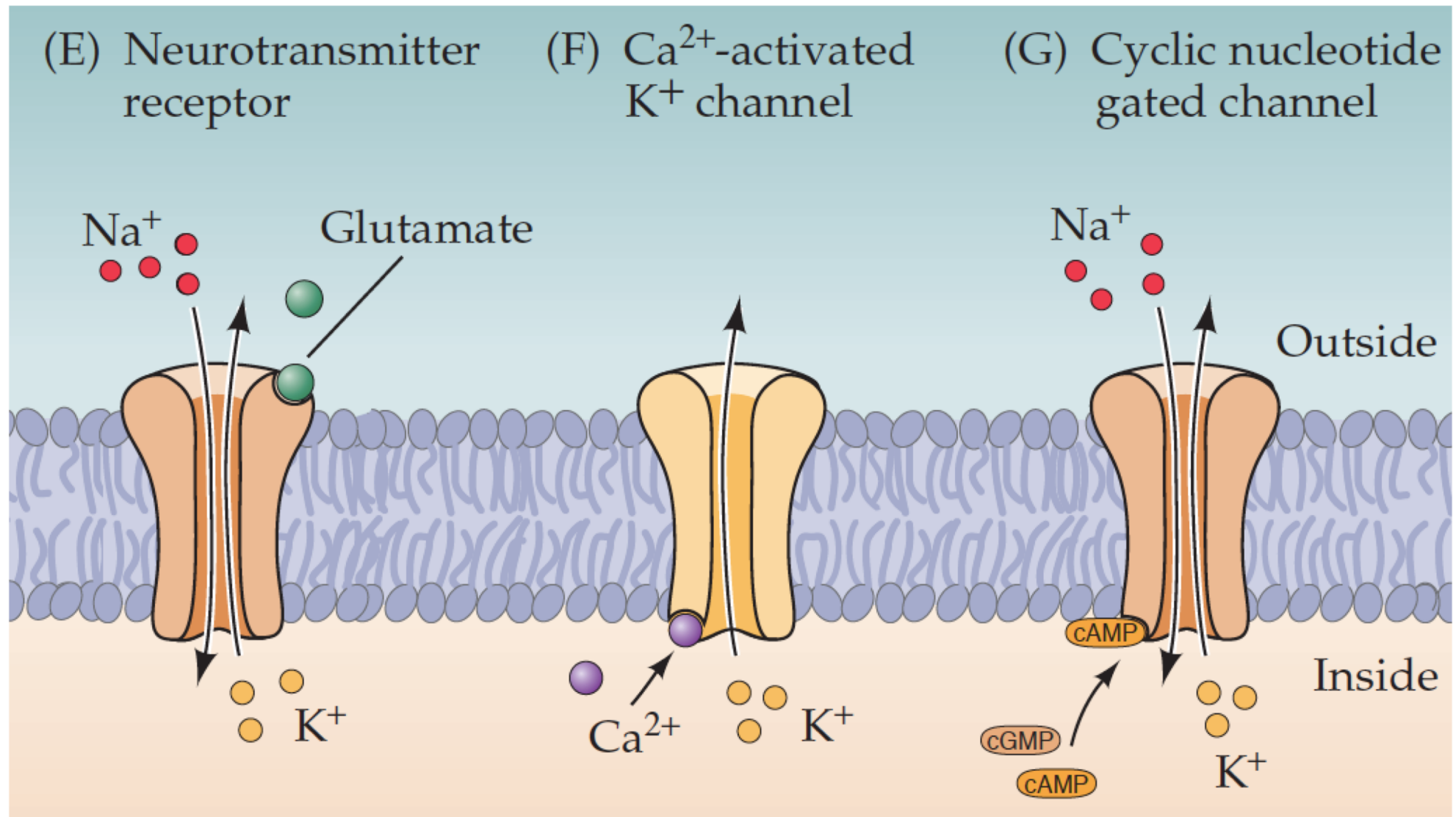
tetramer

Leakage K⁺ channel

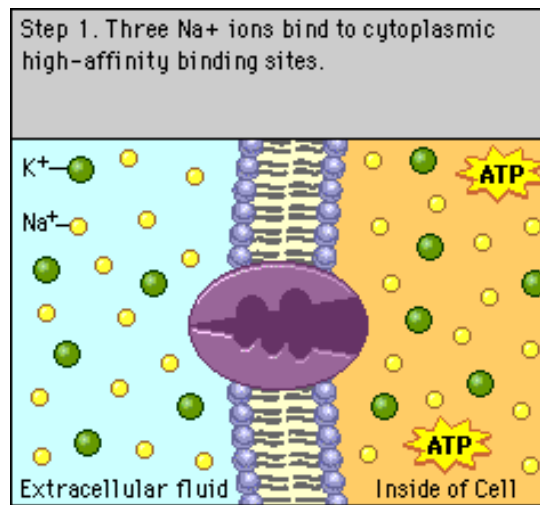


dimer

LIGAND-GATED CHANNELS



Pumps require energy, **channels** do not



How do ions affect membrane potential?

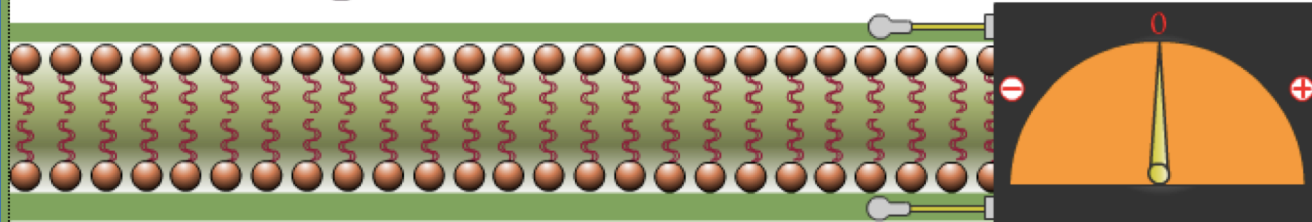
across the cell membrane

Outside

Ca^{2+}) and negatively charged

then see the general

Inside



Potential Difference Across A Membrane

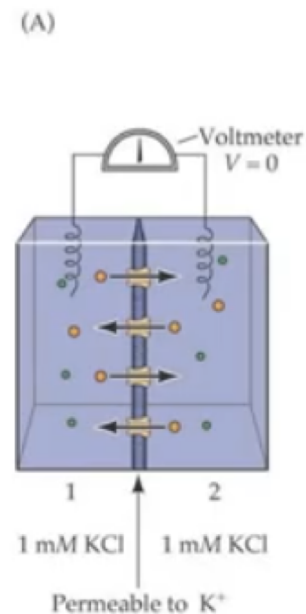
