

Electrochemical redox of Cd(II) mediated by activated carbon modified glassy carbon electrode.

Abstract

The use of a glassy carbon electrode (GCE) modified by activated carbon (AC) mediates the redox of CdCl_2 in 0.1 M aqueous solution of potassium chloride (KCl) supporting electrolyte. During cyclic voltammetry, two oxidation and two reduction current peaks of Cd^{2+} were appearing at +0.4, -0.6, +0.6 and -1.8V respectively, versus Ag/AgCl. The redox current of Cd^{2+} was enhanced by two folds at AC modified GCE and about five folds in acidic media. The oxidation peak of Cd^{2+} was shifted to lower potential by approximately 5mV and for the reduction peak was shifted to 0 mV when AC modified GCE in acidic pH. The sensitivity under condition of cyclic voltammetry was significantly dependent on pH, concentration of AA and temperature. Interference with Cd^{2+} was observed in different metal ions, such as Cu^{2+} , Mn^{2+} and Hg^{2+} . The current enhancement appeared and causes further increase in the two reduction peaks and one of oxidation peak of Cd^{2+} , in contrast the other oxidation current peak decrease when increase the concentration of the interference metals. The surface charge determined by chronocoulometry (CC) of Cd^{2+} at AC/GCE in presence of AA solution was more conductive than use of GCE. Diffusion coefficient determined by chronoamperometry (CA) for Cd^{2+} at AC/GCE in presence of AA was promising results.

Keyword: Activated carbon; GC electrode; CdCl_2 ; Ascorbic acid; Cyclic voltammetry.