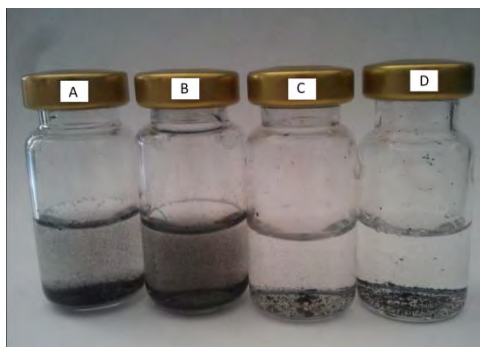


EFFERVESCENCE ASSISTED CARBON NANOTUBES DISPERSION FOR THE MICRO-SOLID PHASE EXTRACTION OF TRIAZINE HERBICIDES FROM ENVIRONMENTAL WATERS

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Extraction techniques are surface dependent processes since their kinetic directly depend on the contact area between the sample and the extractant phase. The dispersion of the extractant (liquid or solid) increases this area improving the extraction efficiency. In this article, the dispersion of a nanostructured sorbent at the very low milligram level is achieved by effervescence thanks to the in-situ generation of carbon dioxide. For this purpose, a special tablet containing the effervescence precursors (sodium carbonate as carbon dioxide source and sodium dihydrogenphosphate as proton donor) and the sorbent (multiwalled carbon nanotubes, MWCNTs) is prepared. All the microextraction steps take place in a glass beaker containing 100 mL of the sample. After the extraction, the MWCNTs, enriched with the extracted analytes, are recovered by vacuum filtration. Methanol was selected to elute the retained analytes. The extraction mode is optimized and characterized using the determination of nine herbicides in water samples as model analytical problem. The absolute recoveries of the analytes were in the range 48-76% while relative recoveries were close to 100% in all cases. These values permit the determination of these analytes at the low microgram per liter range with good precision (relative standard deviations lower than 9.3 %) using ultra performance liquid chromatography (UPLC) combined with ultraviolet (UV) detection.

Figure 1. Dispersion of the MWCNTs under different experimental conditions.



- (A) The dispersion was performed adding a powder that contained sodium carbonate (162.5 mg), sodium dihydrogenphosphate (82.5 mg) and MWCNTs (5 mg).
- (B) The dispersion was performed adding a tablet (compressed powder) that contained sodium carbonate (162.5 mg), sodium dihydrogenphosphate (82.5 mg) and of MWCNTs (5 mg).
- (C) The dispersion was performed adding directly 5 mg of MWCNTs.
- (D) The dispersion was performed in two steps. First, a tablet containing sodium carbonate (162.5 mg) and sodium dihydrogenphosphate (82.5 mg) was added to the vial. After the effervescence, 5 mg of MWCNTs were added to the vial.