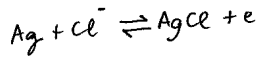
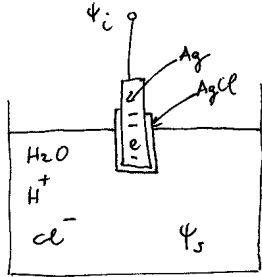


Electrodos para - cloreto de prata
 Ag AgCl

(Wobball pág 113)



$$\psi_i = - \frac{RT}{F} \ln c + \psi_0$$

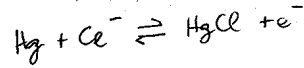
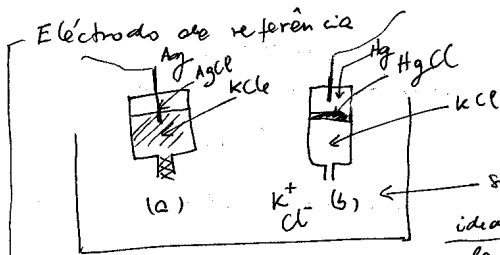
R - constante de Rydberg

T - temperatura absoluta

F - constante de Faraday

c - concentração de iões Cl⁻

ψ₀ - potencial de contacto

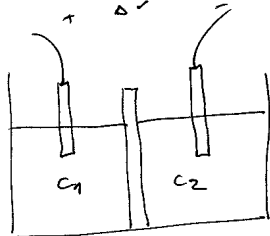


(a) Ag/AgCl type

(b) Hg/HgCl type

soluções em teste
 ideal concentrações constantes
 dentro dos electrodos

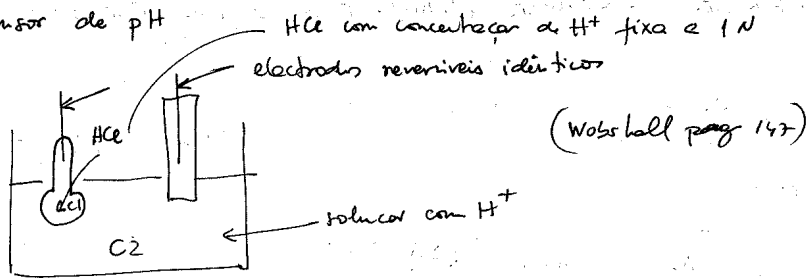
Potencial entre um par de electrodos



$$\Delta V = \frac{RT}{F} \ln \frac{c_1}{c_2} + \Delta V_m + \psi_0^{(1)} - \psi_0^{(2)}$$

$$\Delta V = \frac{RT}{F} 2.30 \log_{10} \frac{c_1}{c_2} \leftarrow \text{Nernst Equation}$$

Sensor de pH



$$\Delta v_i = 2.30 \frac{RT}{F} \log \frac{C_1}{C_2}$$

$$= 2.30 \frac{RT}{F} (\log C_1 - \log C_2)$$

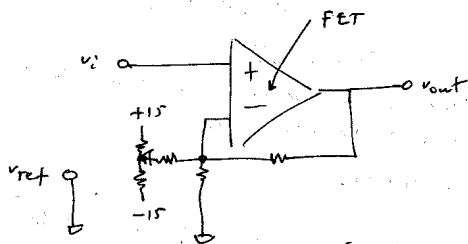
$$= 2.30 \frac{RT}{F} \log C_1 \quad \text{pq } \log C_2 = \phi$$

$$\Delta v_i = 2.30 \frac{RT}{F} \text{ pH}$$

porque (por definição)

$$\text{pH} \equiv \log C_H$$

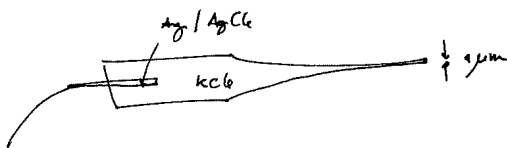
Condicionamento de sinal



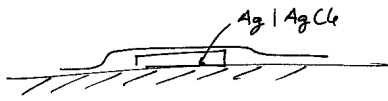
Resistência ^{interna} do electrode
 $10^6 \sim 10^8 \Omega$
 necessita de vídeo!

