The theoretical description for hydroxyquinol and sesamol CoO(OH)-assisted electrochemical determination in tahini halva

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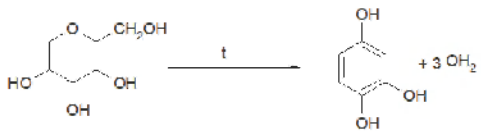
Hydroxyquinol is one of the natural polyphenolic compounds [1 – 5], widely used as biomarkers and monomers for conducting polymers. Its natural occurrence is abundant and it is formed by fructose dehydratation (1):



(1)

Sesamol is one of the hydroxyquinol cyclic eters. It gives its specific flavor and scent to Turkish delights like tahini halva, lokum, baklava etc. On the other hand, hydroxyquinol and its derivatives may also be pharmaceutical wastewater pollutants, like their isomers, as they may be toxic for aquatic organisms, reason why the development of an efficient method for its quantification is really actual.

Both hydroxyquinol and sesamol are phenolic compounds. So, they are electrochemically active. Phenolic and polyphenolic compounds are very popular objects for electroanalytics and are popular monomers for conducting polymers.

Nevertheless, their electroanalytic properties´ investigation has only begun, and a CoO(OH)-assisted electrochemical oxidation may confront the problems like:

- the indecision in the modifier mechanism of action;

- the compatibility of the modifier with the pharmaceutical tissue or biological

object (some modifiers, used in vitro may be non-compatible with in vivo sensing);

- the presence of electrochemical instabilities, accompanying both electrochemical synthesis of cobalt (III) oxyhydroxide [31], and electrochemical oxidation and electrooxidative polymerization of organic molecules.

So, the goal of this work is to describe an interesting electroanalytical process for hydroxyquinol and sesamol electrochemical determination on cobalt (III) oxyhydroxide has been described. As hydroxyquinol is 1,2 and 1,4-hydroquinonic derivative simultaneously, two low-molecular oxidation possibilities are foreseen. The polymerization scenario is not discarded.

The analysis of the correspondent mathematical model confirms that the oscillatory behavior is lower in neutral media and higher in the alkaline media. Either way, the electroanalytical process is diffusion-controlled, being efficient in a wide concentration range.