In this study, the preparation and characterization of ionic liquid (IL) modified Montmorillonite (MMT) and their applications as a micro-solid phase extraction (µ-SPE) material for the determination of Chlorpyrifos pesticide in water samples were reported. Different chain length ionic liquids such as 1-methyl-3-octyl-imidazolium bromide \([C_8\text{mim}Br]\), 1-methyl-3-undecyl-imidazolium bromide \([C_{12}\text{mim}Br]\) and 1-methyl-3-octadecyl-imidazolium bromide \([C_{18}\text{mim}Br]\) were intercalated in the galleries of MMT. The modified clays were characterized by means of FTIR, XRD, TG/DTG and zeta potential measurements. The developed ionic liquid modified clay surface offers to the analyst to exploit it as an innovative sorbent in pesticide analysis. This new sorbent has given efficient extractions compared to unmodified MMT clay. The parameters which may affect the amplitude of the signal were optimized. The best results were obtained by using 5.0 mg of \([C_{12}\text{mim}Br]\) modified MMT. The developed method was validated for the monitoring of endocrine disruptor pesticide in well water samples. The extraction method developed in this study, using small amounts of adsorbents and solvents proved to be environmental friendly due to the drive for green chemistry. It permits a good linearity, repeatability and sensitivity for CP determination.

LOD and LOQ values for CP were calculated as 0.03 and 0.09 ng mL\(^{-1}\), respectively. The repeatability of the proposed method was studied for five replicate experiments based on extraction of aqueous sample containing 20 ng mL\(^{-1}\) of CP. The relative standard deviation was calculated as 5.5 % and good linearity in the range of 0.1 – 100 ng mL\(^{-1}\) with squared regression coefficient (0.9952) was obtained. CP content of the analyzed two water samples were calculated as 0.57 ± 0.04 and 0.35 ± 0.02 ng/mL.

In virtue of diminishing the sample preparation time and enhancing the analyte retention on its surface to exert better selectivity and hence the developed ionic liquid modified surface offers to the analyst to exploit it as an innovative sorbent in pesticide analysis.

KEYWORDS: Ionic liquids, Montmorillonite, modification, Chlorpyrifos, GC-MS

REFERENCES: