Synthesis Characterization and Biological Evaluation of Some New Azo-Schiff compounds Derived from 5-aminosalicylic acids

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Abstract

In this work we are reported the synthesis , characterization of five new azo-schif compounds(M1,M2,M3,M4,M5) derived from 5-amino salicylic acid, by converting 5-amino-salicylic acid to diazonium salt, and from the reaction product it was reacted with a number of compounds Aromatic (aldehyde or ketone) to form azo compounds (H1,H2) and through the aldehyde or ketone carbonyl group, The compounds (H1,H2) were reacted with a number of aromatic compounds containing the primary amine group to obtain an amine group (C=N).) And that these compounds are azo-schiff (M1-M5) containing azo group (N=N) and amine group (C=N). The Biological activity and physical properties of the prepared compounds were studied and The characterization was performed using FT-IR and proton NMR spectroscopes.

Keywords: 5-amino-salicylic acid, Azo-schiff compounds, Schiff's bases, Primary Amine

1. Introduction

5-amino salicylic acid (5-amino-2-hydroxybenzoic acid) or mesalazine, better known as mesalamine 5-ASA Molecular formula: C7H7NO3, and its molar mass is 153.135 (g/mol) [1] 5-Amino salicylic acid (5-ASA) is the most widely prescribed anti-inflammatory drug for the treatment of inflammatory bowel disease(IBD) [2], and is also used to treat ulcerative colitis of the gastrointestinal tract [3]. 5-ASA was approved by the FDA (Food and Drug Administration) in 1987 [4].

The Schiff bases It is a class of organic compounds that contain in their chemical structure the azomethine group (C=N) as an active group [5] Schiff bases were obtained by a condensation reaction between primary amines with a carbonyl group and were first discovered by Schiff in 1864 [6] Schiff bases have gained importance due to their use in many pharmacological activities such as antibacterial [7], antifungal [8], and antitumor [6, 9].

Schiff's bases have been widely used in various fields, because they have physical and chemical properties that qualify them to bond with many metal ions to form complexes, which have proven their feasibility in many practical applications in various fields [10], and in recent years the researchers' work has focused on studying the effectiveness of this type of compounds when used Catalysts in the Fields of Organic Chemistry [11] and Biochemistry [12]. The effectiveness of Schiff bases can be attributed to the non-aligned pair of electrons with hybridization (SP3) of the nitrogen atom of the azomethine group.

2. Synthesis

synthesis of azo compounds (H1, H2)

1- Dissolve (1 g) of 5-amino salicylic acid in a mixture of (15% HCl) and cooled the mixture to 0°C.
2- Then a solution of sodium nitrate (0.5 g of sodium nitrate in 2.5 ml of distilled water) to the mixture with stirring, and noting that the temperature did not rise above 0 ° C, then we left the solution for 10 minutes until it formed dazonium salt
3- Then dissolve (2 g of the compound containing the carbonyl group (aldehyde or ketone) in 10% of sodium hydroxide)
4- Then add the dazonium salt formed in step No. (2) to step No. (3) with continuous stirring, then left the solution for 30 minutes, where it precipitates and filters the mixture and washes the precipitate or recrystallizes it with petroleum ether.

Synthesis of Schiff's Base (M1, M2)

In a conical flask, (0.14 g) of the prepared azo compound H1 is dissolved in the ethanol solvent, to which (0.087g and 0.075g) are added respectively from the primary amine dissolved in the same solvent with the addition of (2-3) drops of glacial acetic acid. The mixture rises for three hours Leave the mixture to cool as it precipitates, filter the mixture and wash the precipitate or recrystallize it with petroleum ether.

Synthesis of Schiff's Base (M3, M4,M5)

In a conical flask, (1.6 g) of the prepared azo compound H2 is dissolved in the ethanol solvent, to which (0.053 g and 0.098 g and 0.14 g) are added respectively from the primary amine dissolved in the same solvent with the addition of (2-3) drops of glacial acetic acid. The mixture rises for three hours Leave the mixture to cool as it precipitates, filter the mixture and wash the precipitate or recrystallize it with petroleum ether.

3. Result and Discussion

The compounds (H1,H2) was synthesis by converting 5-amino salicylic acid to diazonium salt using sodium nitrite and hydrochloric acid at a temperature of 0-5 °C in order to keep the diazonium salt from disintegrating and after obtaining the diazonium salt it was reacted with vanillin once and again with 4- Bromobenzaldehyde to obtain azo compounds (H1,H2) as shown in the following scheme 1, Then, new five-Azo-Schiff compounds were synthesis by

