

Studying of (Chemical ,Physical ,Biological) –Applications of Oxo- Sulfur Derivatives

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Abstract

In previously work of our paper , we synthesized several organic compound , but in this paper we will study some chemical applications like (DSC – Analysis , Solubility in different solvents , chromatography behavior) for some compounds and biological applications against three type of bacteria and two types of fungi towards some compound [1- 10].

Keywords: application , behavior.

Introduction

Derivatives of Oxo – Sulfur compounds are an important role in biological system which have important biological properties and synthetic compounds which used in many literature and past papers , especially in several fields like in medicinal chemistry with drugs and a grow chemical research and development.

Some of past papers on the synthesis and biological activities of the Sulfone compounds appeared particularly after the discovery of broad spectrum of compounds⁽¹⁻⁴⁾.

The biological activity of any compound depends on its content from active atoms in compound structure, The compounds containing the (thi , thia , thio , sulfone , sulfide , sulfoxide)- moiety exhibit a wide applications of biological activities⁽⁵⁻⁷⁾ and other applications like in studying of chromatography behavior for some compounds^(8,9). From these classes of sulfur heterocycles, the synthesis of new derivatives of sulfone , sulfide have been attracting considerable attention because of many pharmaceutical properties like antioxidant, antifungal, anticancer, DNA-Inhibitory activity, HIV- Inhibitors and other applications in pharmaceutical field and synthetic chemistry field or other fields like in polymers⁽⁸⁻¹¹⁾.

