

Electrochemical redox of Hg²⁺ 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 mercuric chloride (HgCl₂) in 0.1 M aqueous solution of potassium chloride (KCl) supporting electrolyte. During cyclic voltammetry, an oxidation and two reduction peaks of Hg²⁺ were appearing at +200, +680 and +100mV respectively, versus Ag/AgCl. The redox current of Hg²⁺ was enhanced by two folds at AC modified GCE and about five folds in acidic media. The oxidation peak of Hg²⁺ was shifted to lower potential by approximately 5mV and for the reduction peak was shifted to 0 mV in acidic solution at AC/GCE. The sensitivity under condition of cyclic voltammetry was significantly dependent on pH, concentration of AA and temperature. interference with Hg²⁺ was observed in different metal ions, such as Ca²⁺, Cu²⁺, Ni²⁺, Mn²⁺ and Cd²⁺. The current enhancement appeared and causes further increase in the reduction peaks of Hg²⁺, in contrast the oxidation current decrease when increase the concentration of the interference metals. Excellent analytical recovery results were observed with using blood sample and seawater. The surface charge determined by chronocoulometry(CC) of Hg²⁺ at AC/GCE in acid solution was more conductive than use of GCE. Diffusion coefficient determined by chronoamperometry (CA) for Hg²⁺ at AC/GCE in presence of AA was promising results.

Keyword: Activated carbon; Electrocatalysis; AC/GC electrode; HgCl₂; Cyclic voltammetry.