Chromatographic behaviour of arylidene 2-thiohydantoin derivatives in an acetonitrile and F5 column

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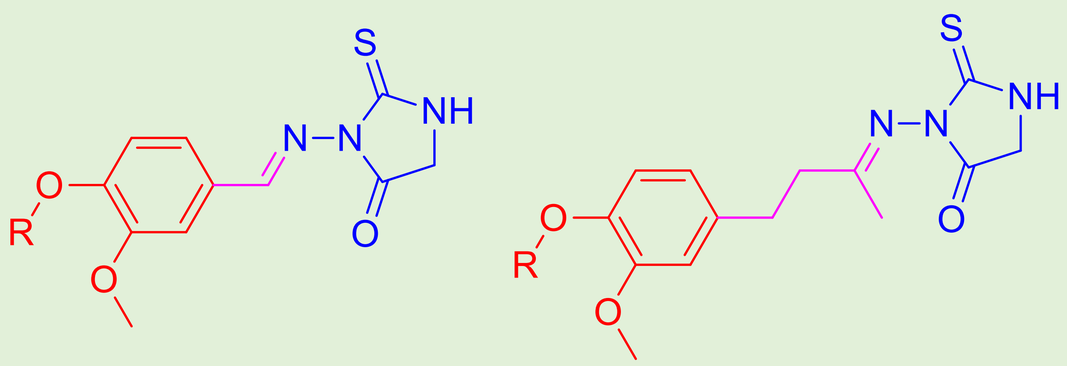
Introduction

Hydantoins are a class of five-membered heterocyclic compounds with a cyclic ureide structure, and thiohydantoins represent their sulphur analogues, where a sulphur atom replaces one or both carbonyl group oxygens. Anticancer, antimicrobial, anticonvulsant and anti-inflammatory are some of many biological activities that hydantoins possess and are the reason why this class of compounds has been and continues to be the topic of research in medicinal chemistry. Some hydantoins have found use as clinically approved commercially available drugs, while many others have found applications in various branches of industry. As determination of the chromatographic parameters is an important step in drug discovery, the aim of this study was to examine the retention behaviour of 13 arylidene 2-thiohydantoin derivatives using the HPLC technique. Also, the potential in terms of the hydrophobicity index φ_0 was examined to approximate the lipophilicity of the analysed compounds.



Materials and methods

The HPLC analysis was performed using an F5 column. The mobile phase was a binary mixture of the solvents acetonitrile and water (ACN-W). The retention behaviour of the compounds was observed using various proportions of acetonitrile (φ), starting with 20% and increasing it in increments of 5% to a final amount of 50% acetonitrile in the mobile phase. The retention coefficients log$k$ were calculated using the retention times and death times collected from all of the chromatograms. Furthermore, log$k$ was fitted to φ.

Results

The fittings were linear within an R^2 (coefficient of determination) range of 0.98265–0.99998. The hydrophobicity index φ_0 of all of the examined compounds was calculated by dividing the intercept (logk_0) by the slope (S) of the obtained linearities. To approximate the lipophilicity, φ_0 has to show a correlation with the generally accepted lipophilicity coefficient log$P$. The fitting of φ_0 and log$P$ was linear, with an R^2 value of 0.8416.

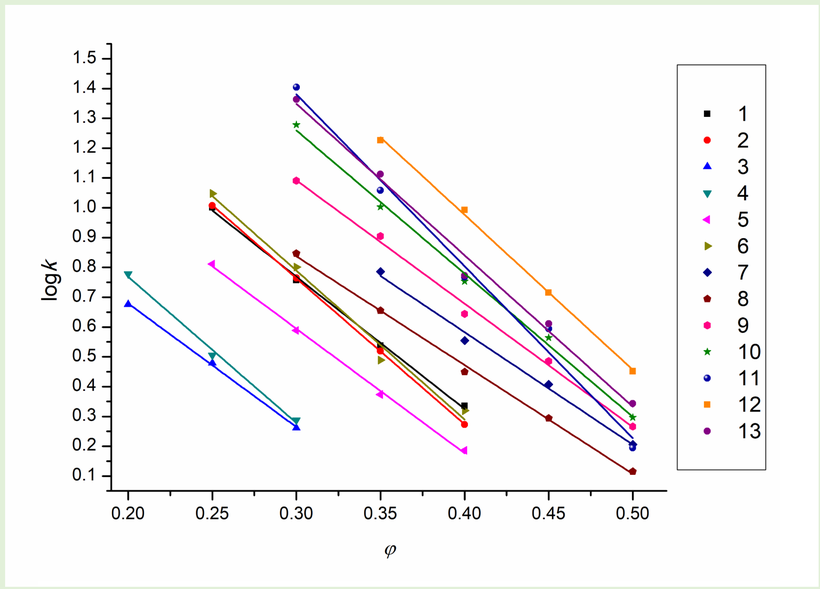


Figure 1. Correlation curves of analyzed derivatives

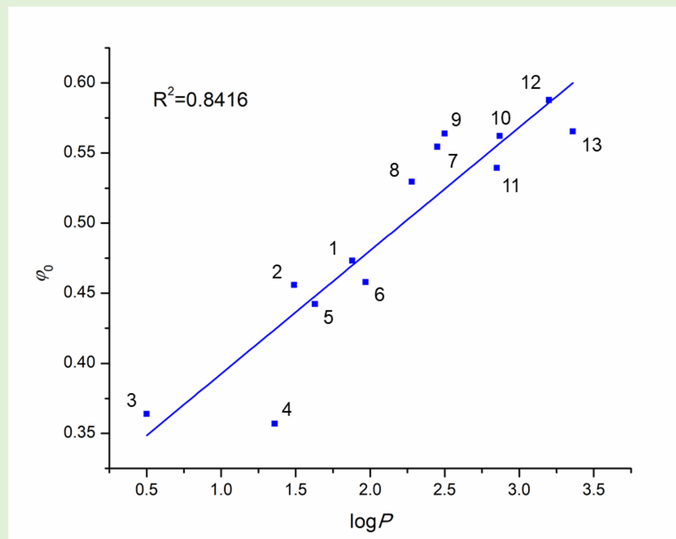


Figure 2. Plot of φ_0 against log$P$

Conclusions

The obtained results indicate that the hydrophobicity index φ_0 has the potential to be used to approximate the lipophilicity of the examined arylidene 2-thiohydantoin derivatives.