Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 39 2024

Colloquium on Applied Sciences 2024
19-21 January 2024, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

A Dispersive Micro-Solid Phase Extraction Using Ionic Liquid – Modified Graphene Oxide Sorbent for Pre –Concentration and Extraction of Acid Drug From Water Sample Using Liquid Chromatography

Siti Nor Ziana Mat Zain[a], Nor Suhaila Mohamad Hanapi[a,b*]

Structured Abstract

Background: Pharmaceutical waste has recently been identified as a significant cause of novel toxins and a grave ecological health concern. Dispersive micro-solid phase extraction (D-μ-SPE) is a miniaturized method that adheres to the same principle as the solid phase extraction (SPE) approach, based on the dispersion of miniature or milligram level of sorbent within a solution. The advancement of dispersive micro-solid phase extraction (D-μ-SPE) has offered a novel method that is straightforward, quick, and effective. Nowadays, graphene oxide (GO), combined with ionic liquid, has found applications as sorbents for diverse purposes.

Methods: Approximately 0.01g of sorbent was dispersed into a 10 mL aqueous sample in a 50 mL centrifuged tube. The mixture was vortex for 2 minutes to trap the analytes. Afterwards, the adsorbent was isolated from the solution by centrifugation at 9000rmin^{-1} speed for 6 min, and the supernatant was discarded. About 1 mL of a desorption solvent, which is liquid chromatography grade isopropyl alcohol, was added to the centrifuge tube and vortex for another 2 min. The mixture was then centrifuged at 9000rmin^{-1} speed for another 6 min. The solvent was collected and evaporated into 0.5 mL under a gentle stream of nitrogen gas. About 0.5 mL of the extracted analyte was transferred into a 1 mL amber glass vial. Lastly, 5μL of the extract was injected into the HPLC system.

Results: This study shows that the performance of the prepared sorbent has been successfully applied for the extraction of acidic drugs using the D-μ-SPE method combined with HPLC-DAD for chromatographic analysis. Several parameters affecting this method were optimized. The optimum conditions were as follows: 6 min for desorption time, IPA for the desorption solvent and 0.01g for the mass of the sorbent. Good linearities were achieved for the analytes with r2 of 0.9971. The relative recoveries demonstrate an 82% yield with acceptable reproducibility, expressed as a percentage relative standard deviation (RSD) of 3.20%.

Conclusion: In conclusion, this sorbent has been demonstrated as a viable alternative for trapping pharmaceutical contaminants in solid-phase extraction. The suggested dispersive micro-extraction technique offers a more cost-effective, convenient, and environmentally friendly option compared to traditional SPE methods.

Keywords: Microextraction technique, pharmaceuticals, graphene oxide, ionic liquids.

*Correspondence: norsuhaila979@uitm.edu.my

[a]School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia