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Review JoMCCT

Preparation, Spectral Characterization and Bio-Evaluation of Five and Seven Membered Ring Derivatives

Marwah Tahseen Neamah[1,*]

Abstract

Many cyclic compounds are made of heterogeneous atoms that are good electron donors to be the basic nucleus in the basic structure of chemical drugs, so most drugs and vitamins take cyclic compounds as a basic material for the manufacture of drugs, and without a doubt these drugs are distinguished by their high ability to make many biologically active derivatives in the fields of biochemistry and clinical medicine. Universal studies have been directed for the spinoffs to accomplish their chemical conformations by spectroscopic implementations (FT.IR, H.NMR, C.NMR)–bands, also Biotic Evaluation (Fungi and Bacteria). Since it has been established that cyclic derivatives are substances that either kill or inhibit the growth of bacteria, we have verified in our research that they are all employed as antimicrobials. Antimicrobial medications can be segregated according to the bacteria they are intended to combat. Antibiotics and antifungals, for instance, are used in conjunction with bacteria and fungus, respectively.

Keyword: five, six, ring, fungi, bacteria, cycle.

INTRODUCTION

The interest in preparing such types of five- and seven-membered rings indicates their wide importance in most types of biological research, especially in organic chemistry [1], because they contain free carbon doublets that generate broad vitality against different types of microbes spread in the environment and the body [2–4]. It can be used in the colorimetric analysis of a wide range of transition elements that give distinct spectral absorptions in the visible regions, which increases the possibility of separating many of these elements spectrally using the UV-vis spectroscopy technique or separating them by precipitation methods if the antipyrine derivative contains groups or donor atoms with a negative charge to form non-ionic (neutral) complexes [5–8] that can be precipitated in the aqueous phase or extracted with a solvent. Organic derivatives of diformylphenol and its substitutes have wide applications, starting from the organic synthesis of heterocyclic compounds, as well as derivatives resulting from the condensation of dol and novo-phenol, as well as their wide uses in the industrial fields [9–14]. Due to the presence of donor doublets in cyclic compounds, they have rare electronic spectra [10–13]. Their use developed in the late nineteenth and early twentieth centuries as chelating materials for the colorimetric analysis of many transition elements with trace amounts in biological systems [14–19].

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EXPERIMENTAL PART

Numerous spectrophotometric devices were taken to evidence the arrangements of the organized

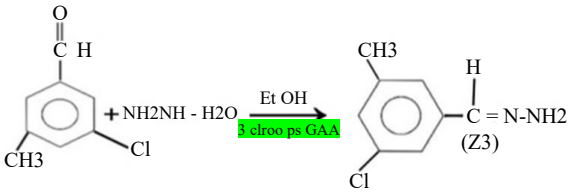
derivatives of heteroatoms and associated with cyclic compounds of nitrogen and oxygen, and they were deliberate at Kashan University. The substances were highly pure and the quantities were highly accurate.

Manufacturing of [E)-1-[(3-chloro-5-methylphenyl)methylidene]-2-(2,4-dinitrophenyl)hydrazine.,Comp. [Z3]

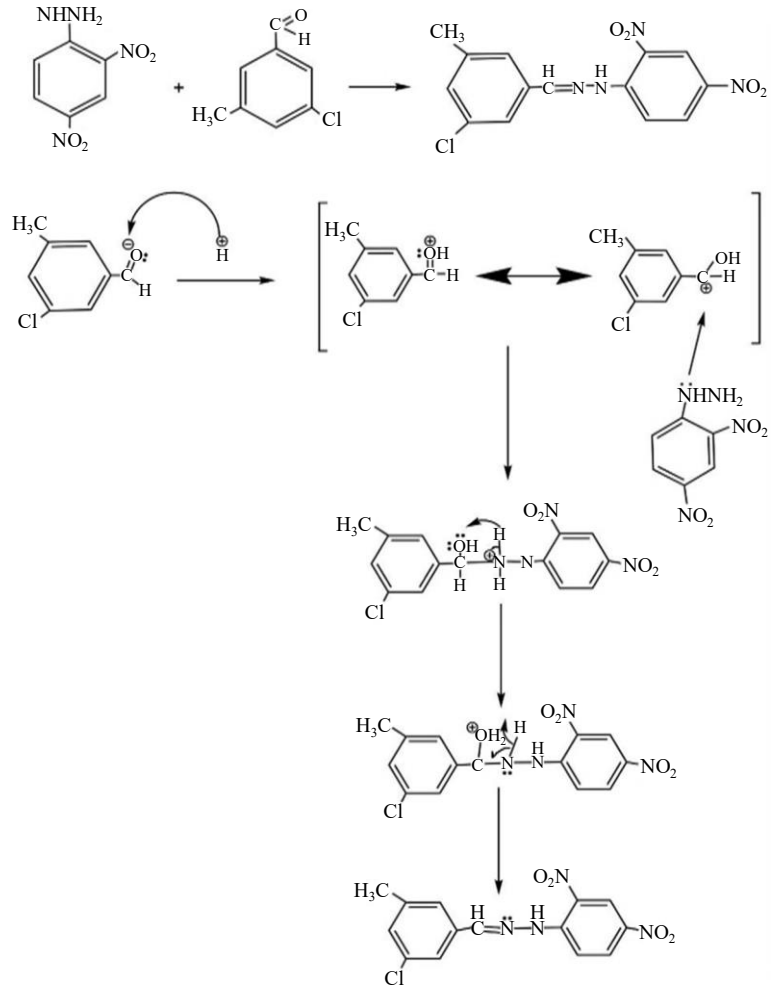
Aldehyde derivative (0.01) mole reacted with hydrazine (0.01)mole in presence of glacial acetic acid as a drops with stirring for (3 hrs) and refluxing process, then filteration, drying, recrystallization to provide Compound {Z3} approving to procedures [5, 6]

Manufacturing of (3-chloro-5-methylbenzylidene)hydrazine, Comp. [B1]

Aldehyde derivative (0.01) mole reacted with 2,4-dinitro phenyl hydrazine (0.01)mole in presence of glacial acetic acid as a drops with stirring for (4 hrs) and refluxing process, then filteration, drying, recrystallization to provide Compound {B1} approving to procedures [5, 6]



