Preparation of SPE hybrid mesoporous silica sorbents for the analysis and removal of organic pollutants in water

Abstract

Polycyclic aromatic hydrocarbons (PAHs) are organic pollutants that threaten the health of humans and the environment. PAHs are found naturally in the environment but they can also be man-made. PAHs are produced when products like coal, oil, gas, and garbage are burned in an incomplete burning process. PAH's can be introduced into water bodies in several ways including industrial, domestic and commercial effluents, sewage, agricultural runoff and wastes. Monitoring of PAH's in water is of great importance because of their mutagenic and carcinogenic properties. The aim of this study was to develop the hybrid mesoporous silica sorbents for the analysis and removal of organic pollutants (OPs) in water especially PAH's. The determination of PAHs was performed using gas chromatography coupled to time of flight mass spectrometry (GC × GC–TOFMS). The hybrid materials were successfully synthesized using silica gel as a source of silica followed by modification with organic compounds. However the performance of the materials was evaluated using GC × GC–TOFMS for the determination of recovery PAH's concentrations. At optimum conditions sorbent materials were able to remove 95.9 ± 12.21% of the PAHs in spiked water samples at a laboratory scale.

Keywords

Hybrid mesoporous silica;
Solid phase extraction;
Polycyclic aromatic hydrocarbons;
Gas chromatography mass spectrometry