



Original article

Influence of Zn(II) Ion on the Autoxidation of Pyrogallol and Gallic Acid in Weakly Acidic Aqueous Solutions

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SUMMARY

Pyrogallol-type phenolic compounds are widespread in nature and may have significant impact on human health. As Zn(II) ion was proved to be capable of enhancing some biological activities of pyrogallol-type natural phenolic compounds, we decided to study its influence on the autoxidation of pyrogallol and gallic acid in weakly acidic aqueous solutions.

UV-Vis spectrophotometric measurements showed that autoxidation of pyrogallol was initiated by the influence of Zn(II) ions at pH 5.5 and pH 6.5. The differences in UV-Vis spectra of the first autoxidation products resolved by the application of multivariate curve resolution - alternating least squares (MCR-ALS) method indicated that pH change also changed the mechanism of autoxidation process. Formation of stable Zn(II) ion spin stabilized free radical obtained during the autoxidation of pyrogallol at pH 6.5 was confirmed by using electron spin resonance (ESR) spectroscopy and its structure was determined. Both UV-Vis spectrophotometric and ESR spectroscopic measurements did not give any evidence that gallic acid autoxidation was initiated by the influence of Zn(II) ions in weakly acidic aqueous solutions.

The results of this study may be used for explaining possible differences in the Zn(II) ion influence on various biological activities of pyrogallol-type phenolic compounds containing simple pyrogallol moiety and the ones containing gallate moiety as a part of the molecule.

Key words: autoxidation, pyrogallol, zinc, MCR-ALS, ESR

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