Scheme 1. Synthesis of compound {Z3}



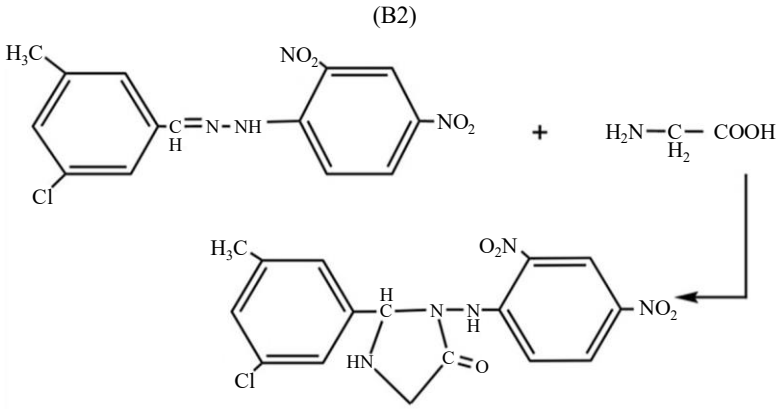
Scheme 2. Mechanism - synthesis of compound {B1}

Manufacturing of [2-(3-chloro-5-methylphenyl)-3-[(2,4-dinitrophenyl)amino]imidazolidin-4-one, Comp. {B2}

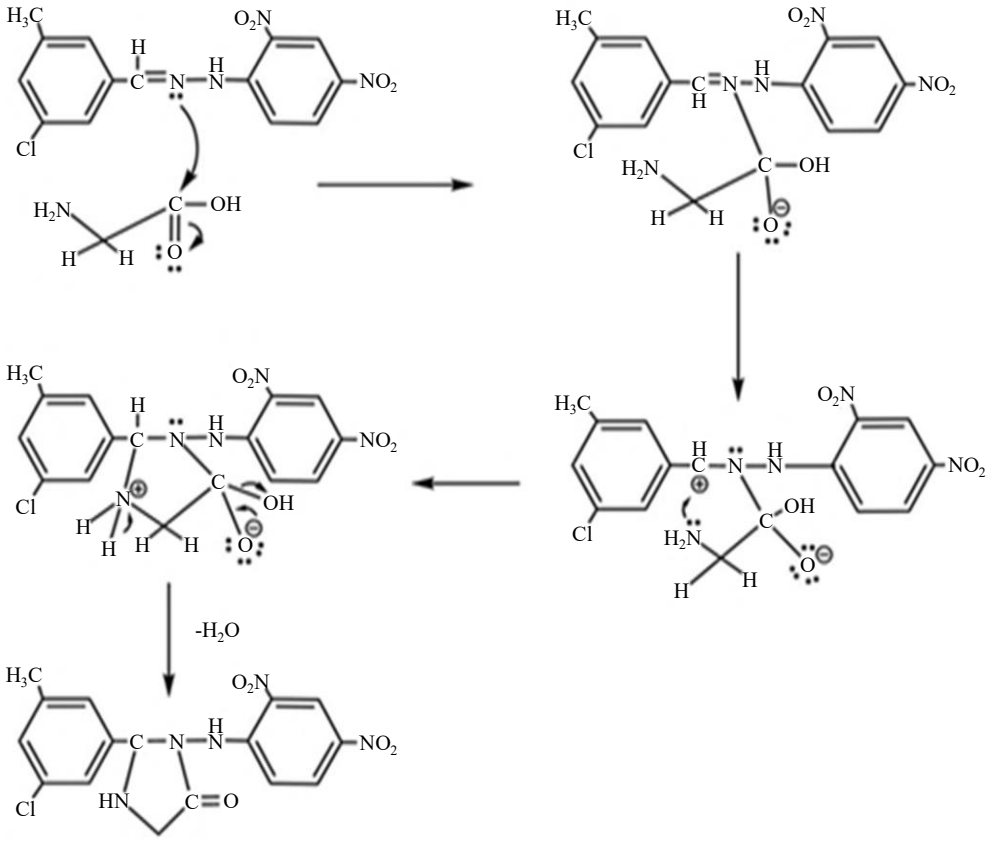
In the refuxing process, Compound{B1} (0.01 mole) reacted with amino acetic acid (0.01 mole) in a cyclization reaction using absolute ethanol. Compound{B2} was then separated, dried, and recrystallized to produce a five-membered ring from an imidazole derivative that complied with procedures [5, 6].

Production of [(2,4-dinitrophenyl)amino] 3-(3-chloro-5-methylphenyl)-4-Comp. {B3}: -1,3,4,5-tetrahydro-2,4-benzoxazepine-1,5-dione

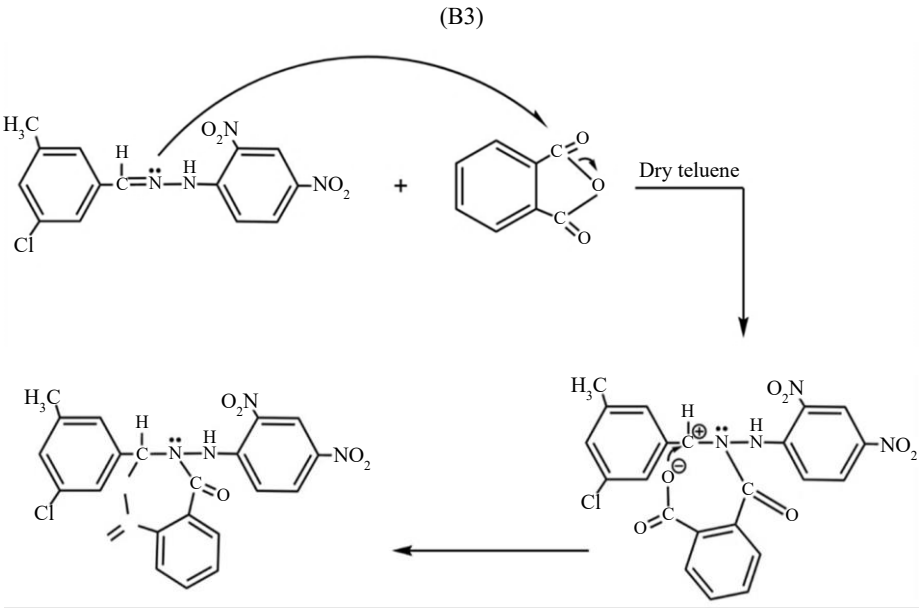
In the refuxing process, Compound{B1} (0.01 mole) reacted with phthalic anhydride (0.01 mole) in a cyclisation reaction with dry benzene. Compound{B2} was then separated, dried, and recrystallised to produce a seven-membered ring from an oxazepine derivative that complied with procedures [5, 6].