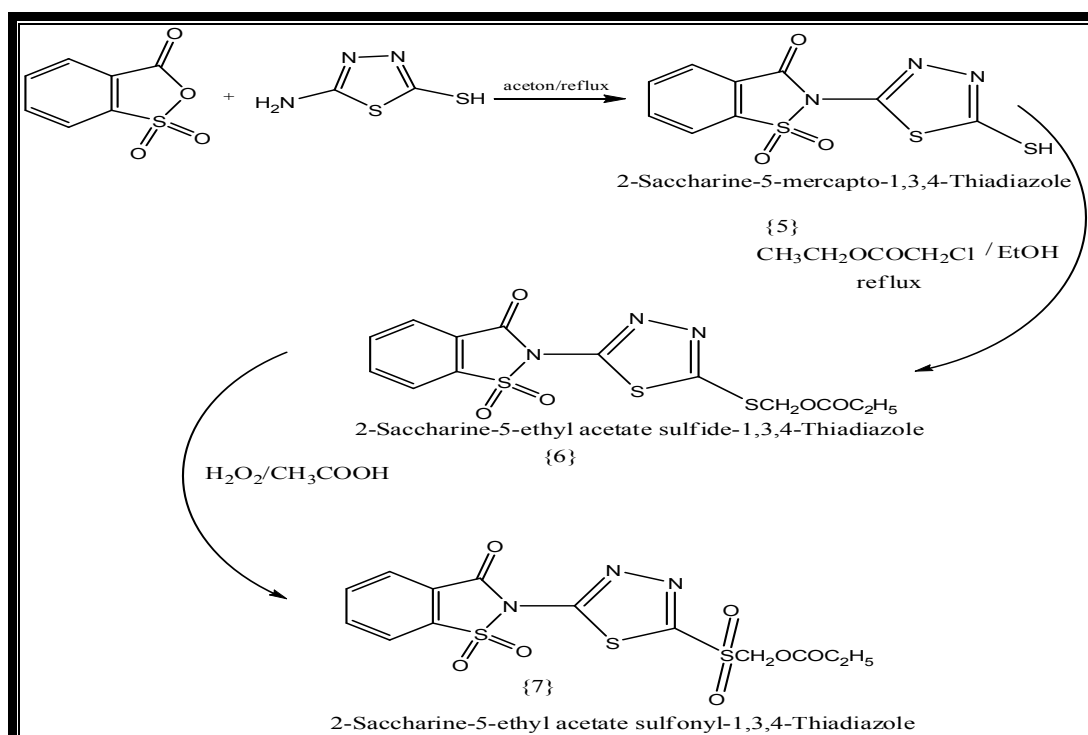
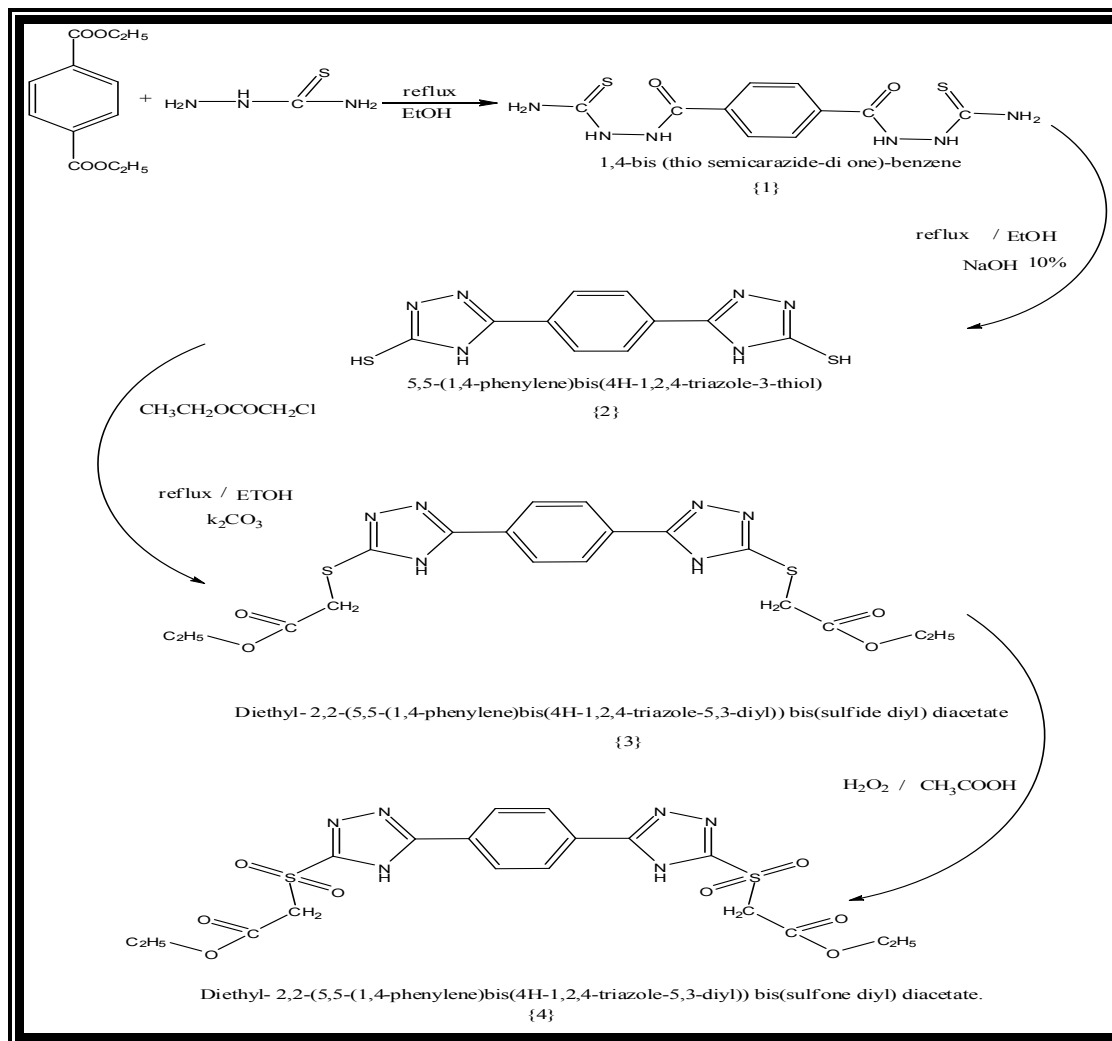
Experimental & Materials :

