Anion selective electrodes (ISEs) on solid support

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Analytical chemistry is an important part of science, which enables us to measure the presence and concentration of the exact analyte in the sample. Potentiometry is a field of analytical methods, in which the potential between the working and the reference electrode is measured in a non-current environment. [1] Ion-selective-electrodes (ISE) are one of the most important sensors in the chemical analysis, because of their high selectivity, wide working rage, short response time and low cost. [2]

Compared to the conventional electrodes, miniaturized ones can't contain a liquid electrolyte, which should be replaced by an intermediate layer. [3] Conductive polymers are often used because of their mixed conductivity. [4] They can also be added to the membrane and act not only as an intermediate layer, but also as an ionophore. [5]

Most of the published research concerns intermediate layers in cation-selective electrodes. The aim of the research was to find a fitted material which can replace the inner electrolyte in anion-selective electrodes.

Another addition to the membrane are silver complexes that stabilize the interface in cation-selective electrodes with an anion additive [6], so there were prepared similar samples for the anion-selective electrodes. During the research the dithizone and silver complex were used in the miniaturized electrode instead of the inner electrolyte in an conventional one. Moreover, the silver ionophore IV was used for the same aim, but without success.

The dependence between the potential difference and the activity of fluoride anions in the solution (because of zirconium porhiryn used as an ionophore) and response stability in time were measured. Below there are calibration curves of prepared electrodes (Fig. 1) and selevtivity plots (Fig. 2).

It was concluded that the selctivity of the electrodes is similar to the selectivity of conventional fluoride-selective electrodes. Moreover, the stability of the interface potential was improved compared to the coated-wire ones.

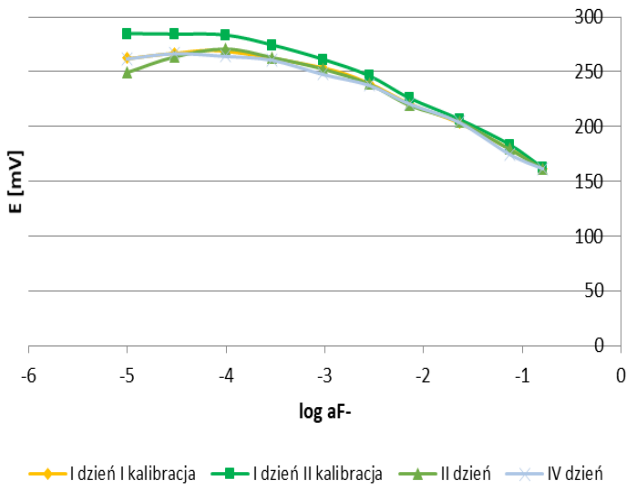

Fig. 1. Calibration curve of the electrodes with ditihizon-silver complex inside the membrane

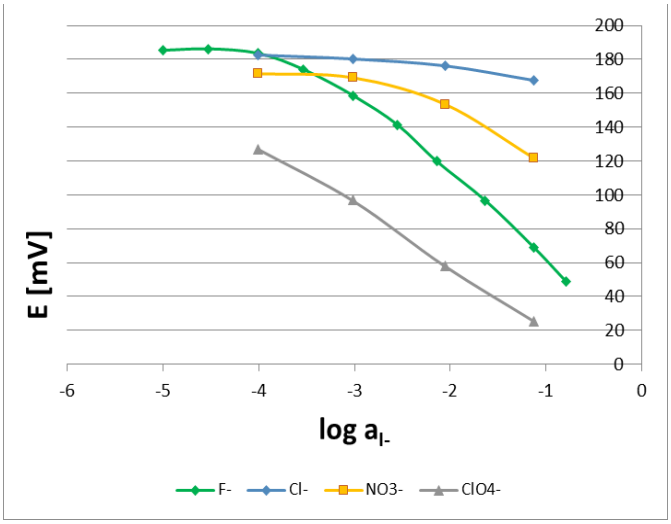

Fig. 2. Selectivity plot of te ready electrodes with ditihizon-silver complex inside the membranę

It was concluded that silver and dithizon complex can stabilize the interface potential in miniaturized electrodes. Moreover, electrodes can work both in a neutral-carrier and a charge-carrier mechanism, with smaller working range in the latter.

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