Abstract

In this work, the possibility in application of guard column C18 replacement conventional analytical column was investigated incorporating to micellar liquid chromatography (MLC) for separation and determination of methyl paraben, ethyl paraben, propyl paraben and butyl paraben. The chromatographic behavior was studied to prove the performance of this column and it was found that the reciprocal value of capacity factors of each parabens were linear to micellar concentration. The optimum conditions, by simplex optimization, were 0.046 mol L^{-1} sodium dodecyl sulfate with a flow rate of 0.612 mL min^{-1} and detection at 254 nm. The calibration curves of each paraben were linear in the range of 1-100 µmol L^{-1} with R^2 > 0.9990 and detection limits were 0.04-0.10 µmol L^{-1}. The percentage recoveries of extraction step were in the range of 92.4-109.2 %. This proposed method was applied for determination of parabens in commercial cosmetics and Thai community cosmetics. This method illustrated that it is not only a greener analytical method but also an effective and inexpensive method.

The second part of this work involves the development of liquid chromatography mass spectrometry (LC-MS/MS) for determination of perchlorate in environmental samples. The method was based on ion interaction (ion pair) chromatography with cationic ion-pairing reagent, hexamethonium bromide, which was formed on C18 column. The separation of perchlorate was carried out using methanol and 10 µmol L^{-1} hexamethonium bromide (10 : 90) as mobile phase with a flow rate of 0.40 mL min^{-1} at 100 µL injection volume. Under the optimal conditions, the linearity range of perchlorate was 4-1000 µg L^{-1} with correlation coefficient (R^2) at 0.9998. The detection limit was found to be 2 µg L^{-1} and was within U.S. EPA requirements (EPA method 314.1 and 331.0). For interferences study, chloride, nitrate, nitrite, carbonate, bromide, iodate and iodide at concentration of 50 mg L^{-1} were not interfered perchlorate analysis in environmental samples. The tolerant limits of phosphate and sulphate were 0.5 and 100 mg L^{-1}, respectively. This confirmatory method can be effectively applied to the quantitation of perchlorate in water and soil samples.