(Wobshell pag 151)

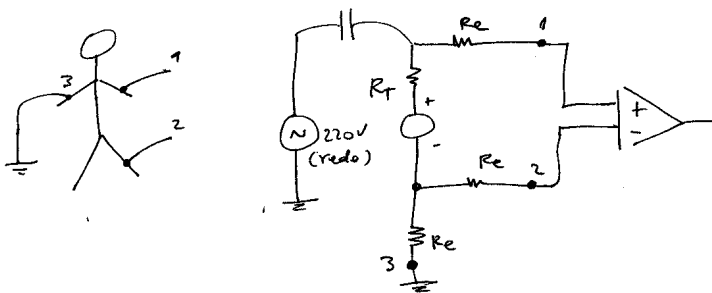
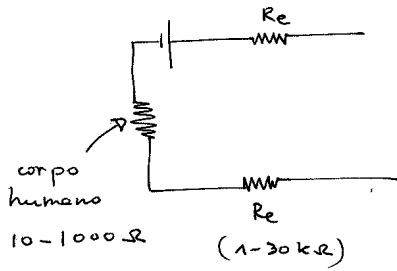
Pino de eletrodo



electrodo para a pele (pág 154 nosichall)



circuito equivalente (2 electodos)



- necesidad de OPAMP de instrumentación
- necesidad de amplificador aislado

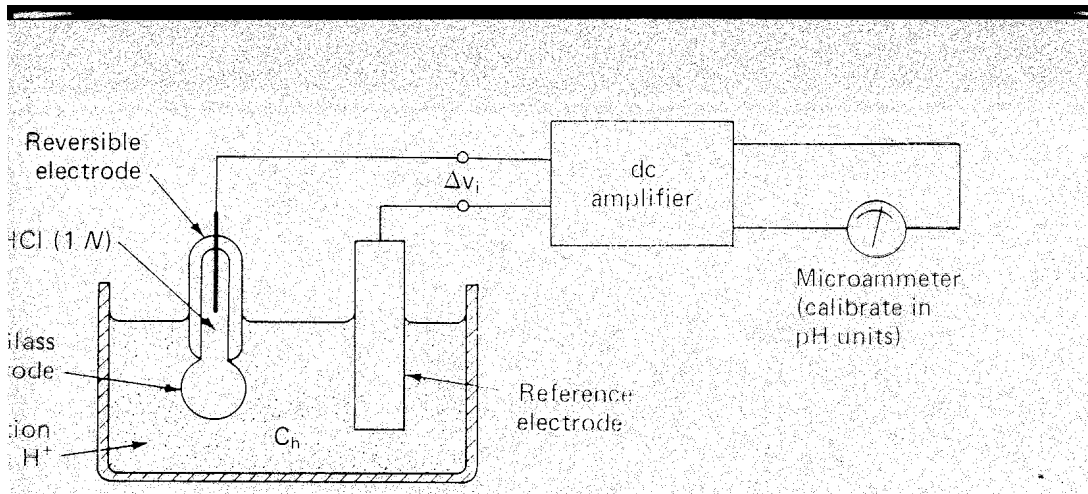


Figure 9-4 The pH meter.

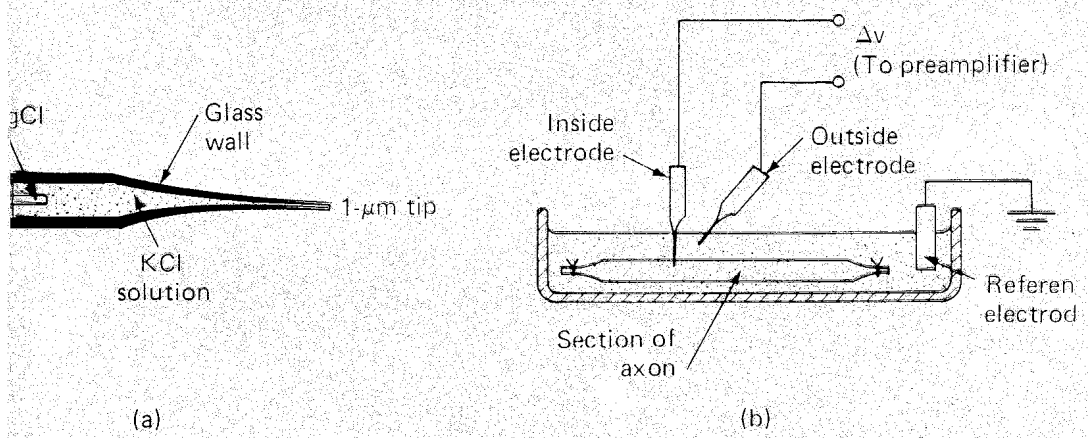


Figure 9-9 Glass microelectrodes: (a) electrode construction schematic; (b) test setup

