Fabrication and Applications of Potentiometric Sensors Based on *p*-*tert*-butylthiacalix[4]arene Comprising Two Triazole Rings Ionophore for Silver Ion Detection

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This work describes the fabrication and applications of potentiometric silver-selective sensors, based on the use of a newly synthesized *p*-*tert*-butylthiacalix[4]arene comprising two triazole rings, as a novel neutral ionophore in plasticized poly(vinyl chloride) (PVC) membranes. The effect of lipophilic anionic additives on the voltammetric responses of the sensors was investigated in details. The constructed sensors exhibited a Nernstian behavior with 53 ± 0.9 mV per decade change in Ag^+ activity over the range from 7.0×10^{-6} to 8.0×10^{-3} , with a repetitive detection limit of $0.421 \mu\text{g mL}^{-1}$. Moreover, the effect of lipophilic salts, plasticizers and various interfering ions were probed. Importantly, validation of the method is achieved in terms of good performance characteristics, including good selectivity for Ag^+ over alkali, alkaline earth and transition metal ions (e.g. Na^+ , K^+ , Pb^{2+} , Mg^{2+} , Co^{2+} , Ni^{2+} , and Cu^{2+}) together with long life span. Other important characteristics such as low detection limit, acceptable accuracy and precision, long term stability, reproducibility were also demonstrated. On the application side, the sensors were utilized for facile potentiometric measurements of iodide ions (I^-) over the concentration range of 0.749 to $856 \mu\text{g mL}^{-1}$ and also employed for probing sequential titration of some importantly relevant anions (e.g. Cl^- , Br^- , I^- , SCN^- and N^{3-}). Significantly, sequential binding of these anions with Ag^+ cations produces sharp stepwise titration curves with consecutive end point breaks at the equivalent points.

Keywords: Thiacalix[4]arenes; silver-ion selective electrode ; Potentiometry.

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