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Abstract

Characterization of the Essential Oils Antioxidant Properties by Coulometric Titration

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Abstract: Essential oils are known from ancient times and used in aromatherapy. Nowadays, their application area also covers medicine and food industry due to a wide spectrum of bioactivity including antioxidant properties. Thus, estimation of the essential oils antioxidant properties is of practical interest. Phenolic compounds and terpenes are the major antioxidants according to gas chromatography-mass spectrometry (GC-MS). Total antioxidant parameters are a good alternative to the characterization of individual components by GC-MS allowing to avoid a time-consuming and expensive procedure. Coulometric titration with electrogenerated bromine and ferricyanide ions has been used for the estimation of total antioxidant capacity and ferric reducing power of essential oils for the first time. Data for the reaction of individual antioxidants (volatile phenolics and terpenes) with coulometric titrants confirm applicability of the method for characterization of the essential oils antioxidant properties. Essential oils of clove, cinnamon, nutmeg, lavender, ginger, anise, basil, bergamot, jasmine, ylang-ylang, marjoram, neroli, rosemary, thyme, and clary sage of various trademarks (total 27 samples) are investigated. The data are compared to the standard parameters (antioxidant activity towards 2,2-diphenyl-1-picrylhydrazyl and total phenolic contents). Positive correlations with coefficients of 0.7051-0.9558 confirm the accuracy of the coulometric approach. Moreover, ferric reducing power reflecting phenolic antioxidant content can be used for all samples of essential oils, while Folin-Ciocalteu method for total phenolic contents is applicable to four essential oils only. Another advantage of coulometry titration is the possibility of automation and rapidity making it an attractive tool for screening purposes in routine practice.

Keywords: electroanalysis; coulometry; electrogenerated titrants; antioxidants; total antioxidant parameters; essential oils

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