PH-metric

The oldest and still most widespread ion-selective electrode that is used to measure pHis the glass electrode. As a rule, it is constructed in one body directly with a suitable reference electrode. There are a number of modifications; here we will show the principle on the basic design.

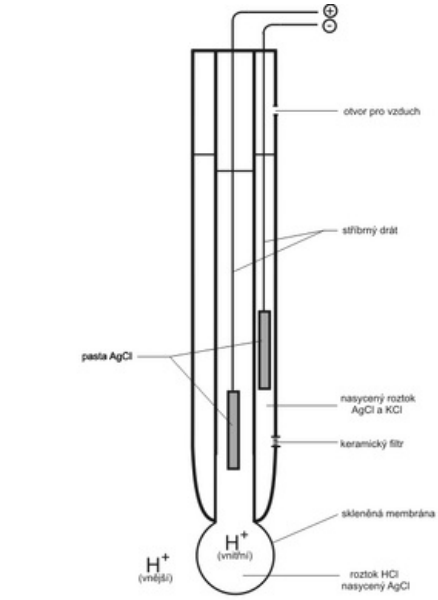
The ability of the glass electrode to indicate the concentration of H^+ can be simply explained by the fact that the glass membrane (a well with very thin walls blown from special glass) is permeable to H^+ and impermeable to other ions. A silver wire covered with a layer of AgCl is immersed in the internal electrolyte. Depending on the acidity of the measured solution, the concentration of H^+ inside the flask changes. Cl^- ions do not pass through the membrane, so in order to maintain the electroneutrality of the solution, the reaction takes place at the electrode

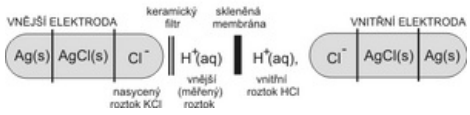
$$AgCl + e^- <=> Ag^+ + Cl^-.$$

If we immerse the electrode in an acidic solution, the excess of H^+ ions will cause more Cl^- ions to be released from the AgCl paste. This consumes more electrons from the silver wire and the electrode gets a more positive voltage compared to the reference. Conversely, in an alkaline environment, excess Cl^- will donate its electrons and the electrode will have a more negative voltage.

A silver wire coated with AgCl paste is most often used as a reference electrode in pH-metric, but this time it is immersed in a KCl solution with a precise concentration (i.e. in a solution with a constant concentration of Cl^-, e.g. saturated, 1 $mol \cdot l^{-1}$, 3 $mol \cdot l^{-1}$ etc.). The potential of the reference electrode is not affected by the concentration of H^+ ions. The electrolyte of the reference electrode is conductively connected to the measured solution by means of a bridge with a ceramic partition (frit).

The given description of the pH-metric electrode is greatly simplified. The actual steps on the glass membrane are described in the glass electrode details subpage





Glass electrode

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