Determination of perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) in paper-based food packaging samples

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Abstract

In this study, a method for simultaneous determination of perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) by liquid chromatography-tandem mass spectrometry (LC-MS/MS) in paper-based food packaging was validated. The paper samples were extracted with ethanol/water (1 : 1, v/v) mixture at 70°C for 2 h by using an incubator shaker. The extracts were passed through 0.2 μm filters before LC-MS/MS analysis. The method detection limit and method quantification limit of both PFOA and PFOS were 0.1 and 0.3 ng/g, respectively. Correlation coefficients > 0.99 were obtained over concentration ranges from 0.3 to 10 ng/mL. The method recovery ranged from 100 - 106% with good repeatability (RSD < 5%). The method was applied to analyze 23 paper samples, however, PFOA and PFOS were not detected in any of these samples.

Keywords: PFOA, PFOS, paper-based food packaging, LC-MS/MS.

1. INTRODUCTION

PFOA and PFOS belong to perfluoroalkyl substances (PFASs), which have been used in many industrial fields as stainproof furniture, carpets, clothing, firefighting foam, coating materials, and cosmetics, because of their oil-resistant and waterproof properties [1-3]. Due to features of PFASs such as extreme resistance to degradation even at high temperatures and resistance to water and oil, these compounds have been widely used in food contact materials such as non-stick kitchen utensils and food-contact materials [4]. PFOA and PFOS are very stable in the environment and bio-accumulative, so they are classified as persistent

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