Cu²⁺-selective Sensors Based on a New Ion-Carrier and Their Application for the Analysis of Copper Content of Water Samples

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The present work tends to introduce a new selective ion-carrier (i.e. 4-(2-hydroxy-benzylideneamino)-5-phenyl-4H-1,2,4-triazole-3-thiol (**L**)) for Cu²⁺ ions. The study, hence involved complexation studies in acetonitrile solutions of different ions which proved a selective interaction between the ion-carrier and copper as opposed to alkali, alkaline earth, and transition metal cations. Based on the complexation observations **L** was evaluated for use as a new sensing agent in copper selective membrane sensors and the optimal sensor responses were observed at a membrane composition of 30% PVC, 62% NPOE, 6% **L** and 2% NaTPB. The potentiometric sensors produced stable potential responses towards Cu²⁺ ion, and the slope of the calibration curve was 28.7±0.4 mV decade⁻¹ over the range of 1.0×10⁻⁶ to 1×10⁻² mol L⁻¹ for polymeric membrane electrodes (PMEs) and 28.5±0.3 for all solid state electrodes (ASSEs) in the range of 1.0×10⁻⁸ to 1×10⁻⁴ mol L⁻¹. The response time of the sensors was rather short (i.e. about 25s in the case of PMEs and 15 s for the ASSEs) and both devices showed acceptable life times of 5 weeks for the PMEs and 7 weeks in the case of the ASSEs. The electrodes were used for the determination of the copper content of some water samples, and the results proved to be acceptable.

Keywords: Copper, PVC membrane, Ion selective electrode, Potentiometry, Sensor, Water sample

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