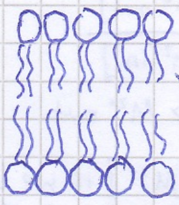
LH $2NADH \rightarrow 2NAD^+ + 4e^- + 2H^+$ $E^\ominus = -0.11\ V$ $E^\oplus = -0.32\ V$
RH: $O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$ $E^\ominus = +1.23\ V$ $E^\oplus = +0.81\ V$

$E^\ominus_{cell} = 1.34\ V$ $\Delta G^\ominus = 517\ kJmol^{-1}$

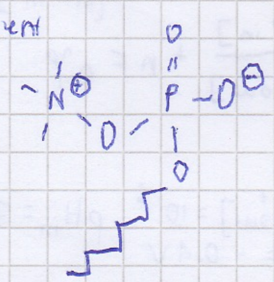
$E^\oplus_{cell} = 1.13\ V$ $\Delta G^\oplus = -436\ kJ\ mol^{-1}$

BIOLOGICAL MEMBRANES



→ hydrophilic due to permanent (+) and (-) gr on the head

→ hydrophobic due to long chain hydrocarbon (stick together)



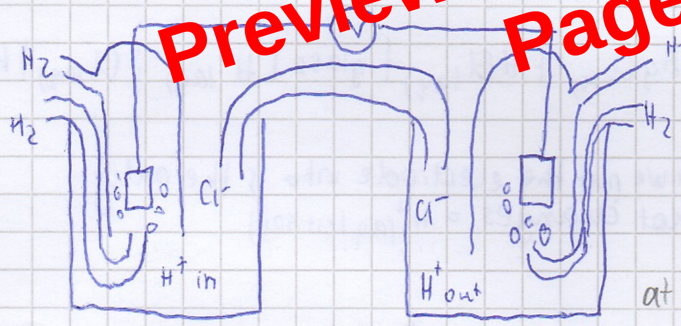
PHOSPHOLIPID BILAYER

They are selectively permeable
+ have protein ion pumps K^+, Na^+, H^+...

$[ion]_{in} \neq [ion]_{out}$ => this creates membrane potential
so when ions travel across the membrane work is done

Ion gradients are coupled to other reactions (ex. ATP formation) and make them favourable!

Electroneutrality doesn't exist because if we put the cell into a beaker with low Cp of ions, only small ions will move to the beaker, big will stay and create charge (movement due to max entropy)



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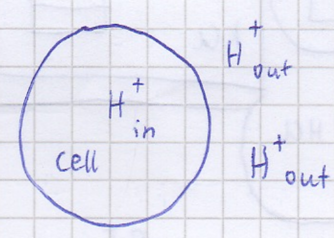

at stp $E^\ominus_{LH} = E^\ominus_{RH}$

2 hydrogen cells

LH: $H^+_{in} + e^- \rightarrow \frac{1}{2}H_{2\,in}$ $E^\ominus_{LH}$

RH: $H^+_{out} + e^- \rightarrow \frac{1}{2}H_{2\,out}$ $E^\ominus_{RH}$

LH. $E^\oplus = E^\ominus + \frac{RT}{nF}\ln\frac{[H^+_{in}]}{(pH_2)^{\frac{1}{2}}}$

RH: $E^\oplus = E^\ominus + \frac{RT}{nF}\ln\frac{[H^+_{out}]}{(pH_2)^{\frac{1}{2}}}$

1 atm

$E^\ominus_{cell} = H^+_{out} + \frac{1}{2}H_{2\,in} \Rightarrow H^+_{in} + \frac{1}{2}H_{2\,out}$

$= H^+_{out} \rightarrow H^+_{in}$

$E^\oplus_{cell} = \frac{RT}{nF}\ln\frac{[H^+_{out}]}{[H^+_{in}]}$

ΔCp causes $\Delta E^\ominus$ = gradient allows electrochem!

The bigger the Cp gradient the bigger the E_Δ = voltage the more energetic the reaction!

→ wants to equalize charge/cp difference