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Theoretical and Experimental Study of Fluconazole Solvatochromism †

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Abstract: This work aims to study the theoretical and experimental solute-solvent interactions of Fluconazole (FNZ) in pure solvents and their effects on the UV-Vis spectrum. This solvatochromic analysis was performed in 7 protic and aprotic pure polar solvents. The FNZ molecular geometry was optimized using CAM B3LYP 6-31G+(d), and the UV-Vis absorption spectra and the solvent effects were simulated using IEF PCM and the time-dependent self-consistent field theory. The results were analyzed using multi-parametric equations. Catalán and Laurence's relationships were preferred. There were significant correlations in the UV-Vis absorption λ_{max} between the experimental and the theoretical data at both levels of analysis. From acetonitrile, moving to aprotic solvents of lower polarity and protic solvents of higher polarity, bathochromic shifts were observed. The calculated solvation energies were lower for solvents of higher polarity, according to FNZ solubility. The experimental and computational results show the importance of non-specific interactions with the solvent and the hydrogen bond acceptor and donor capacity of the solvent with the drug. The halogenated phenyl group of FNZ is responsible for the non-specific interactions, while the hydrogen bond interactions are due to the -OH group of C7 and the N4' of the 1,2,4-triazole groups.

Keywords: solvatochromism; fluconazole; TDSCF; CAM B3LYP; Kamlet-Taft; Catalán; Laurence.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.