

Synthesis, Characterization and Antibacterial Activity of (E)-2- (1H-1, 2, 4-triazol-3-ylimino) methyl) Phenol

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Abstract

The (E)-2-((1-H-1,2,4-triazol-3-ylimino)methyl)phenol under investigation has been synthesized from the reaction between salicylaldehyde and 3-amino-1,2,4-triazol. Elemental analysis and infrared spectrum were used to characterize the structure of the synthesized compound which is (E)-2-((1-H-1,2,4-triazol-3-ylimino)methyl)phenol, The CHN elemental analysis data showed the required compound. Infrared spectral data agreed with the functional groups present in the synthesized compound. The results of antibacterial showed that (E)-2-((1-H-1, 2, 4-triazol-3-ylimino)methyl) phenol has a great effect against *Escherichia coli*, *pseudomonas aeruginosa*, , *staphylococcus aureus* and *streptococcus pyogens*. However, no effect was observed against *Klebsiella Pneumonia* and *proteus mirabilis*.

Keywords: Salicylaldehyde, 3-amino-1,2,4-triazol, and antibacterial.

Introduction

It's evident that an imine derivatives (-H-C=N) group is an essential structural requirement in biological activity.⁽¹⁾ The azomethine derivatives and their complexes derived from o-formyl phenoxyacetic acid with some aromatic and aliphatic amines have been investigated.⁽²⁾ Biological significance such as antimetabolites of pyridoxal phosphates, chorismata synthase inhibition and antitumor activity were studied,⁽³⁻⁵⁾ and the obtained results may be useful to researches attempting to gain more insight into the antibacterial activity of azomethine derivatives.⁽⁶⁻⁹⁾ Ben-Gwerif et al.⁽¹⁰⁾

reported that Schiff base chelates derived from salicylaldehyde and tryptophan had a great activity against different pathogenic gram positive and gram negative bacteria.

The aim of the present paper is to synthesis, characterize and screen the antibacterial activity of (E)-2-((1H-1, 2, 4-triazol-3-ylimino)methyl) phenol on some pathogenic bacteria.

Experimental

Chemicals

All chemicals used in this work were reagents grade (BDH/Aldrich), and the organic solvents were obtained as pure grade materials from BDH. Double distilled water was always used.

Synthesis of (E)-2-((1-H-1,2,4-triazol-3-ylimino)methyl)phenol

The compound was synthesized from salicylaldehyde and 3-amino-1,2,4-triazol by adding 25 cm³ of salicylaldehyde ethanolic solution (1.22g; 0.01mol) to the same volume of methanol solution of 3-amino-1,2,4-triazol (0.84g; 0.01 mol), the mixture was stirred for 2 hours at room temperature. The resulting solution was evaporated to 20% of its original solution, and the product was collected by filtration, washed several times with ethanol and crystallized from hot ethanol and then dried. The melting point of yellow crystals found to be 182 °C.

Bacterial culture

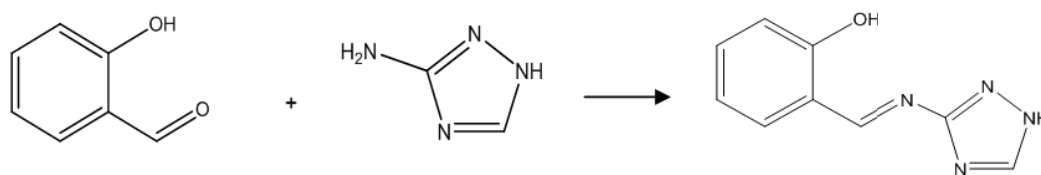
Different genera of pathogenic bacteria ; *Escherichia coli*, *pseudomonas aeruginosa*, *streptococcus pyogens*, *staphylococcus aureus*, *Klebsiella Pneumonia* and *proteus mirabilis* was obtained and confirmed in Al-Jamahiriya hospital. Different concentration of (E)-2-((1-H-1,2,4-triazol-3-ylimino)methyl)phenol ; 0.02 M ,0.016 M and 8X10⁻³M were placed on the surface of incubated media with pathogenic bacteria and incubated at 37 °C for 24 hours. The diameter of inhibition zone (mm) was recorded.

Measurements

The CHN elemental analyses for the (E)-2-((1H-1, 2, 4-triazol-3-ylimino) methyl) phenol estimate the percent of carbon, hydrogen and nitrogen using a Perkin-Elmer-2400 analyser. IR spectrum was recorded on a Nicolet P510 spectrometer. All analyses were carried on the university of Paderborn, Germany.

Results and discussions

The condensation of salicylaldehyde and 3-amino-1,2,4-triazol yields one product as shown below :



The microanalysis data for the (E)-2-((1-H-1,2,4-triazol-3-ylimino)methyl)phenol (C% 55.00 ,57.44) , (H% 4.62 , 4.25) and (N% 28.28 , 29.78) were found to be consistent with the expected results.

Infrared spectrum

The infrared spectral data of the (E)-2-((1-H-1,2,4-triazol-3-ylimino)methyl) phenol is in agreement with the expected range, Fig.1. A band at 1612 cm^{-1} is due to $\nu(\text{C}=\text{N})$ vibrations.⁽¹¹⁾ Meanwhile, Two bands at 3541 and 1315 cm^{-1} are assigned to $\nu(\text{-OH})$ and $\nu(\text{C-N})$ vibrations,⁽¹²⁾ and the $\nu(\text{C-H})$ is proved by the appearance of -C-H group at 2921 cm^{-1} .⁽¹³⁾

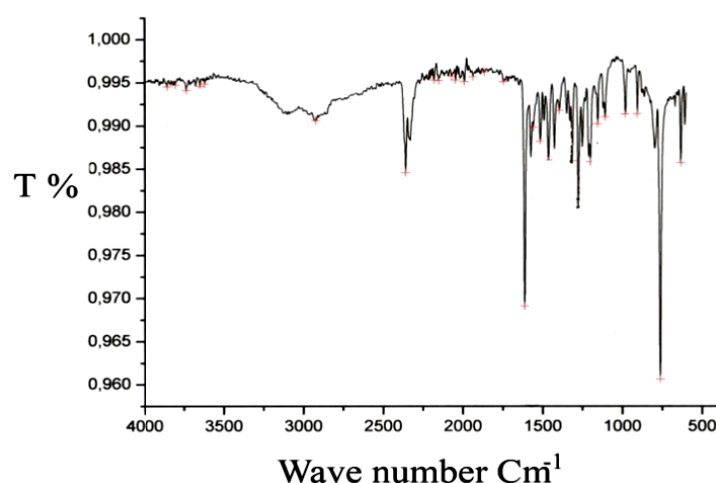


Figure 1: infrared spectrum of the compound

Antibacterial activity

The results of antibacterial activity showed that moderate activity was observed For 2-[(2-hydroxyphenyl)methylene]amino-3-methylbutanoic acid against *Escherichia coli* and *staphylococcus aureus* only at concentration 0.016M. Similar effect was observed against *klebsiella pneumonia* at all concentrations used. However, low effect was recorded against *pseudomonas aeruginosa* only at concentration 0.02M. In contrast, no effect was observed against *proteus mirabilis* and *streptococcus pyogens* at all concentrations used

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