

# Application of Thiosemicarbazide Based Schiff Base Ligands as Ionophore in PVC Matrix for Potentiometric Sensor Development

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## Abstract

The main objective of this work is to provide information on the development of ion selective electrodes (ISEs) based on PVC membrane by incorporating Schiff base ligands and their complexes as ionophores for sensing different metals ion. Ion selective electrodes can be prepared and the electrodes performance may optimized by varying the amounts of PVC, plasticizers and cation/anion excluders. Various characteristic features of chemical sensors with different parameters such as response time, selectivity, lifetime and pH effect on sensor response have been reported. The proposed ISEs have been successfully applied to determine cations and anions and as electrode in potentiometric titrations.

**Keywords:** PVC Membrane; Ion-selective Electrode; Membrane Electrode; Schiff Bases; Thiosemicarbazide; Semicarbazide

## Introduction

Ion selective electrodes (ISE) are one of the most frequently used potentiometric sensors during laboratory analysis as well as in industry, process control, physiological measurements, and environmental monitoring [1-6]. In ISE's, Signal is generated by the charge separation at the interface between the membrane and the solution, due to the selective partitioning of ionic species between these two phases. In past two decades, there has been a growing interest in search for ionophores (electroactive material) that can chemically recognize specific ion and offers new or improved selectivity for different ions [7].

The main components of membrane in ion selective potentiometric sensors are a polymeric matrix, a membrane solvent mediator, an ionic additive and an ion sensory molecule. All these components and their relative amounts influence the characteristics of these types of sensors. Ionophore and plasticizer in a PVC membrane plays a key role in the performance of an ion selective electrode [8].

Schiff bases derived from thiosemicarbazide may be very useful as ionophores because of their significant electrochemical and biochemical activity in liquid membrane. Schiff bases are the products of condensation of arylamines and carbonyl compounds [9]. They are quite stable and versatile intermediates for preparation of

a number of important medicinal compounds. Schiff base ligands have also been for the synthesis of metal complexes with different metal ions [10-12].

A series of new Schiff base derivatives were synthesized with thiophene-2-aldehyde and acetyl-2-thiophene. These Schiff base ligands have been used as ionophore for the preparation of PVC membrane for the fabrication of Ion-selective electrodes (ISEs). The ISEs have widely been used as chemical sensors for various metal ions.

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