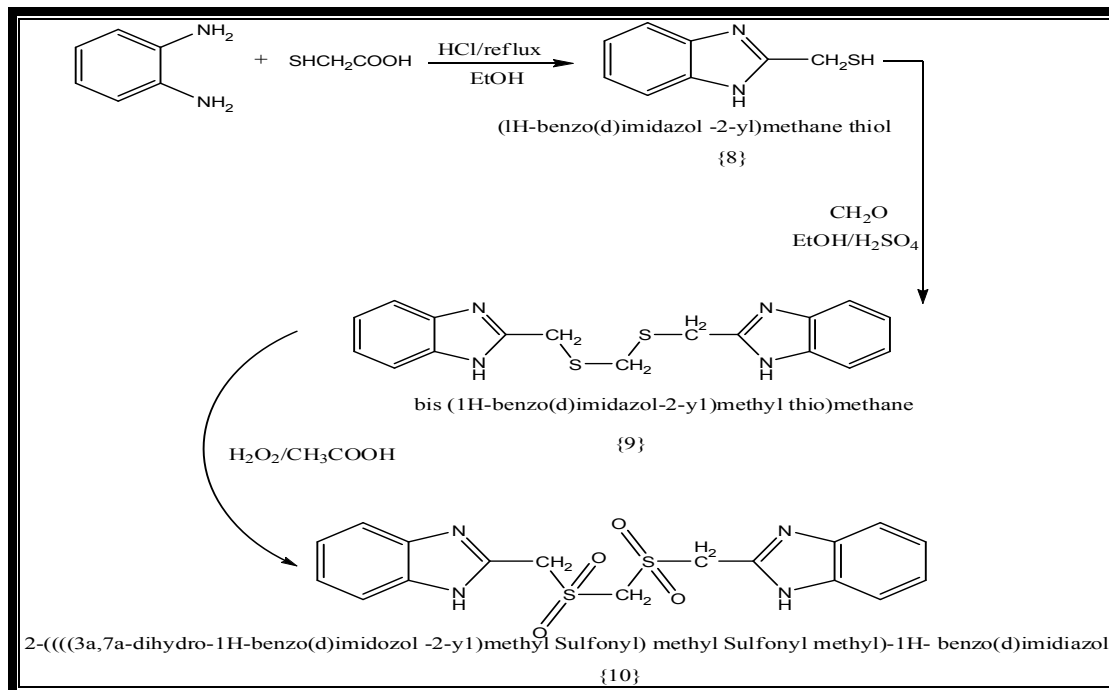
All chemicals and instrumentals carried out in college of education, biological studying carried out in Bio – lab in biological department.

Chemical Studying carried out in chemistry department , Baghdad university .

Synthesized Compounds In Our Past Work⁽¹⁾ :

In our previously paper, we synthesized (10) compounds , but now we will study the chemical Analysis and biological activity for them in this work :





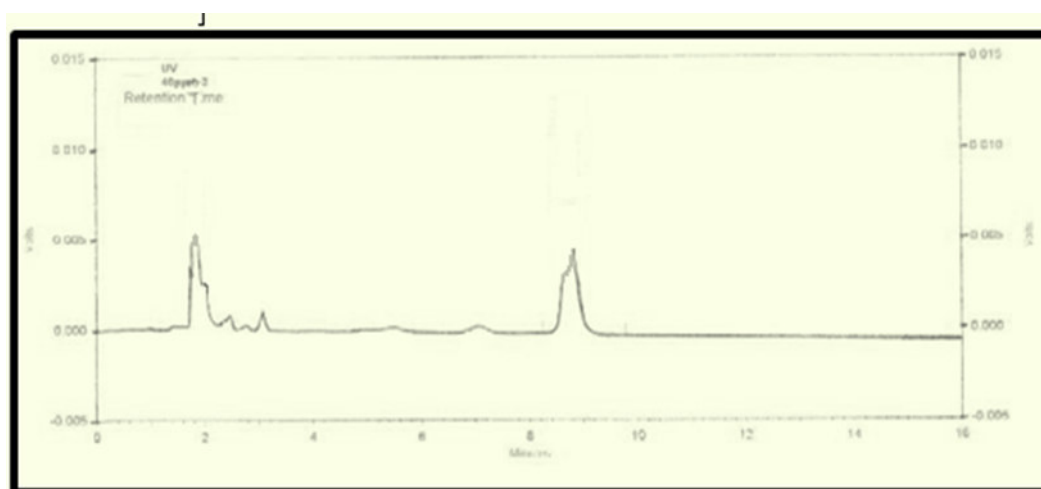
Results and Discussion :

In past paper of our work, we synthesized these oxo - sulfur compounds but now we will study of chemical applications like (DSC – Analysis , Solubility in different solvents , chromatography behavior) for some compounds and biological applications like antimicrobial activity against three types of bacteria and two types of fungi :

