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SOLID-PHASE MICROEXTRACTION TO DETERMINE THE MIGRATION OF PHTHALATES FROM PLASTIC WARE TO DRINKING WATER

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EXTENDED ABSTRACT

Phthalate esters are widely used as additives in the manufacture of plastics improving their softness and flexibility. As these compounds are not chemically bound to the plastics, they can easily penetrate these materials and migrate into the food or water that comes into direct contact. The presence of phthalates in drinking water is usually in the low μg/L contamination level due to their hydrophobic nature. Today, phthalate esters are included in the priority lists of pollutants in several countries and are being questioned worldwide because of their potential toxicity to humans and the environment.

Solid Phase Microextraction (SPME) coupled to Gas Chromatography was used for the determination of phthalate esters in water samples introducing thus a fast and solventless analytical method enabling detection of these compounds in the low μg/L concentration levels. The major advantage of SPME over other preconcentration techniques was that it minimized the risk of secondary contamination during sample preparation, a major parameter to consider during phthalate contamination.

This paper investigates the extent of phthalates migration from several disposable plastic materials into drinking water. The plastic materials investigated included plastic shakers used for the preparation of iced coffee, plastic cups and plastic straws. The scope of the present work was to investigate for the first time the effect of temperature on phthalate migration establishing thus the safety of these materials when used with hot beverages as well as demonstrating the importance of storage and transfer conditions of plastic materials containing drinking water.

Overall, the results revealed that significant quantities of phthalates are expected to be present in drinking water samples coming into direct contact with disposable plastic items at elevated temperatures. The contamination level is higher when a prolonged exposure to such temperatures is applied. Therefore, it is strongly advisable to control temperature during the transfer, storage and/or handling of these materials.

Key words: SPME, phthalate esters, drinking water, water analysis