Drag positive ions from the outside of the membrane to the inside, noting the change on the voltmeter reading. Drag them in the opposite direction, again noting the change.

Reset ●

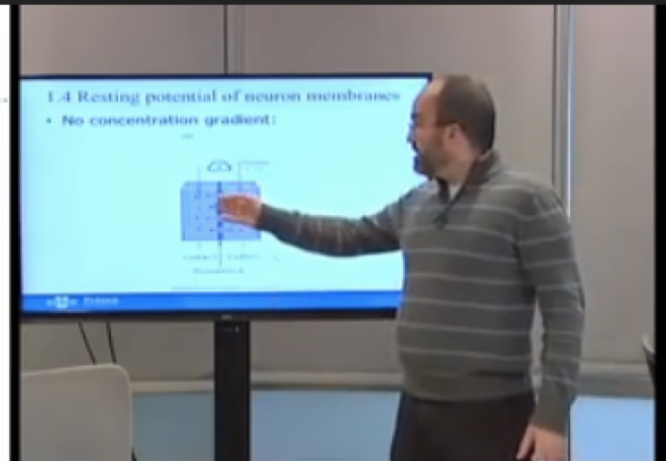
1.4 Resting potential of neuron membranes

- No concentration gradient:

Not mandatory



NEUROSCIENCE, Third Edition, Figure 2.4 (Part 1) © 2004 Sinauer Associates, Inc.



Pedro P. Irazoqui

Introduction to the Nervous System
Lecture 1.4:
Resting Potential of Neuron
Membranes