



# Simultaneous determination of preservatives (benzoic acid, sorbic acid, methylparaben and propylparaben) in foodstuffs using high-performance liquid chromatography

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Available online 8 December 2004

## Abstract

A reversed-phased HPLC method that allows the separation and simultaneous determination of the preservatives benzoic (BA) and sorbic acids (SA), methyl- (MP) and propylparabens (PP) is described. The separations were effected by using an initial mobile phase of methanol–acetate buffer (pH 4.4) (35:65) to elute BA, SA and MP and changing the mobile phase composition to methanol–acetate buffer (pH 4.4) (50:50) thereafter. The detector wavelength was set at 254 nm. Under these conditions, separation of the four components was achieved in less than 23 min. Analytical characteristics of the separation such as limit of detection, limit of quantification, linear range and reproducibility were evaluated. The developed method was applied to the determination of 67 foodstuffs (mainly imported), comprising soft drinks, jams, sauces, canned fruits/vegetables, dried vegetables/fruits and others. The range of preservatives found were from not detected (nd)—1260, nd—1390, nd—44.8 and nd—221 mg kg<sup>-1</sup> for BA, SA, MP and PP, respectively.

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**Keywords:** Food analysis; Preservatives; Benzoic acid; Sorbic acid; Parabens

## 1. Introduction

Chemical preservation has become an increasingly important practice in modern food technology with the increase in production of processed and convenience foods. These preservatives are deliberately added to stop or delay nutritional losses due to microbiological, enzymatic or chemical changes and thus increasing its shelf life. Benzoic acid (BA) and sorbic acid (SA) are generally effective to control mold and inhibit yeast growth, and against a wide range of bacterial attack [1–5]. *P*-hydroxybenzoic esters (parabens) have been used as preservatives for over 70 years [6]. Methylparaben (MP) and propylparaben (PP) are the most commonly used parabens and are often used together since they

have synergistic effects [7]. It had been found that the antimicrobial activities of the parabens seem to increase with increasing chain length. However, esters of longer alkyl chains are of limited applications due to their lower solubility in water [8].

The analytical determination of these preservatives is not only important for quality assurance purposes but also for consumer interest and protection. The most common analytical method for the determination of BA and SA or the parabens has been reversed-phase HPLC [2–6,9–15], although other analytical methods such as TLC [9], capillary electrophoresis [8,14] and gas chromatography [15] have also been reported. Most of the reported methods are for the separation of benzoic and sorbic acid or amongst the parabens. However, chromatographic reports on the simultaneous determination of BA, SA and the parabens, especially in food items are scarce [5,11]. Such a method is important as there seem to be an increasing trend in using combination of preser-

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