Selective Potentiometric Method for Determination of Nitrile in Water Samples Using New PVC Membrane Sensors

Amr L Saber^{1,2,*}, Layla S. Almazroai²

¹ Chemistry Department, Faculty of Science, Zagazig University, Zagazig, Egypt.

² Chemistry Department, Faculty of Science, Umm Al Qura University, Makkah, Saudi Arabia

*E-mail: alshefny@yahoo.com

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The performance characteristic of sensitive PVC-nitrile sensor was investigated for the quantification of nitrile ions in water samples, based on the use Cis-(2-thiophene-carbonitrile)-Bis-(2,2'-bipyridyl)ruthenium(II)tetrafluoroborate (ionophore A) and Cis-(trichloro-acetonitrile)-Bis-(2,2'-bipyridyl)ruthenium(II)tetrafluoroborate (ionophore B). The sensors are prepared by incorporating of A and B ionophores into a plasticized poly vinyl chloride (PVC) sensors to form electrodes I and II, respectively. The best performance was obtained using casting solutions of composition: *o*-nitrophenyloctylether(*o*-NPOE): PVC: ionophore ratio (wt %) of 63:30:7, respectively. The sensors exhibit significantly enhanced selectivity toward nitrile ions over the concentration range 1.0×10^{-5} - 1.0×10^{-2} mol L⁻¹ with a lower detection limit of 7.0×10^{-5} and 5.0×10^{-5} mol L⁻¹ and a Nernstian slope of 57.0 ± 0.71 and 55.1 ± 0.33 mV decade⁻¹ at pH 12 for both electrodes I and II. The sensors show stable and fast response time (≤ 11 s) and can be used for about 120 days without any considerable variation in the response of potential for electrodes I and II, respectively. The proposed sensors show good segregation of nitrile in presence different ions. The proposed method is successfully applied for determination of nitrile ion in environmental samples using potentiometric method.

Keywords: PVC sensor; Environmental samples; Nitrile determination; Cis-(2-thiophene-carbonitrile)-Bis-(2,2'-bipyridyl)ruthenium(II)tetrafluoroborate (ionophore A) and Cis-(trichloro-acetonitrile)-Bis-(2,2'-bipyridyl)ruthenium(II)tetrafluoroborate (ionophore B)

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