Scheme 3. Synthesis of compound {B2}



Scheme 4. Mechanism-synthesis of compound {B2}



Scheme 5. Synthesis of compound {B3}

RESULTS AND DISCUSSION

The literature refers to research that is interested in studying cyclic compounds in the living system, most of which are related to porphyrin derivatives, cyanopalmitin, and pharmaceutical drugs whose center is in the form of hybrid atoms [20–24]. The effective effect in transporting blood oxygen in mammals, the respiratory cycle.

FT.IR- Revealing

This chemical revealing gave strong statistics of constructions of structured cyclic-derivatives through appearance clear bands at (3377, 3421)cm^{-1} in prepared compound {Z3} for amine group (NH_2) and other band at (1622) cm^{-1} for (CH=N) Imine group., while appearance band at (3325) cm^{-1} for (NH) amine group in compound {B}, appearance band at (1627) cm^{-1} for Imine group in compound {B1}., appearance bands for the amine group in the imidazole ring of compound {B2} at (3318) cm-1, the cyclic ester group at (1710) cm-1, and the cyclic amide group in compound {B3}Oxazepine at (1678) cm-1, all of which are spectrally revealing and in agreement with the literature [14] (Figures 1–4).

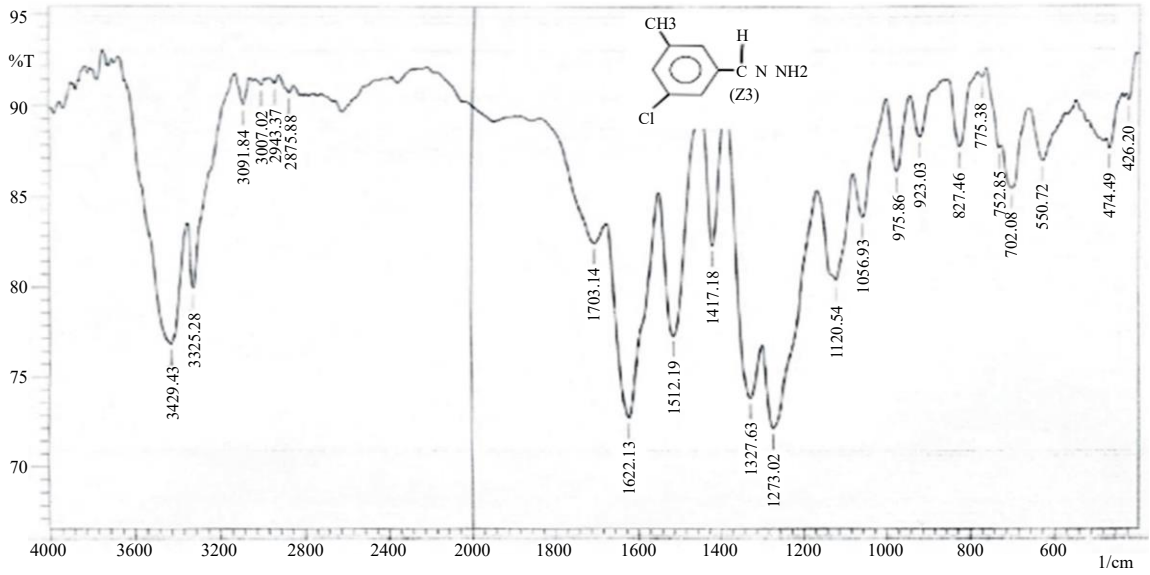


Figure 1. IR of comp. {Z3}

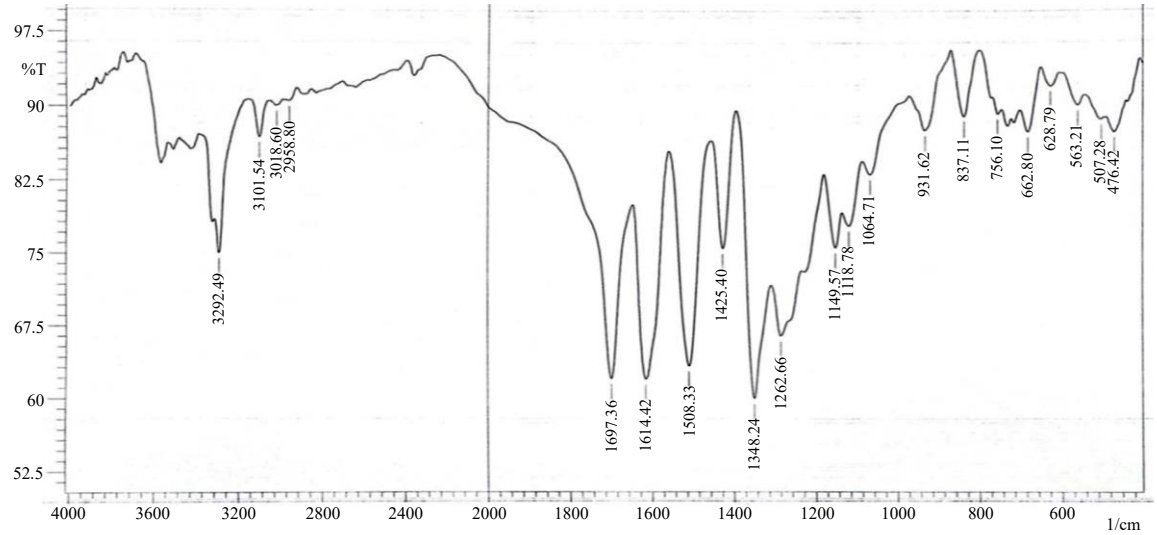


Figure 2. IR of Comp. {B1}

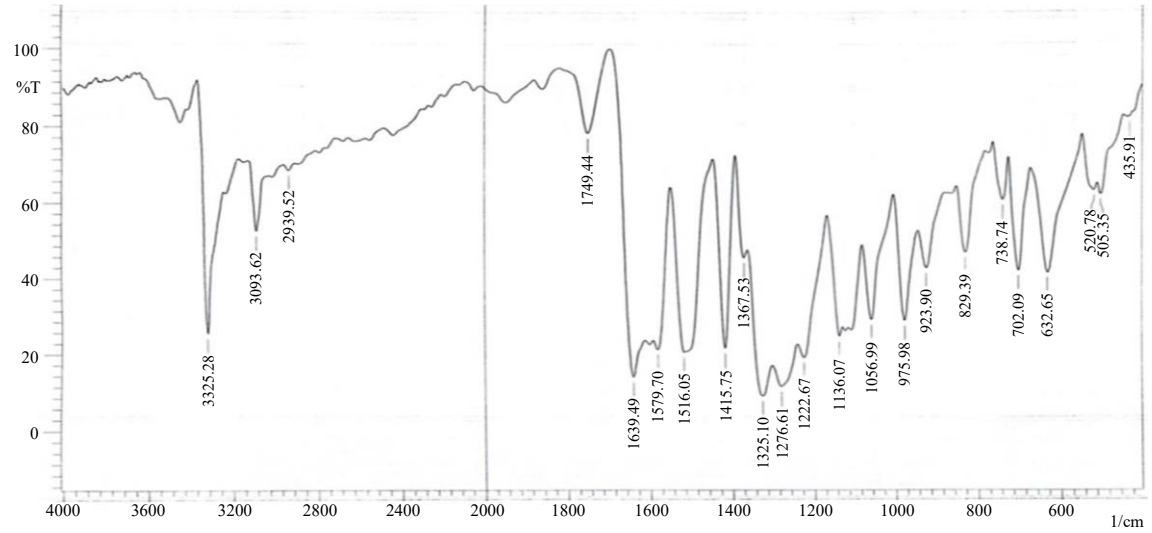


Figure 3. IR of Comp. {B2}

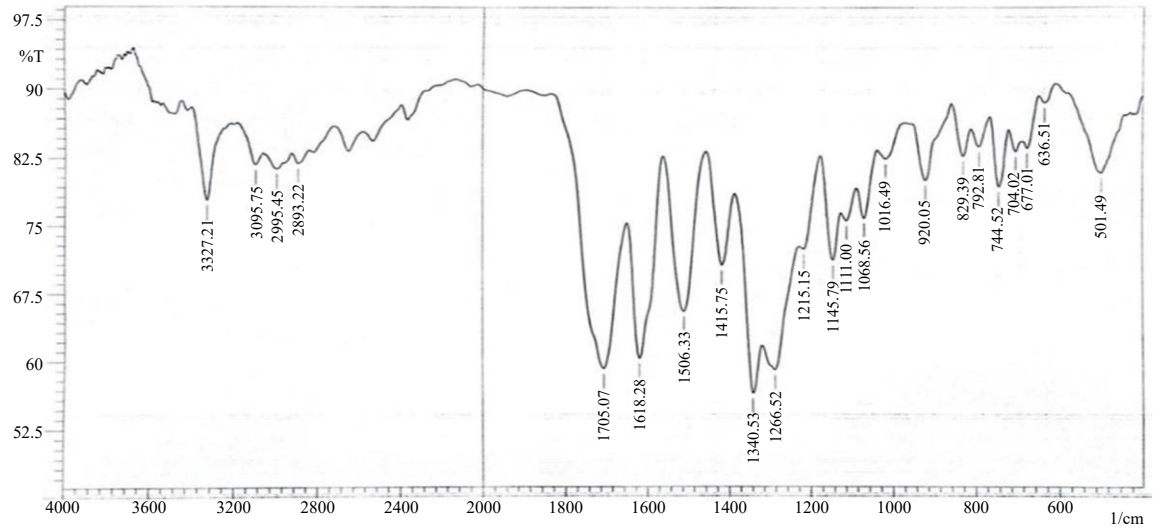


Figure 4. IR of Comp. {B3}

[1]H.NMR- Revealing

Through attendance vivid peak at δ (3.98), this chemical revelation provided significant facts on constructions of structured cycle-derivatives. for protons of amine group (NH_2) and peak at δ (8.75) for proton of Imine group (CH=N) in compound {Z3}., peak at δ (5.54) for protons of amine group (NH) and peak at δ (8.43) for proton of Imine group (CH=N) in compound {B1}., peak at δ (4. 43) for protons of amine group (NH) in compound {B2}., peak at δ (4. 52) for protons of amine group (NH) in compound {B3}and all spectral revealing approving to literature [14] (Figures 5–8).

