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FABRICATION AND OPTIMIZATION OF Cu(II) ION SELECTIVE MEMBRANE ELECTRODE

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In this study, the fabrication, performance characteristics and application of a Cu(II) ion selective pyridine based thorium(IV) phosphate membrane electrode are studied. The membrane electrode exhibited a fast response time of 10 s, the wide linear response in the concentration of $1 \cdot 10^{-1}$ to $1 \cdot 10^{-7}$ M of Cu (II) ions with a slope of 27.60 mV/decade change in concentration and a lifetime of 4 months. The potentiometric response revealed that the potentials are independent of pH in the wide range of 3.0–6.5. It was also used as an indicator electrode in the potentiometric titration of Cu(II) ions using ethylenediamine tetraacetic acid, disodium salt.

Keywords: composite cation-exchanger, potentiometric determination, pyridine based thorium(IV) phosphate, membrane electrode, selectivity.

Introduction

Water pollution caused by the excessive discharge of heavy metal ions into water sources is of great environmental concerns because of non-degradable and persistent nature [1]. Natural and anthropogenic sources, including forest fire, volcanic activity, mining as well as industrial activities such as electroplating, smelting, batteries manufacturing, paint, petroleum, pharmaceuticals, pesticides etc. may discharge a large quantities of lead, mercury, nickel, zinc, aluminium, iron and copper effluents into water drainage [2]. Copper is ranked third major metal commodity which is being consumed in industrial activities after iron and aluminium. Copper is an essential trace element in biological systems and living organisms at ambient levels [3]. However, it is toxic to aquatic organisms and human beings above the permissible limit as proposed

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- [18] Jain A.K., Singh R.P. // Indian J. Chem. Technol. - 1981. - 19. - P. 192 - 194.
- [19] Amarchand S., Menon S.K., Agarwal Y.K. // Electroanal. - 2000. - 12. - P. 522 - 526.
- [20] Gregor H.P., Jacobson H., Shair R.C., Weston D.M. // J. Phys. Chem. - 1957. - 61. - P. 141 - 147.
- [21] Moody G.J., Thomas J.R.D. Selective Ion Sensitive Electrode. - Watford, Hertfordshire, England: Marrow, 1971.
- [22] Ghaedi M., Khajehsharifi H., Montazerzohori M. et al. // Mater. Sci. Eng., C. - 2012. - 32. - P. 674 - 679.
- [23] Gholamian F., Mohseni M.A.S., Niasari M.S. // Ibid. - 2011. - 31. - P. 1688 - 1691.

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