

Health of newborn baby is the most important subject that the parents are preoccupied, if this issue was neglected, the consequence would be inconvenient. If the baby's health is compromised, it may affect its whole lifetime.

Due to the widespread use of disposable diapers in healthy baby's as well as children prone to allergies and premature babies with reduced immunity, disposable diapers should only be made of non-toxic and natural ingredients. Unfortunately, disposable diaper manufacturers are reluctant to present their exact chemical composition, claiming that their trade secrets apply. However, several reports show that disposable diapers of big-name brands, "store" brands and "bio" brands may contain a number of toxic compounds.

Although, there is very little study focused on the chemical composition of disposable baby diapers, the literature shows, that many of the undesirable compounds may occur in napkins. Due to the presence of toxic compounds in diapers and their possible negative effect on babies health, it is necessary to control of individual compounds content in diapers. In general, only few methodology are reported for the determination of some groups of compounds that could have negative impact on the baby's skin, and in fact, there are very limited number of papers devoted to the identification of toxic compounds and method which allow to determinate them in diapers.

The lack of accurate information on the occurrence of various types of chemical compounds in disposable baby diapers, lack of information on the concentration levels at which they occur and, moreover, the lack of analytical methods that would be used to determine and monitor of these toxic compounds, have become a motivation to address this problem.

Taking all of above into consideration, the aim of the project is to develop a new analytical methodologies based on deep eutectic solvents (DESs) and ultrasound assisted solvent microextraction of porous membrane-packed samples (UA-PMPS) that will be universal for few groups of compounds occur in disposable baby diapers. The developed procedures will be used to monitor such toxic compounds as phtalate estres, polycyclic aromatic hydrocarbons, monoaromatic hydrocarbons, polychlorinated biphenyl and pesticides that could occur in disposable baby diapers. During the research, a novel deep eutectic solvents (DESs) will be synthetized and used as extractant solvents. In addition, to protect the environment and reduce the cost of the procedure, the synthesis of the membrane used in the project will be performed for the first time. The created database will be a set of modern analytical procedures developed in accordance with the principles of common chemical analytics, but also with the principles of green analytical chemistry, to be as environmentally friendly as possible. Each of developed procedure will be assessed by application of Analytical Eco-Scale and GAPI to give valuable information on the "green" character of the method. The last aim of the project is the assessment of the environmental impact of disposable baby diapers considering the toxic compounds release to the environment.

In the framework of the research at the development and optimization of the sample preparation step it is plane to use DES-UA-PMPS extraction technique. This technique will be applied in this project as it eliminates the step of adsorption as analytes are directly extracted into the suitable solvent. Moreover, no sample cleanup is needed, because the interfering species cannot come out of the porous membrane. This technique results in a clear extract that can be directly injected into the analytical instrument. The proposed methodology could be fast and easy to perform. In addition, no specific instrumentation is required. Depending on the solvent used, it can be considered green due to such reasons: small volume of sample as well as solvent is required, small amount of waste is produced, no much energy is consumed, depending on characteristic of analytes – several group of compounds can be extracted in single extraction. To meet the GAC criteria, DESs will be used as the extractants, and Porous membranes will be synthetized from biopolymers.

We believe that the results of the project will be:

- novel methodologies as a new way of separations, which brings advantages in the analytical separation science;
- new DESs with its characterization, which brings advantages in many areas, but mainly in the area of extraction and chromatographic separations;
- information about the contaminants of disposable baby diapers which could impact on the baby health as well as on the environment.