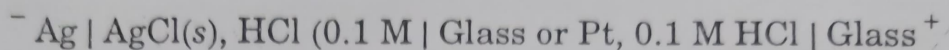


GLASS ELECTRODE :

Construction of Glass electrode and determination of pH using Glass electrode.

Construction : A glass electrode consists of *thin-walled glass bulb** containing AgCl-coated Ag electrode or simply a Pt electrode in 0.1 M-HCl. The glass electrode may be shown schematically as :



HCl in the bulb furnishes a constant H^+ ion concentration. Thus, it is a silver-silver chloride electrode, reversible with respect of chloride ions.

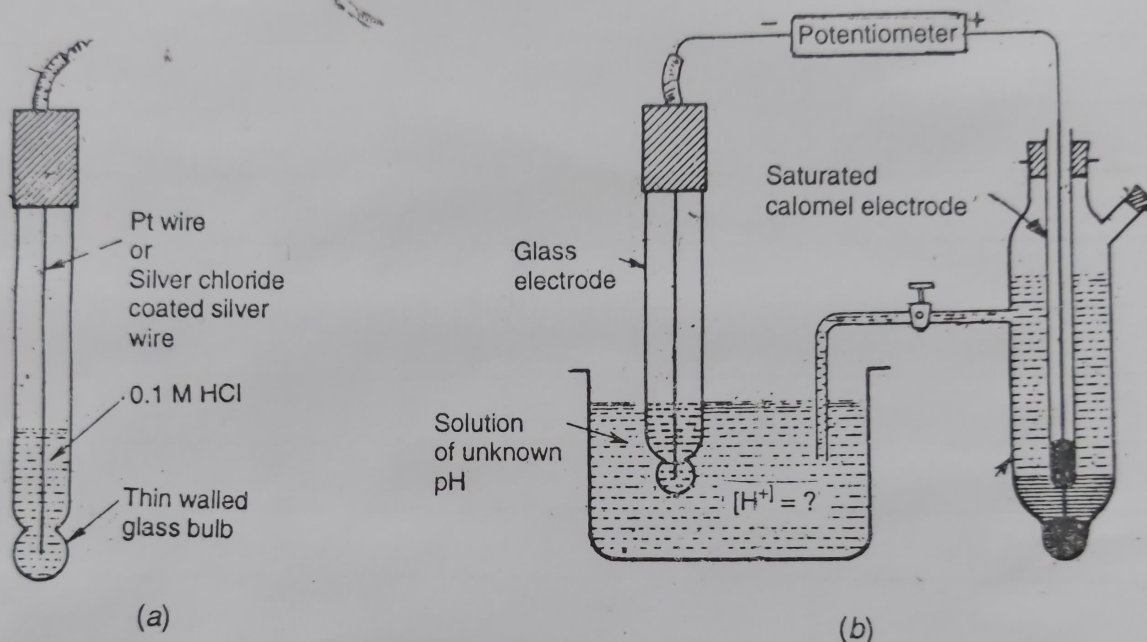


Fig. 18. (a). Glass electrode; (b) determination of pH by glass electrode.

Glass electrode is used as the "*internal reference electrode*". For determining the pH of solutions, especially coloured solutions containing oxidizing or reducing agents. Usually, *calomel electrode is used as the second electrode*. In order to determine the pH of a solution, the glass electrode is placed in the solution under-test and this half-cell is coupled with saturated calomel electrode (see Fig. 18 (b)). The e.m.f. of the cell is measured. Since the resistance is very high, so *special electron-tube voltmeters* are used to measure the e.m.f. of the above cell. The e.m.f. of the complete cell is given by :

$$\begin{aligned} E_{\text{cell}} &= E_{\text{right}} - E_{\text{left}} \\ &= 0.2422 \text{ V} - [E^{\circ}_G + 0.0592 \text{ V pH}] \end{aligned}$$

whence,

$$\text{pH} = \frac{0.2422 \text{ V} - E_{\text{cell}} - E^{\circ}_G}{0.0592 \text{ V}}$$

The E°_G value of a glass electrode can be determined by using a solution of known pH.