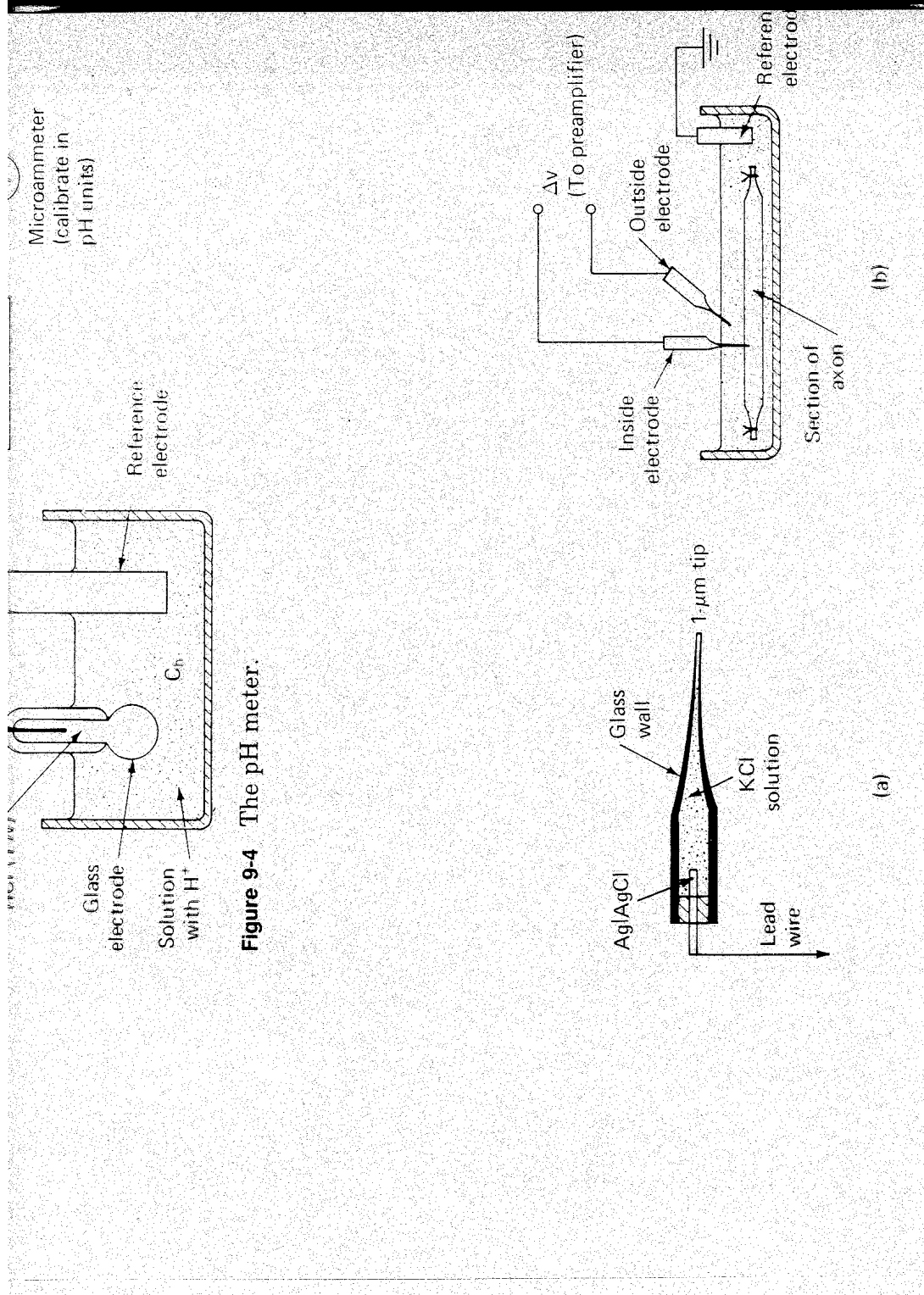


Figure 9-4 The pH meter.

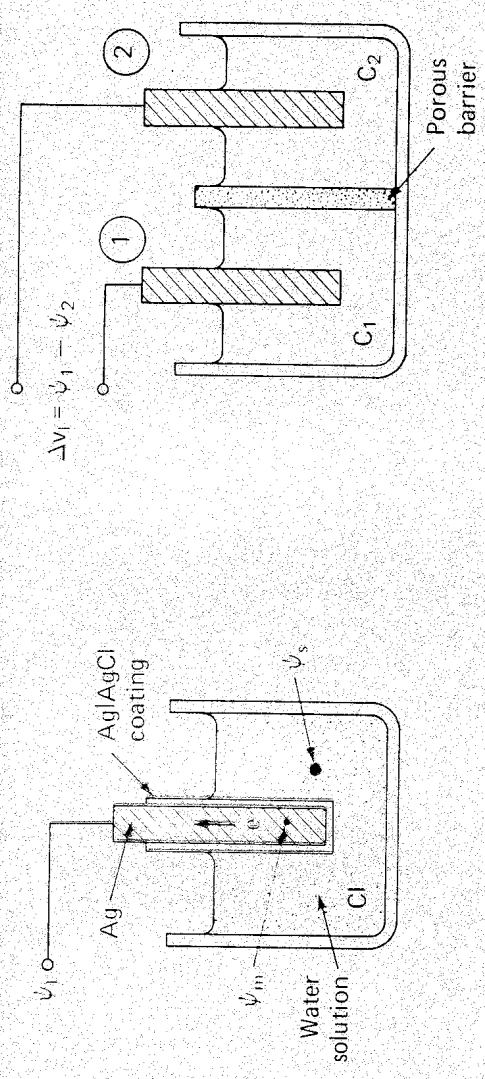
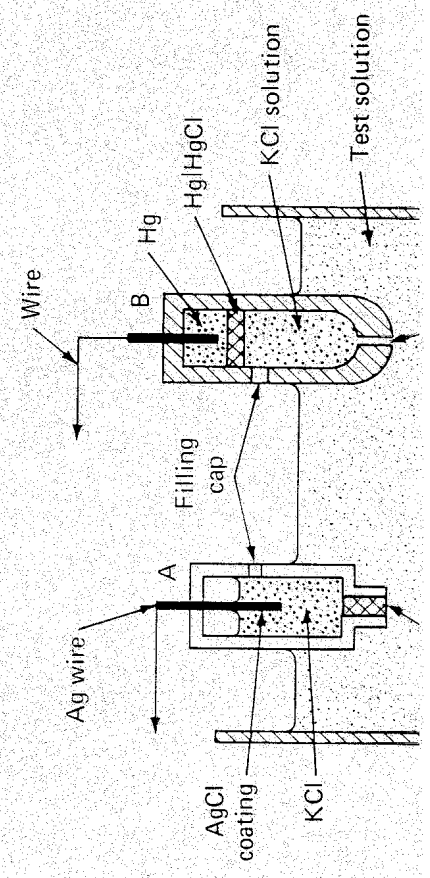


