HOLLOW FIBER LIQUID MICROEXTRACTION FOR PRECONCENTRATION OF BENZOPHENONE

One of the most common preservatives and UV filters that are used in the cosmetic industry for the production of sunscreens, shampoos, gels, hair sprays, lipsticks and some perfume products are benzophenone's derivatives. Unsubstituted benzophenone can also present in antiepileptic drug "phenytoin" (diphenylhydantoin) as an impurity arrived from active ingredient oxidation. As a result of using cosmetics or medicines, benzophenones can get into the body. Benzophenone can be a metabolite of UV filters in living organisms. It was found that benzophenones can be accumulated in living organisms and cause toxic effects on the endocrine system. In addition, some benzophenones can cause allergic reactions: skin redness, swelling of mucous membranes, runny nose, sore throat, etc.

The aim of this study was a development an analytical method for the analysis of unsubscribed benzophenone in water matrices using dispersive microextraction (DME) and gas chromatographic determination with flame ionization detection (GC/FID). The DME is based on the formation of a stable emulsion formed in water samples due to quick injection a mixture of an extraction and a disperser solvents. The mixture includes: a high-density solvent - extractant (chloroform, dichloromethane, tetrachloride carbon etc.) and a water miscible, polar solvent - disperser (acetone, methanol, acetonitrile etc.) Microextraction occurs almost instantly due to the large contact area between two phases. For the separation of extract is used centrifugation.

The parameters of hollow fiber microextraction and gas chromatographic detection of benzophenone were optimized. The effect of the extraction and of the disperser solvents and of their volumes were investigated.It was shown, that the best efficiency of extraction of benzophenone is observed when methanol and chloroform were used as DME solvents. The effect of pH and time on the DME of target analytes was also studied. Optimum pH for extraction of benzophenone was selected in the range of 5.0 - 7.0. The optimal extraction time for benzophenone's DME is reached in 5 min. Good linearity range 0.05 – 1.00 µg/mL and LOQ 0.06 µg/mL was obtained. The applicability of the proposed dispersive microextraction coupled with GC/FID was investigated by analyzing water samples with spiked benzophenone. The method showed good precision and reproducibility with RSD of 6-8%.

Key words: hollow fiber liquid microextraction, benzophenone, gas chromatography