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Preparation and properties of a new solid state Arsenate As(V)ion selective electrode and its application

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Abstract

In this study a new solid-state ion selective electrode which is easy to prepare and sensitive to arsenate ion concentration is prepared. The solid salts used in the electrode composition were Cu_2S , Ag_3AsO_4 and Ag_2S . The principal component of the electrode was Ag_3AsO_4 . The measurements were made in constant ionic strength using 0.1M NaNO_3 and at room temperature. The potentiometric response of electrodes prepared in various compositions was investigated against arsenate ion concentration. The highest slope was obtained with 40 % Ag_3AsO_4 , 30 % Cu_2S and 30 % Ag_2S . This electrode showed linear response for arsenate ion in the 10^{-5} - 10^{-1} M concentration range. An analytically useful potential change occurred, from 1×10^{-6} to 1×10^{-1} M arsenate. The slope of the linear portion was about $19 \pm 2 \text{ mV} / 10$ -fold change in arsenate concentration. The lifetime of the electrode was more than two years, when used at least 4-5 times a day, and the response time was about 20-30 seconds depending on the concentration changes. The interference of most common ions and the effect of pH (6-10) have been investigated. This electrode has been used for the determination of arsenate ion in beer sample.

Keywords: Arsenate electrode, solid state, determination of arsenic, long life time, arsenic in beer

Introduction

Potentiometric detection with the use of ion-selective electrodes (ISE) is nowadays a commonly used analytical technique due to a number of its advantages, such as analysis speed, their selectivities on specific ions, wide working range, ease of handling and low cost.

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