Figure 9-1 Reversible electrodes: $\text{Ag} + \text{Cl}^- \rightleftharpoons \text{AgCl} + e^-$; (a) potentials at one electrode (theoretical); (b) potential between a pair of electrodes.



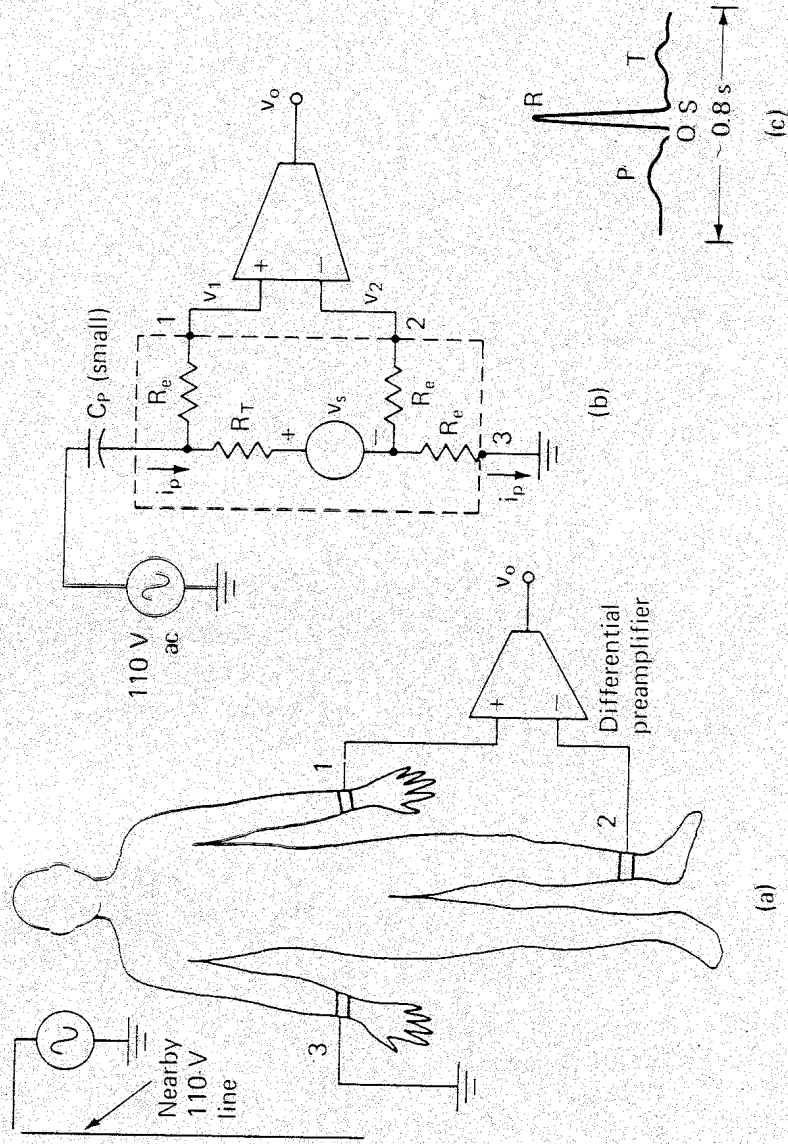


Figure 9-12 ECG: (a) measurement; (b) equivalent circuit; (c) signal