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Simultaneous determination of *tert*-butylhydroquinone, propyl gallate, and butylated hydroxyanisole by flow-injection analysis with multiple-pulse amperometric detection

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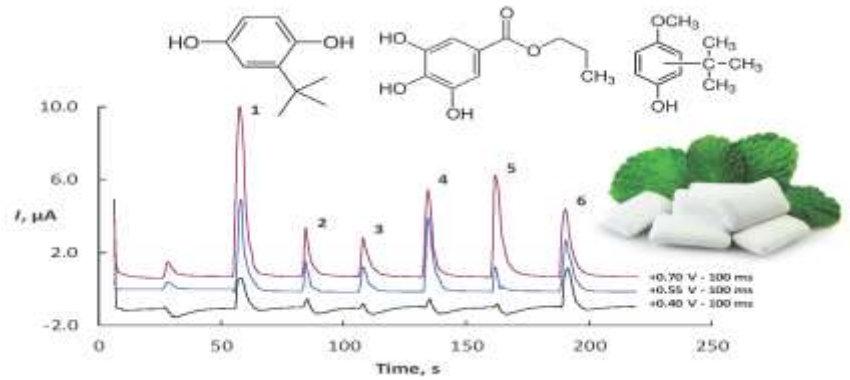
Abstract:

We report the first amperometric method for the simultaneous determination of *tert*-butylhydroquinone (tBHQ), propyl gallate (PG), and butylated hydroxyanisole (BHA) using flow injection analysis coupled to multiple-pulse amperometry. A sequence of potential pulses was selected in order to detect tBHQ, PG, and BHA separately in a single injection step at a glassy carbon electrode without the need of a preliminary separation. A mixture of methanol and 0.040 M Britton-Robinson buffer was used both as a carrier solution and for dilution of analysed solutions before injection. The method is precise (*RSD*<5%, *n*=10), fast (a frequency of 140 injections h^{-1}), provides sufficiently low quantification limits (2.51, 1.45, and 0.85 μmol L^{-1} for tBHQ, PG, and BHA, respectively) and can be easily applied without high demands on instrumentation. As a practical application, the determination of these antioxidants contained in commercial chewing gum samples was carried out by applying a simple extraction procedure.

Graphical abstract



Keywords: flow injection analysis; multiple-pulse amperometry; glassy carbon electrode; antioxidants.

1 Introduction

Synthetic phenolic antioxidants are extensively used in the food industry as additives to improve the stability of various products, especially for the prevention of lipid oxidation reactions, responsible for the production of volatile compounds with unpleasant flavours. Among the most