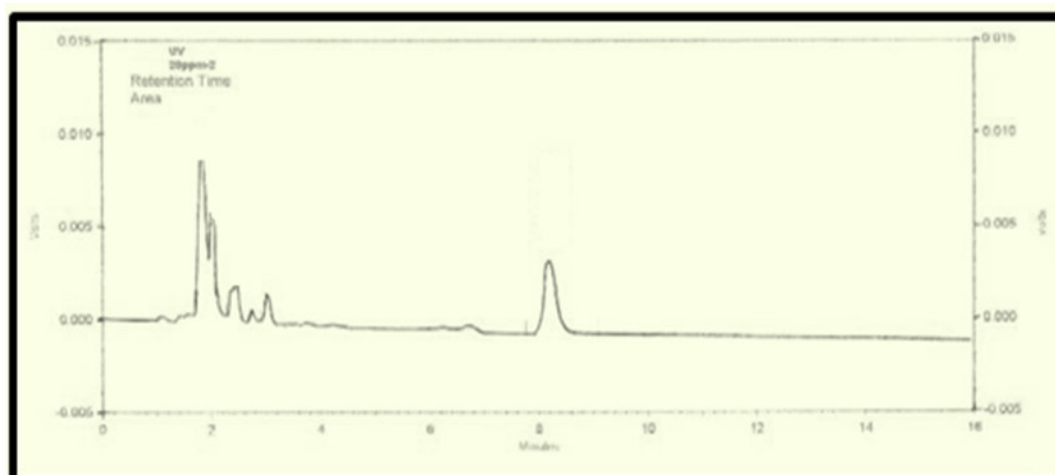
Chemical Studying :

Analysis of Compounds [some compounds] by Chromatography Method:

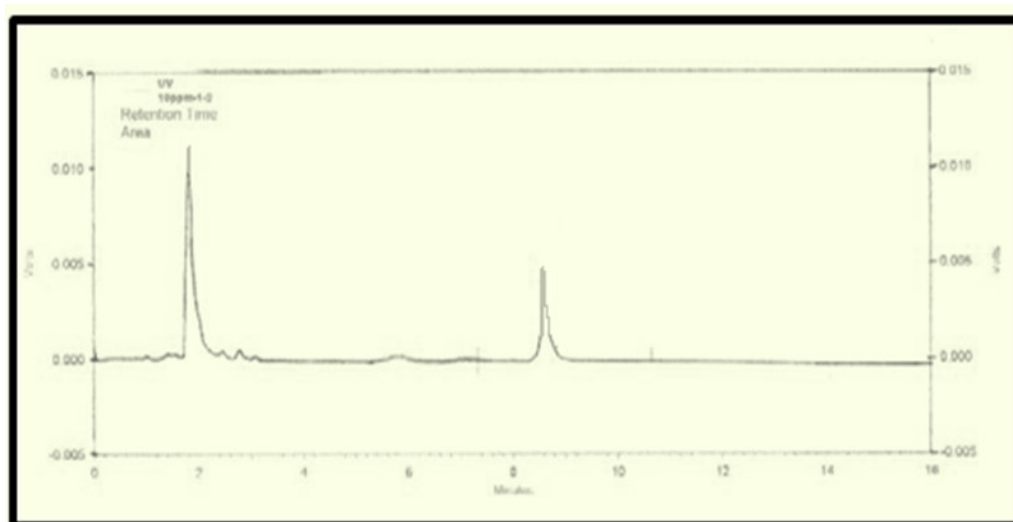
Preparation of diluted solutions ((concentration of 1ppm for vehicles)) of compounds [6 , 7 , 8 , 9 , 10] after dissolved with ethanol was also attended by a mixture of compounds which prepared by mixing 10ml of each solution individually after shaking continuous., injected models by using a syringe(Hamilton) with a capacity of 10ml individually and then injected the mixture, and then install the measurement conditions through the use of nitrogen a gas flow of 25ml/min bus speeds and injection temperature was 25C° degrees higher than the temperature separation column and then use a flame ionization detector is 50C° higher than the temperatures of the column either column temperature programmed gradual increase of of(90-160)C°, taking into consideration the maximum temperature to avoid damage to the column ., all data are shown in figures (1- 5).



