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Simultaneous determination of preservatives and synthetic dyes in cosmetics by single-step vortex extraction and clean-up followed by liquid chromatography coupled to tandem mass spectrometry

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ABSTRACT

A simple methodology based on vortex extraction (VE) followed by liquid chromatography tandem mass spectrometry (LC-MS/MS) has been developed for the simultaneous analysis of 22 regulated preservatives and synthetic dyes in cosmetics. The extraction procedure was performed in an Eppendorf tube allowing both extraction and clean-up in a single step, reducing sample and reagents consumption, and resulting in an effective and quick extraction. The method exhibited good linearity ($R^2 \geq 0.9918$) and intra and inter-day precision ($\%RSD \leq 13$) with LOQs lower than $0.587 \mu\text{g g}^{-1}$ for preservatives and $3.437 \mu\text{g g}^{-1}$ for synthetic dyes. Quantitative recoveries were obtained at four concentration levels in the range 2-100 $\mu\text{g g}^{-1}$ in the cosmetic matrices. The method was successfully applied to a broad range of cosmetics, including both leave-on and rinse-off products in which 13 of the target compounds could be quantified at concentrations ranging from 0.39 to 442 $\mu\text{g g}^{-1}$ in the case of dyes, and from 1.89 to 1335 $\mu\text{g g}^{-1}$ for the preservatives. It can be highlighted the presence of parabens in 24 out of the 35 analyzed samples at concentrations higher than 1000 $\mu\text{g g}^{-1}$ in a toothpaste.

Keywords: dyes; preservatives; cosmetics; vortex extraction; LC-MS/MS

1. Introduction

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