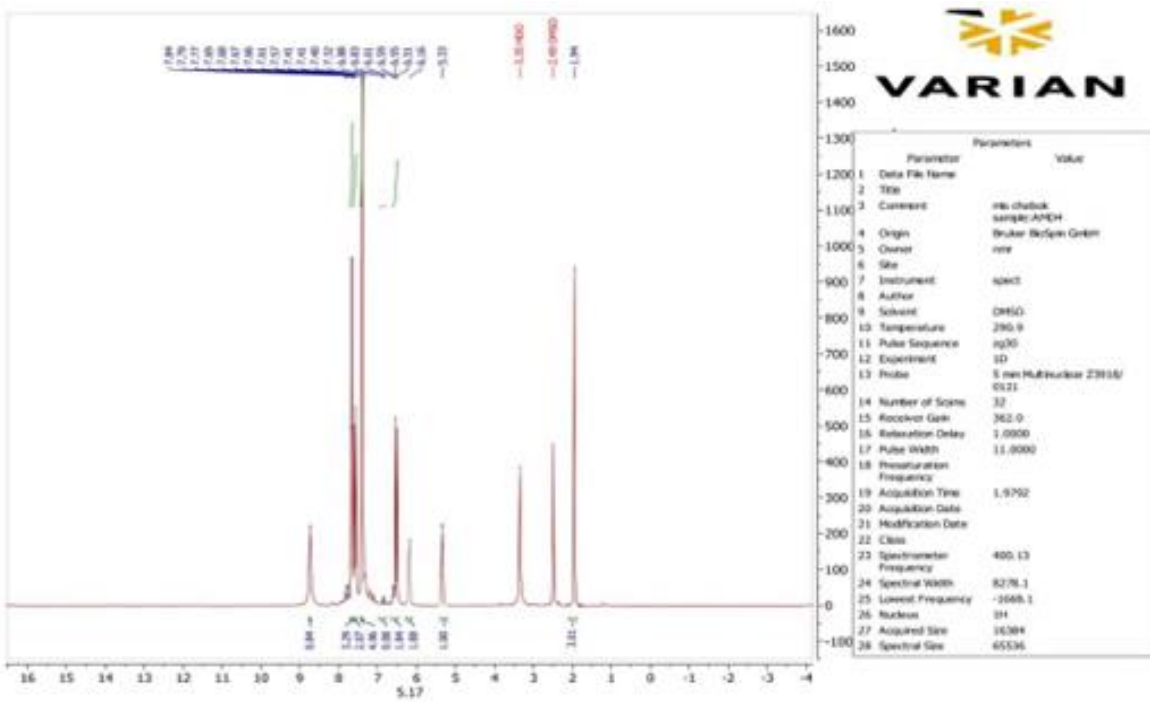


Figure 5. H.NMR-revealing of Compound{Z3}

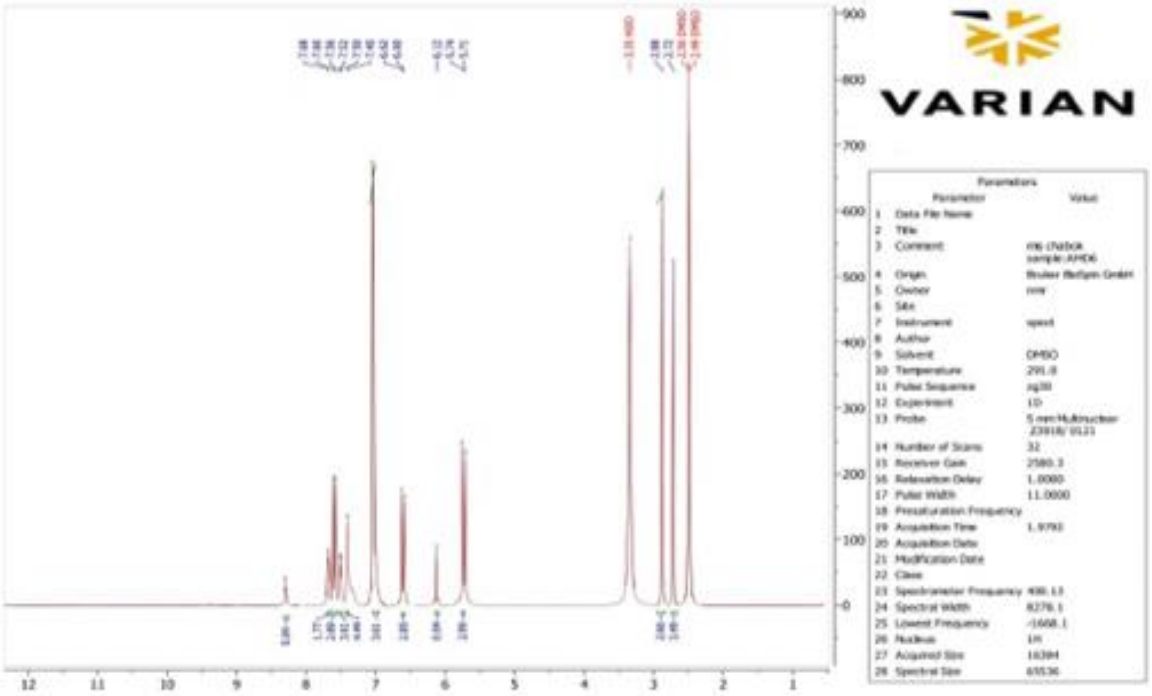


Figure 6. H.NMR-revealing of compound{B}

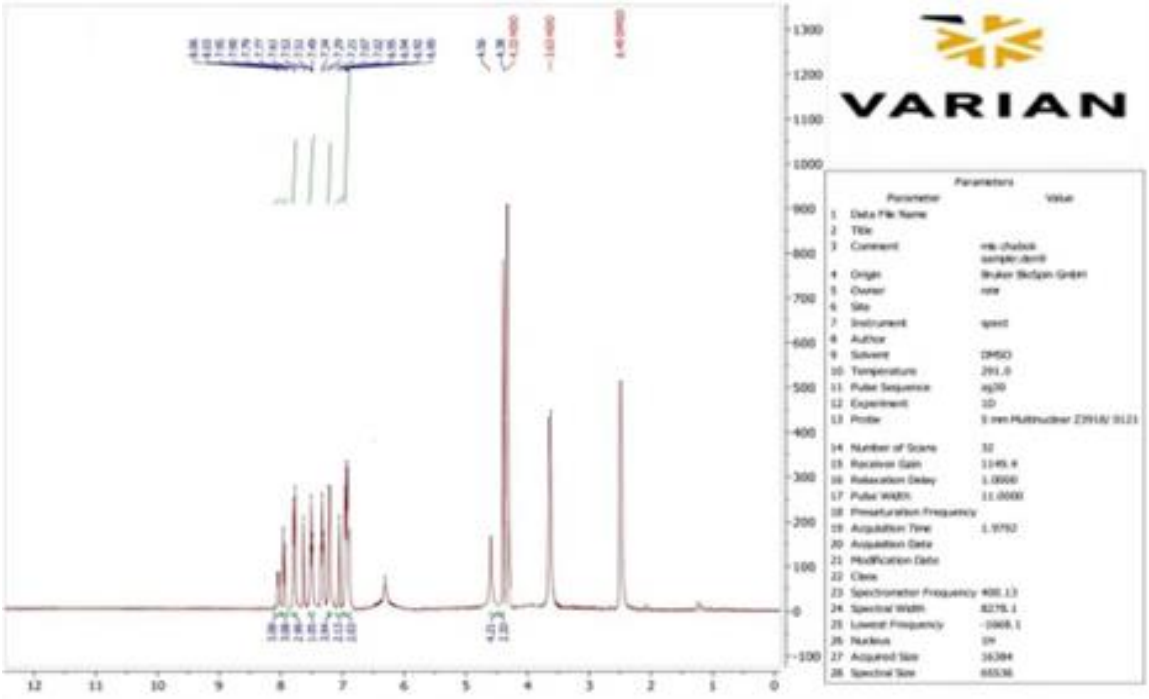


Figure 7. H.NMR-revealing of compound{B2}

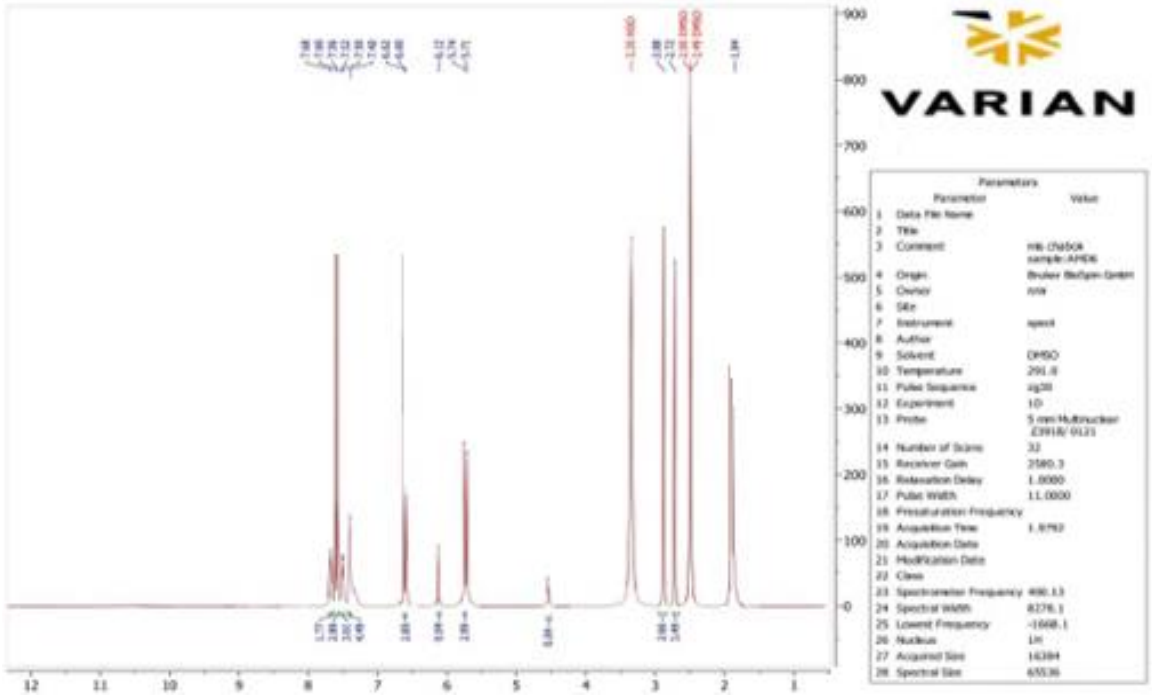


Figure 8. H.NMR-revealing of compound{B3}

C.NMR- Revealing

This chemical revealing gave strong data of constructions of formatted cycle-derivatives through attendance vibrant peak at δ (152) for carbon atom of Imine group (CH=N) in compound {Z3}.; Also peak at δ (150) for carbon atom of Imine group (CH=N) in compound {B1}.,While other peak at δ (168) for carbon atom of amide group (CO-N-) in compound {B2}., peak at δ (170.0) for carbon atom of amide group (CO-N) and peak at (174.0) for cyclic ester geoup (CO-O-) in compound {B3}for oxazepine., all spectral revealing approving to literature [14] (Figures 9–12).

