Abstract

Indiscriminant use of explosives during warfare and land mining of sensitive zones, discharge from explosive manufacturing plants, storage depots, dumping sites and mock military exercises on sea and land surfaces has resulted into contamination of environment on large scale which can ultimately bring adverse changes in eco-biological balance. High explosives are used in bombs, explosive shells, torpedoes and missile warheads. Non detonating explosives e.g., gunpowder and the smokeless powder have found extensive use as propellants for bullets and artillery shells. Taking into the consideration of defence requirement and national security, hundreds of tones of ammunition are produced every year. Discharge from explosives manufacturing plants, storage depots, dumping sites, mock military exercises on land and sea and mining of sensitive zones has resulted in contamination of environment on large scale. Explosives are recognized as highly toxic and dangerous pollutants in environment. They account for only a small share of the nearly 70,000 chemicals which have been considered hazardous to mankind. Explosives are the important contaminants which are carcinogenic and their accumulation in food chain has caused great problem for human survival. Since organic explosives and their degradation products are widely spread over the land and water, they pose risks not only to farm workers but also to general population through contamination of food, drinking water and other environmental factors. The most hazardous explosives have a history of occupational hazardous and some of them have been linked to cancer and heart diseases. These accumulate in vital organs of human beings and exert progressively growing toxic actions. So, proliferation of explosives as contaminants has focused attention on their determination and characterization in environmental media.
The common trace analysis of explosive and related compounds still relies upon time consuming and costly procedures, especially from complex environmental matrices such as soils, water, etc. These procedures usually include various steps of sample treatment, extraction and separation before the final quantitative estimation. Therefore, it is very important to have a powerful and fast analytical method to gain a broad knowledge about the occurrence and concentration of a number of important explosives in the environment. So, with the increasing awareness about the environment and the effects of pollution, the importance of convenient and accurate analytical methods for the measurement of trace levels of many hazardous and toxic explosives has grown tremendously in recent years. There has been an increase in interest as to understand their carcinogenicity, toxicity, bioaccumulation, mobility, decontamination and persistence of these explosives in the environment. So, sensitive, selective, rapid and economical analytical methods are thus needed for the quantification of these organic explosives in various environmental samples. So far, little work is done for the analysis of various explosives using SPME-HPLC-UV technique. It is of high importance to exploit the potential SPME-HPLC-UV technique for the analysis of nitro explosives. The approach of this work was the determination of nitramine and nitroaromatic explosives from soil samples and in aqueous solutions using immersion mode Solid Phase Microextraction (DI-SPME) coupled with High Performance Liquid Chromatography and Ultraviolet detector (SPME/HPLC-UV).