Monitoring Lead Ions With Optical Sensing Films

Filiz SAĞIROĞLU*, Rahime TOPARLAK*, Fadim YEMİŞ* and Berrin YENİGÜL*

*Department of Chemistry, Ege University, Bornova 35100, Izmir, Turkey

Optical chemical sensors or optodes are another system that can be employed for quantitative determination of heavy metal ions. These systems are based on the use of immobilized indicators and attached to the optical sensors, which change their absorption or fluorescence emission intensity in the presence of metal ions.

Because of Rose Bengal which has high fluorescence properties is soluble in water, in order to use it as a chromoionophore for lead ion, it was reacted with tetraoctylammonium bromide (TOABr) to obtain Rose Bengal derivate insoluble in water.

This Rose Bengal derivative was immobilized in PVC matrix to prepare optical sensor for lead ion. The bis-(2-ethylhexyl)phthalate (DOP) was chosen as plasticizer. The absorption and fluorescence emission spectra were recorded by preparing thin films on a Mylar polyester support.

Maximum excitation and emission wavelengths of the sensor slides were found as 525 nm and 580 nm respectively. The sensors films were used for monitoring lead ions from their fluorescence quenching effect. The dynamic working range was found as $10^{-6} - 10^{-2}$ M Pb$^{2+}$ at pH 6.0 buffer solution.

The response time of the optode was about 2 min. under batch conditions depending on the concentrations of Pb$^{2+}$.

The optode was fully regenerated using 0.1 M EDTA in a few seconds for four times. Then 20% decrease of maximum fluorescence was observed.

The possible interfering cations such as Fe$^{3+}$, Cu$^{2+}$, Cd$^{2+}$, Al$^{3+}$, Ca$^{2+}$, Mg$^{2+}$, K$^+$, Co$^{2+}$, Ni$^{2+}$, Na$^+$, Ag$^+$ ions were investigated at pH 6.

References