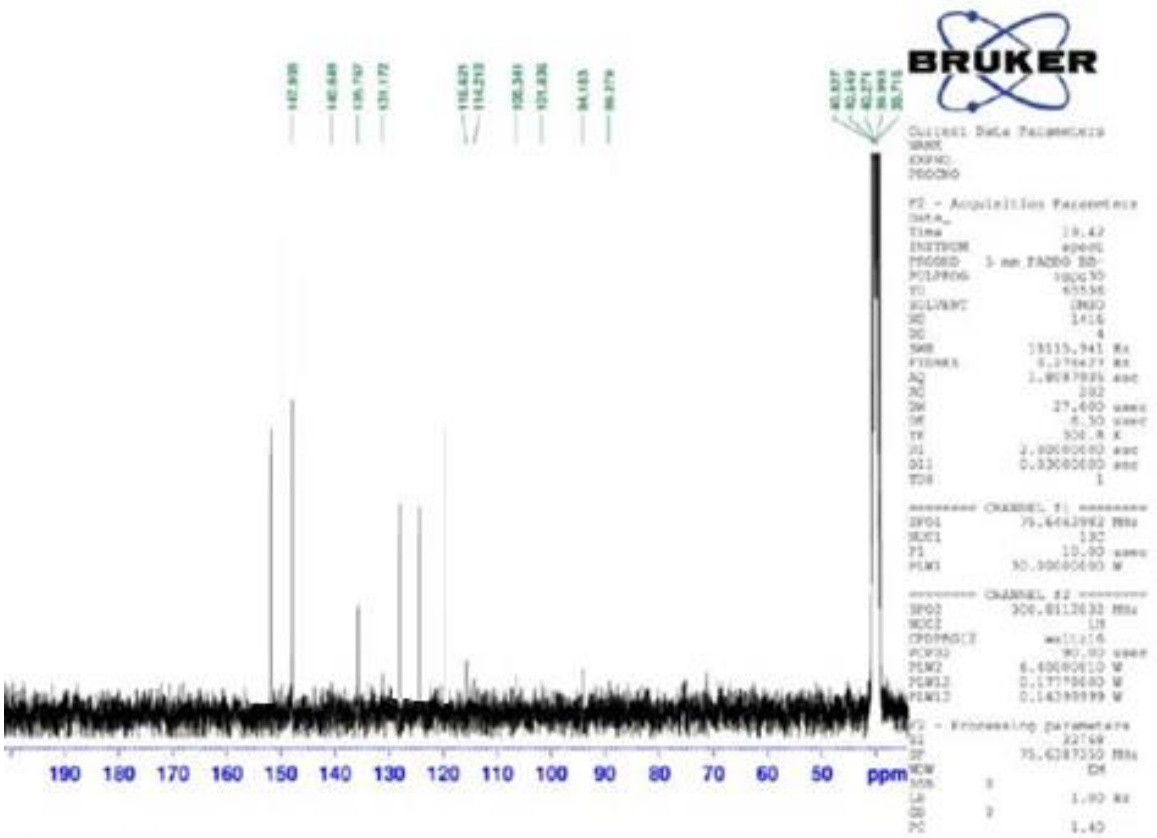


Figure 9. C.NMR-revealing of compound{Z3}

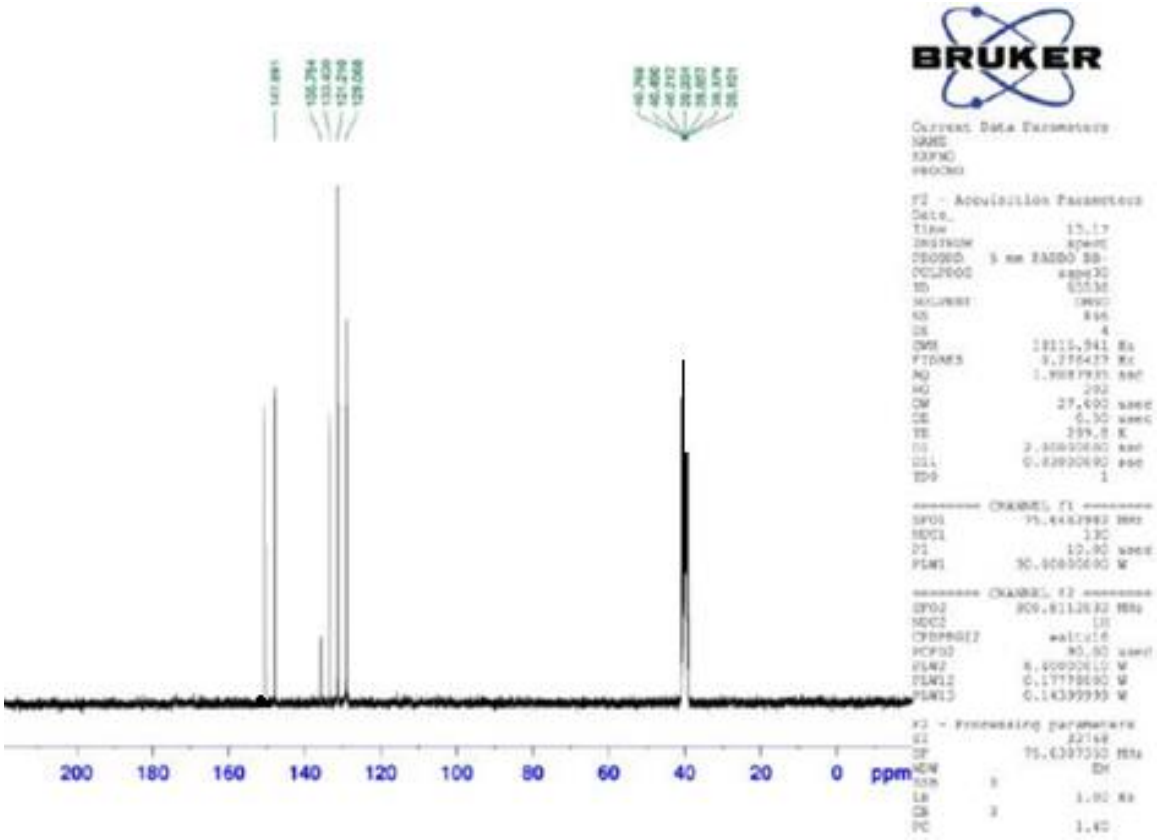


Figure 10. C.NMR-revealing of compound{B}

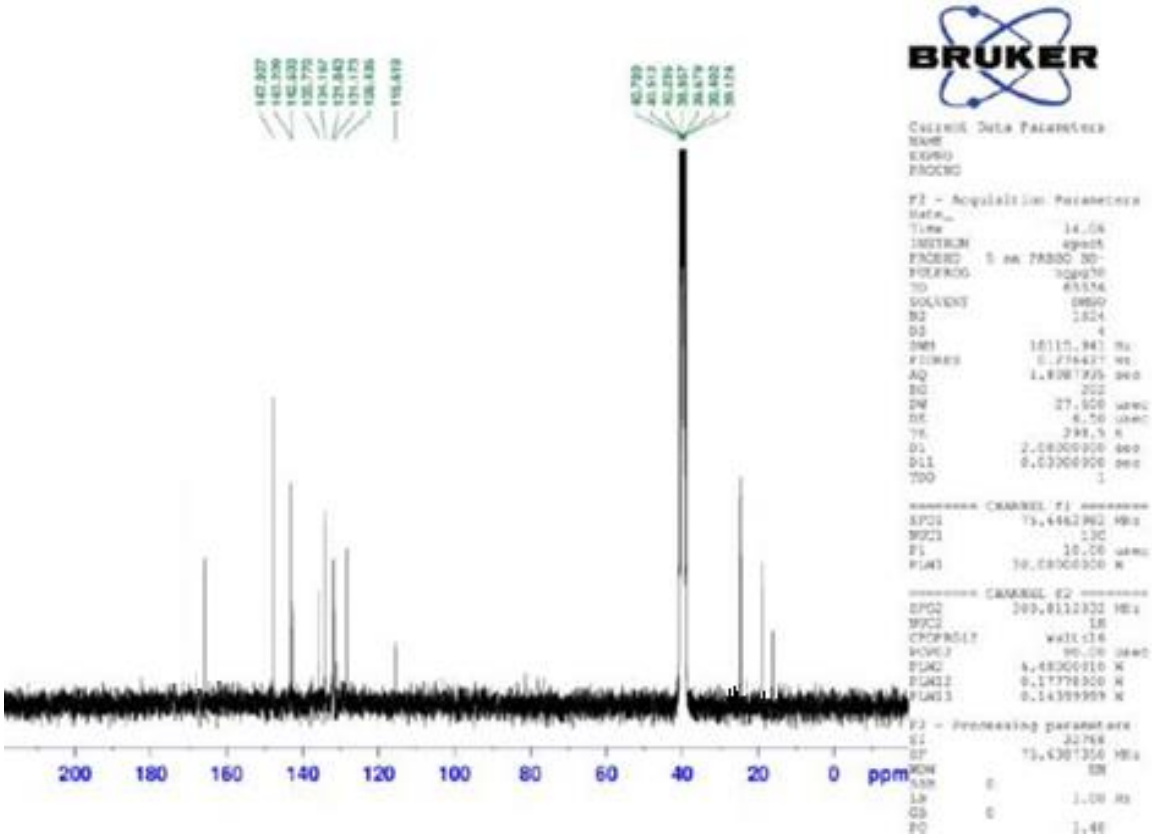


Figure 11. C.NMR-revealing of compound{B2}.

