Preparation and Electrochemical Performance of Fe₃O₄-SWCNTs/ionic Liquid Nanocomposites as Sensor for Determination of Tert-Butylhydroquinone

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In this research, electro-catalytic activity of paste electrode (PE) modified with Fe₃O₄-SWCNTs and 1-Hexyl-3-methylimidazolium tetrafluoroborate (1H3MITFB) nanocomposites toward the oxidation of tert-butylhydroquinone (TBHQ), was investigated. The results showed that Fe₃O₄-SWCNTs/1H3MITFB/PE could improve the oxidation current of TBHQ up to about 3.65 times under the optimum condition. On the other hand, oxidation behavior of TBHQ was shown to have a linear relationship with pH of solution with a negative slope (55.2 mV/pH), confirming the presence of two electrons and two protons in redox reaction of this food additive. SW voltammograms of TBHQ at the surface of Fe₃O₄-SWCNTs/1H3MITFB/PE displayed a linear relationship in concentration range of 0.008 to 350 µM with the detection limit of 2.0 nM. The standard addition results showed that Fe₃O₄-SWCNTs/1H3MITFB/PE could be used as a powerful analytical approach to determine TBHQ in food samples.

Keyword: Tert-butylhydroquinone, Food sensor, Fe₃O₄-SWCNTs nanocomposite, Ionic liquid

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