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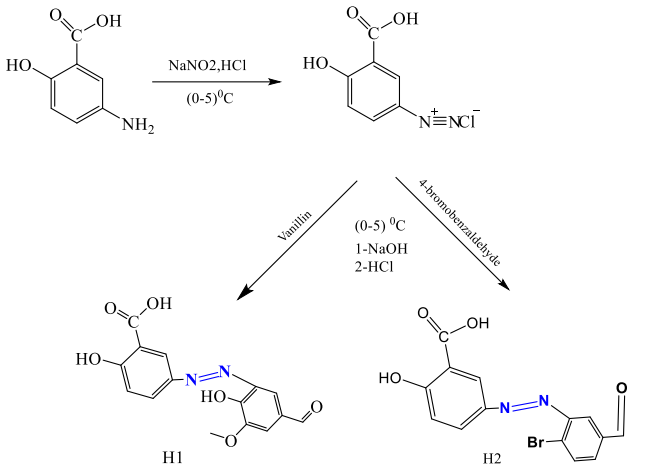
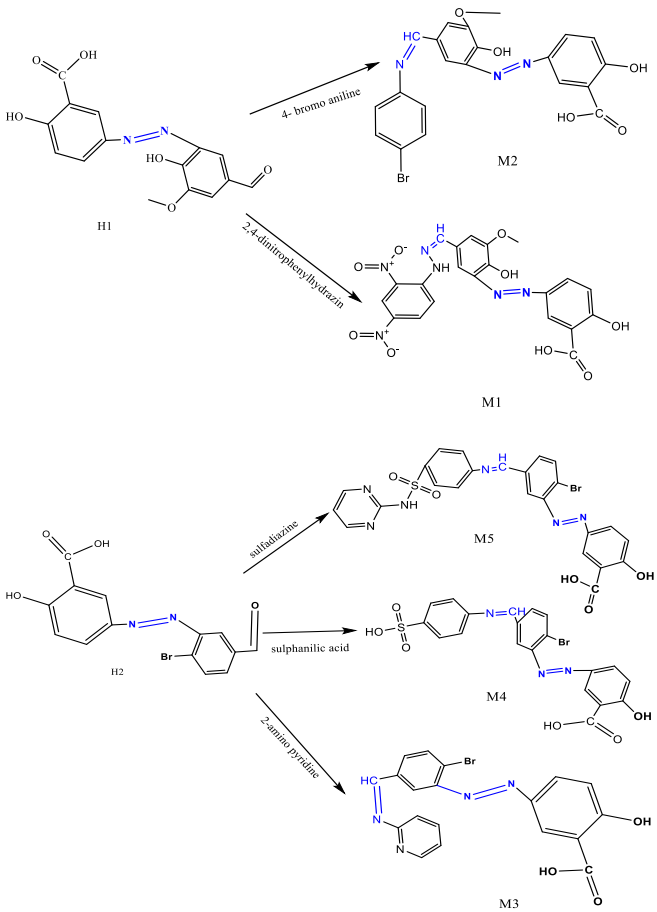
reacting (H1) with (2,4-dinitrophenylhydrazin,4-bromo aniline) to obtain (M1,M2) and reacting (H2) with (2-amino pyridine, sulphanilic acid) , sulfadiazine) to obtain (M1, M2, M3) using ethanol solvent and reflex as in Scheme 2



Scheme1: Synthesis of Azo compounds



Scheme2: Synthesis of Azo-schiff compound

Anti-bacterial Activity

The antibacterial activity of the compounds Schiff bases against Staphylococcus aureus and Escherichia coli was examined, the results showed that all compounds It has excellent biological activity

The inhibition zones of the synthesized Schiff's bases (mm)		
Com .NO	**Staphylococcus aureus**	**Escherichia coli**
M1	27	25
M2	18	17
M3	21	20
M4	20	28
M5	25	22

FT-IR spectra

The compounds was identified utilizing infrared spectroscopy, and the physical properties it was studied, Infrared spectroscopy identified the compounds (H1, H2) by the disappearance of first amine group at (3500-3600cm-1) and the appearance of azo group (N=N) at (1630, 1575 cm-1). Its physical properties were studied as melting point (m.p.) of H1=125°C and H2=150°C, As for FT-IR for compounds (M1-M5) we note the disappearance of carboxyl group at (1725cm-1) and the appearance of imine (C=N) at (1675 - 1600 cm-1). Its physical properties were studied as melting point (m.p.) of M1=190°C, M2=150°C, M3=160°C, M4=158°C and M5=233°C

^{1}H-NMR data

The above-prepared compounds were identified by the H-NMR spectrum, whereas the resonance of protons in the composites was determined based on their multiplicity and integration pattern. The 1H-NMR spectra of the Schiff bases in DMSO exhibit signals at 8.08, 8.58,9.00,8.64 and 8.54 ppm for compounds(M1-M5) attributed to CH=N-protons, respectively.

4. Conclusion

The two components of the two azo compund were prepared as raw materials for the preparation of five schiff bases that containing azo group (N=N) and amine group (C=N). through the addition reaction process, The synthesized compounds were showed excellent antibacterial activity and the characterization by FT-IR and 1H-NMR confirm this preparation

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