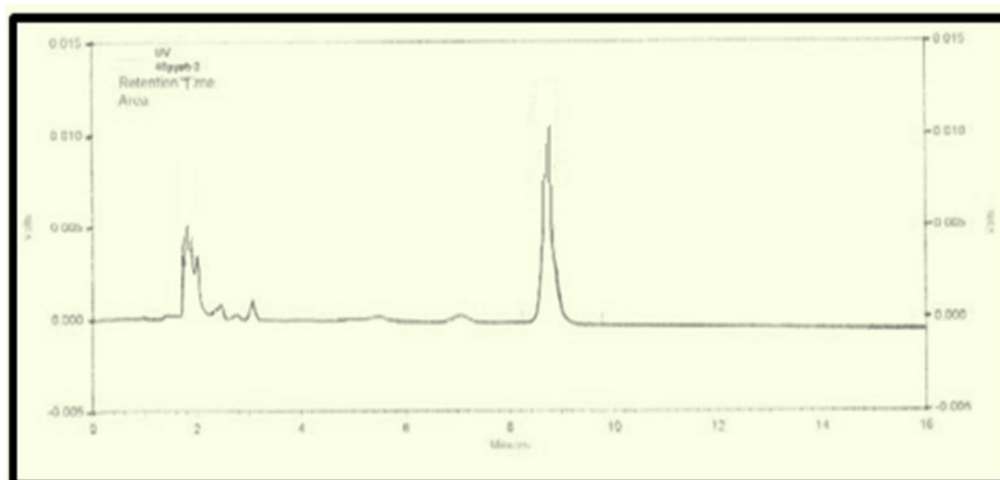
Fig(1): Chromatogram of compound [6]



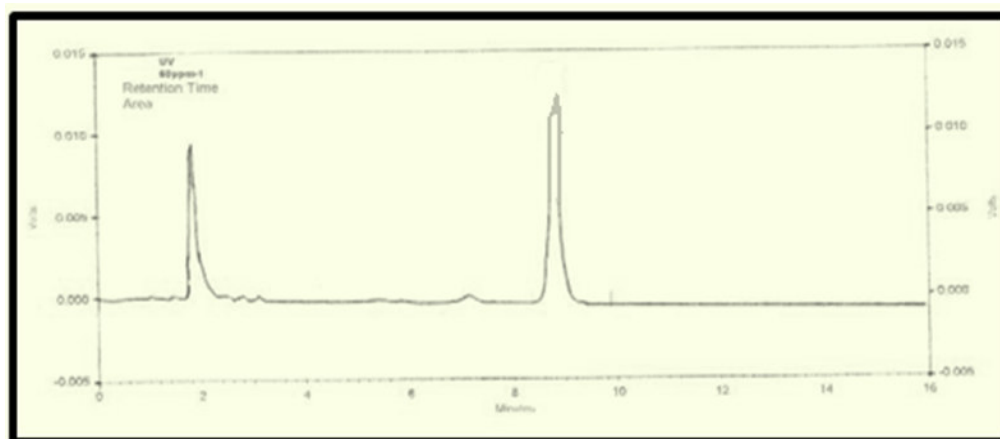
Fig(2): Chromatogram of compound [7]



Fig(3): Chromatogram of compound [8]



Fig(4): Chromatogram of compound [9]



Fig(5): Chromatogram of compound [10]

Studying of Solubility :

The solubility of compounds was studied in different solvents according to polarity of solvents , the results are listed in table (1).

Table (1) : Solubility of Compounds in Various Solvents.

| Compounds | Solvents | | | | | |
|-----------|----------|----------|------|---------|---------|-----|
| | Ethanol | Methanol | DMSO | Benzene | Dioxane | THF |
| {1} | + | + | + | - | - | - |
| {2} | + | + | + | - | - | - |
| {3} | + | + | + | - | - | - |
| {4} | + | + | + | - | - | - |
| {5} | + | + | + | - | - | - |
| {6} | + | + | + | - | - | - |
| {7} | + | + | + | - | - | - |
| {8} | + | + | + | - | - | - |
| {9} | + | + | + | - | - | - |
| {10} | + | + | + | - | - | - |

DSC – Analysis :

DSC – measurements of some compounds carried out for sulfur cycles in some figures (6 - 9) :

