Electrochemical and Spectophotometrical Evidence of a Pb-EDTA-βCiclodextrin a Inclusion Complex Formation

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Abstract.

In an inclusion reaction, a host molecule traps a guest molecule to form a complex held together by a combination of hydrogen bonding, hydrophobic forces, and dipole interactions. The guest encapsulated in the host cavity generally exhibits significantly modified properties and reactivity compared to the free guest **[1].**

Cyclodextrins (CDs) are cyclic oligosaccharides comprising six, seven or eight (α, β, or γ) glucopyranose units. These molecules have characteristic toroidal shapes. Possessing a hydrophobic central cavity suitable for the inclusion of various organic and inorganic molecules **[2]**. Despite a wealth of information on complexes of organic, less is known about inclusion of metal complexes.

In this work we report a number of experimental facts (see i.e. Figure 1) that supply evidence on the formation of a inclusion complex of Pb(II), EDTA and β-CD from an aqueous solution with 0.024 M sodium acetate (pH 6.2). The main techniques employed were cyclic voltammetry and UV-vis. Spectroscopic.

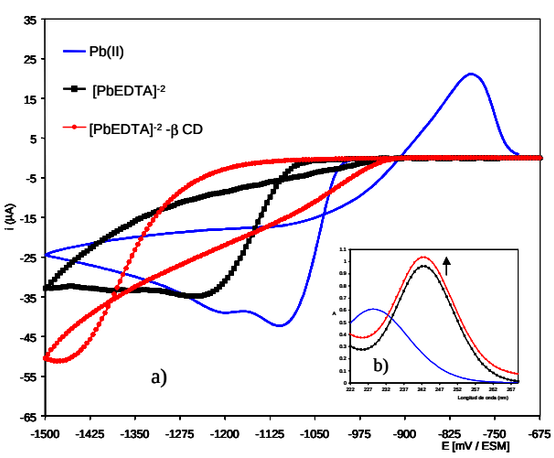

Figure 1. Electrochemical (a) and spectrophotometrical (b) behavior of an aqueous solutions of 0.024 M sodium acetate containing Pb(II) (blue), $[PbEDTA]^{-2}$ (black) and $[PbEDTA]^{-2}$-β-CD (red line)

Note, in votammetrics curves shown in Figure 1a, that the peak associated with the Pb(II) reduction process changes toward negative direction values when EDTA is added to the solution and this variation is more evident in presence of β-CD. This effect is evidence for a inclusion complex formation process. Moreover, the spectrophotometric study (Figure 1b) also show a different behaviour than that related with the Pb(II)-EDTA complex formation.

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