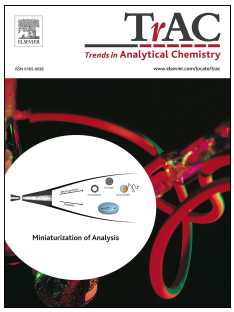
Accepted Manuscript



Dispersive liquid-liquid microextraction coupled with derivatization: a review of different modes, applications, and green aspects

Muhammad Sajid

PII: S0165-9936(18)30178-X

DOI: 10.1016/j.trac.2018.07.009

Reference: TRAC 15193

To appear in: *Trends in Analytical Chemistry*

Received Date: 30 April 2018

Revised Date: 6 July 2018

Accepted Date: 9 July 2018

Please cite this article as: M. Sajid, Dispersive liquid-liquid microextraction coupled with derivatization: a review of different modes, applications, and green aspects, *Trends in Analytical Chemistry* (2018), doi: 10.1016/j.trac.2018.07.009.

Dispersive liquid-liquid microextraction coupled with derivatization: a review of different modes, applications, and green aspects

Muhammad Sajid

Center for Environment and Water, Research Institute, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia.

Abstract

DLLME is widely used as a sample preparation technique due to its unique advantages of fast extraction, low solvent consumption, high enrichment factors, and low cost. DLLME extracts are generally analyzed by gas or liquid chromatography coupled with different detection systems. However, GC or LC cannot analyze/separate many analytes due to their structural properties. Similarly, some of the analytes are not sensitive to commonly used detectors. In such cases, a derivatization process (chemical conversion) is often applied to improve the structural features of the analytes to make them compatible with separation and detection system. The coupling of derivatization with DLLME is a simple way to accomplish the job using minimum volumes of the derivatizing reagents and reducing their impact on workers and the environment. This review explains the different modes of DLLME coupled derivatizations, their applications, and green aspects in a systematic way.

Keywords

Dispersive liquid-liquid microextraction; derivatization; green analytical chemistry; ultrasounds; microwaves; simultaneous extraction and derivatization.

1. Introduction

Accurate quantification of trace level concentrations of analytes becomes quite challenging due to complex matrix compositions, multistep isolation procedures, and the structural properties of the analytes that are not compatible for their detection with analytical instrumentation. It is therefore of great importance to select suitable sample preparation as well as final determination technique [1].

As far as the sample preparation techniques are concerned, liquid-liquid extraction (LLE) and solid phase extraction (SPE) are well-known and widely accepted procedures for extraction of a wide variety of analytes in different samples. These techniques are very advantageous due to superb extraction performance and recoveries. However, they require a large volume of solvents because of which they also produce huge quantities of waste [2,3]. This aspect is not appreciated by the recent trends in green analytical chemistry (GAC). Alternatively, the area of sample preparation is moving toward the development of microextraction techniques. These techniques are developed to minimize the consumption of solvents, miniaturize the dimensions of the extraction devices, and explore the possibility of their automation with routinely used analytical instrumentation. In addition, they are more effective in terms of time, cost, and energy and fulfill the desired features of GAC.