ALIZARIN RED S IMPREGNATED CONDUCTING POLYMER AS A POTENTIAL IONIC SENSOR

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Contamination of metal ions such as Chromium (Cr^{3+}), Copper (Cu^{2+}) and Aluminium (Al^{3+}) in natural water, food and soil has become a major problem in today's world, creating major health hazards. Detection of such metal ions is difficult, especially when present in trace amounts and requires modern methods of detection. The main aim of this project is to use Alizarin red S as a sensoring ion in a conducting polymer and to study the ability of it to be used in quantification of Cr^{3+}, Al^{3+} and Cu^{2+}. In addition, studying the electrochemical behaviour of Alizarin at different pH levels, studying the electrochemical behaviour and complex formation ability of Alizarin with these three metal ions were also carried out.

Electrochemical studies were conducted on Alizarin using UV-Visble spectrophotometry and cyclic voltammetry. A pH study in a pH range of 1 to 8 showed the best electrochemical behaviour of Alizarin is at pH 3. The three metal ions were used to study the chelating ability of Alizarin with metal ions. Colour changes and the UV-Visible spectra showed a clear chelation of Cu^{2+} and Al^{3+} with Alizarin at pH 3. No indication of chelation was shown by Cr^{3+}. The concentration study conducted with Cu^{2+} and Al^{3+} using cyclic voltammetry showed a gradual decrease of peak current of Alizarin with increasing concentration of the cation.

Alizarin impregnated polyaniline was coated electrochemically onto the surface of the glassy carbon working electrode. Stability of the Alizarin anion inside the polymer was checked with continuous scanning in a potential range of + 1.0 V to

-1.0V. The peak current of the characteristic Alizarin peak decreased gradually, which could be due to the applied potential that may neutralize the electrostatic charges between Alizarin anions and the polymer backbone. Another study on this with time, without applying any potential provided the same result. This may be due to the ease of exchanging the larger Alizarin anions with smaller anions in the medium. This chemically modified electrode was used in quantification of metal ions of Cu^{2+} and Al^{3+}. A linear range for the plot of peak current vs. concentration of Cu^{2+} was observed in 1 to 5 mmol dm^{-3} range of Cu^{2+}. No satisfactory result was obtained for Al^{3+} as the effect of concentration to the peak current was not in detectable quantities.