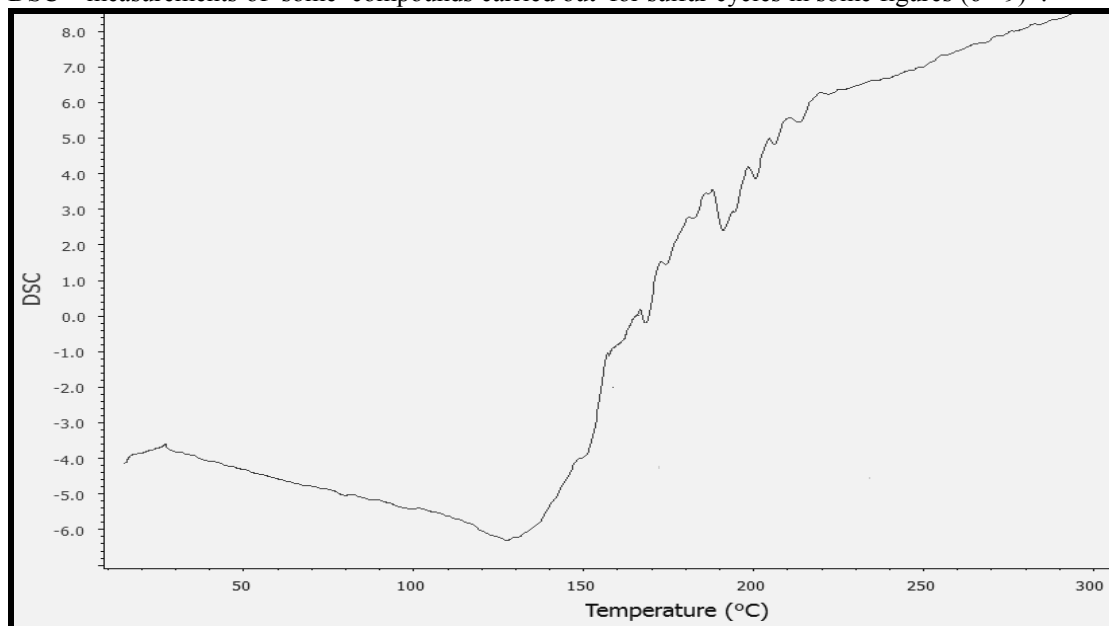


Fig (6) : DSC of Compound [7]

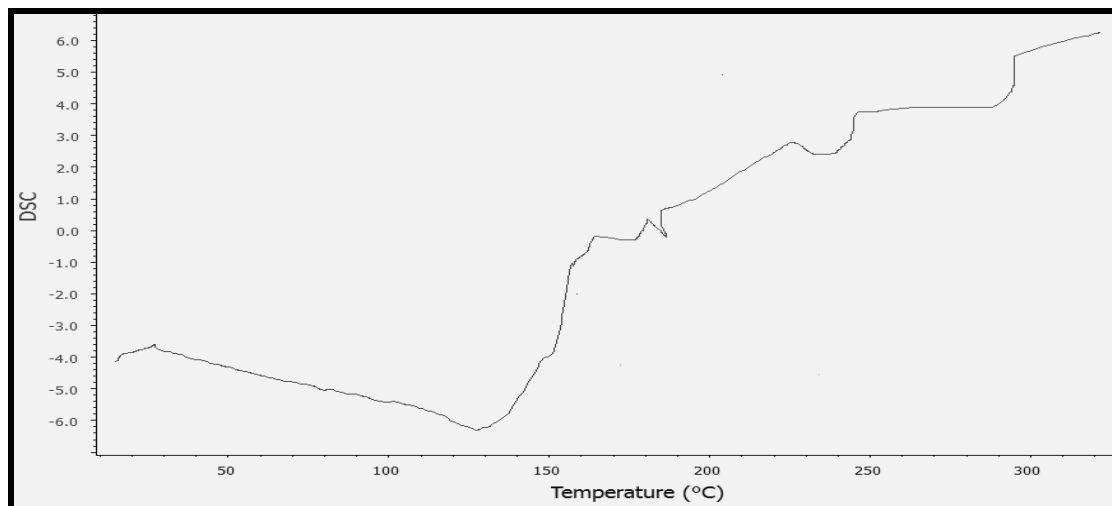


Fig (7) : DSC of Compound [8]