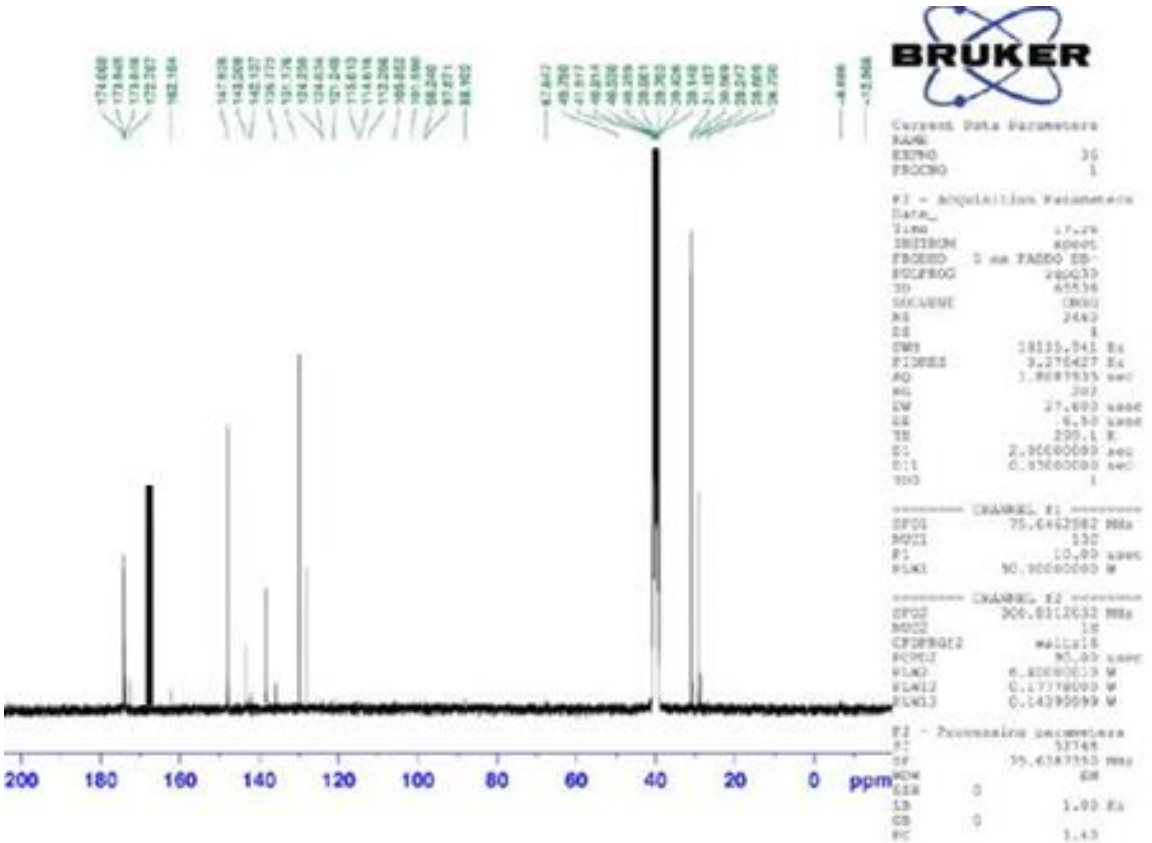


Figure 12. C.NMR-revealing of compound{B3}

Assessment of the Value of Compounds Against Bacteria

Micro-organisms are the affects of various infections, so we notice a lot of investigates in the ground of studying the biological effectiveness of compounds on numerous varieties of pathogenic bacteria. Infections caused by bacteria that are resistant to the majority of currently available antibacterial therapies are becoming more common these days [25–29]., Two types of bacteria that are responsible for a number of human diseases were used in this study: Gramme positive bacteria, such as Staphylococcus aureus and Streptococcus pneumonia, and Gramme negative bacteria, such as E. Coli, at three concentrations (30, 60, and 90 microgrammes) with DMSO as the blank solvent (Figure 13 and Table 1).

Calculating a Compound's Efficacy Against Fungi

The obvious Ganoderma, also called "ling ji" (meaning "spirit plant") in Chinese and "menintake" in Japanese, is the fungus that may have the most potential for healing. Numerous lichen species have been shown to contain a variety of therapeutically significant chemicals [29–33], although it is thought that none of them are currently being used in conventional medicine. Microbicides [41–44] are substances that kill microorganisms [34–40], whereas bacteriostatic agents are substances that prevent bacteria from growing. Antimicrobial prophylaxis refers to the use of antimicrobial medications [56] to avoid infection, whereas antimicrobial chemotherapy [50–55] refers to the use of antimicrobial medications [45–49] to treat infection. There is strong evidence of fungal activity in Figure 14 (Table 2).

Figure 13. Effect of compound {B2} on staphylococcus aureus in different concentrations.

Table 1. Assessment of the effectiveness of compounds against Bacteria in Conc. (60 micro gram)

Compounds	*Staphylococcus aureus*	*Streptococcus pneumonia*	*Escherichia. Coli*
Compound {Z3}	+	+	+
Compound {B1}	++	+	+
Compound {B2}	+++	+++	++
Compound {B3}	++	++	++

(+): inhibition (4–7) mm; (++): inhibition (8–12) mm; (+++): inhibition (13–16) mm

Figure 14. Effect of compounds {B2} and {B3} on *A. neger in 60 microgram\L*

Table 2. Estimation of the effectiveness of compounds against Fungi in Conc. (60 micro gram)

Compounds	*Fungi: A. flevus*	*Fungi: A. neger*
Compound {Z3}	+	+
Compound {B1}	+	+
Compound {B2}	+++	+++
Compound {B3}	+	++

(+): inhibition (4–7) mm; (++): inhibition (8–12) mm; (+++): inhibition (13–16) mm

CONCLUSIONS

By following up on the results of the study, we noticed that all the prepared compounds have microbial activity against three types of bacteria and two types of fungi. We also found clear evidence for the formation of cyclic compounds that gave explicit frequency values in the infrared spectra as well as the proton and carbon resonance spectra.

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