Synthesis, Characterization, and Study the Lipophilicity Properties of Some Imine Compounds and Their Starting Material

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Abstract:

Some Imines were prepared by condensation of 4-aminoantipyrole with benzil or vanillin. The prepared compounds were identified by FT-IR and ^{1}H-NMR spectroscopy. The prepared compounds and the starting materials were studied their lipophilicity properties and the Log P (logarithm of partition coefficient) values were determined by four theoretical methods and two practical methods, and the antifungal activity was determined. The correlation coefficients between the methods was estimated, there are good agreement between the theoretical methods except Hyperchem. The practical methods showed best correlation between TLC (thin layer chromatography) and theoretical method Marvin. On the other hand, the antifungal activity enhanced the lipophilicity values that calculated from the theoretical and practical methods.

Keyword: Lipophilicity, Imine, TLC and Shake Flask.

1. Introduction

Imines/Schiff bases were first discovered by Hugo (ugo) Schiff more than a century ago. Since then Schiff bases constitute one of the most widely used families of organic compounds. Compounds which posses R-CH=N-R' as a general formula of Imines or Schiff bases and can be efficiently prepared by condensation of an aromatic aldehyde or ketone with an appropriate aromatic amine at an optimum pH of 4-6 using dry alcohol as a solvent[1,2]. Schiff bases were reported to possess antifungal, antibacterial, anti-*T. cruzi*, estrogenic and cytotoxic activities [3,4]. Hearn and co-workers demonstrated structural variant of Isoniazid (INH) i.e., INH Schiff base that displayed strong activity, low toxicity and excellent bioavailability[5]. Shi and co-workers studied Structural Activity Relationship (SAR) of some Schiff bases derived from 5-chlorosalicyladehyde and concluded that the hydrophilicity and aromaticity are important parameters for antimicrobial activity[6]. Paula and co-workers verified SAR considering the lipophilicity potential maps and calculated logP values for the set of novel 5-nitro-heterocyclic Schiff bases and concluded that chlorine substitution on furfuryliden indicated optimum lipophilicity value and hence had better biological effect[7].

The most popular scale to measure the lipophilicity of organic compounds is the logarithm of the partition coefficient of compound (called the log *P* parameter) between 1-n-octanol and water,[8,9]. Log *P* is a frequently used molecular descriptor in QSAR analysis [10,11]. It is a quantitative descriptor of lipophilicity, one of the key determinants of pharmacokinetic properties. The lipophilicity modifies the penetration of bioactive molecules through the non-polar cell membranes. This property is usually characterized by the partition coefficient, which is essentially determined from distribution studies of the compound between an immiscible polar and non-polar solvent pair. By knowing exact values for this parameter, it is possible to predict the inhibitory activity of a drug.[12]