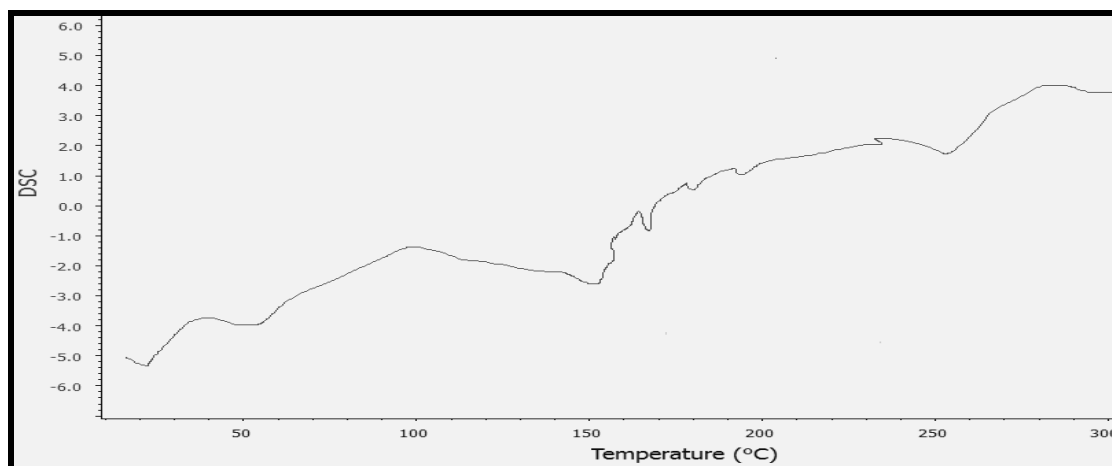


Fig (8) : DSC of Compound [9]

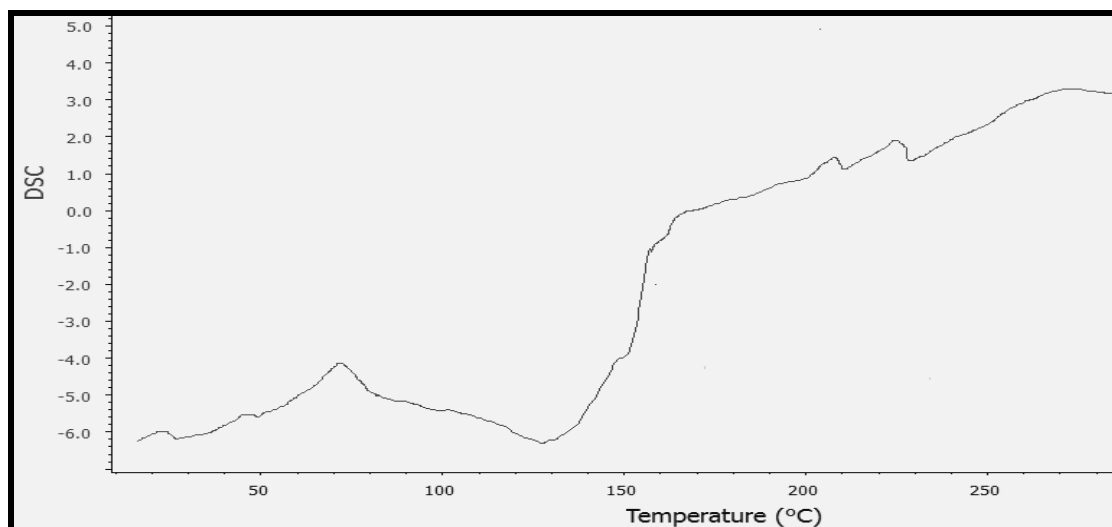


Fig (9) : DSC of Compound [10]

Antibacterial and Antifungal assay :

The biological activities of synthesized compounds have been studied for their antibacterial and antifungal activities by agar via biological methods⁽¹⁾. The antibacterial and antifungal activities were done at 100 mg/ml concentrations in DMO solvent through using three types of bacteria (*Bacillus subtilis* ,

Pseudomonas aeruginosa and *Salmonella typhi*) and two types of fungi (*A. niger* and *P. chrysogenum*). These bacterial strains were incubated for 24hr at 37°C and fungi strains incubated for two days at 37°C.

The antimicrobial results are listed at table (2). From results of antibacterial studies it was found to be potentially activity against all types of bacteria and fungi . while antifungal activity were listed in table (3). It is evident from the results that the biological activity of all compounds have high biological activity which inhibit the growth of bacteria and fungi .

The higher activity of compounds [3 ,4, 10 , 7] may be due to the fact that, is an essential micronutrient during transcription and transformation of nuclei

Acids which shown to inhibit cellular protein and RNA , they included some groups like sulfone with sulfur atoms and hence inhibit the bacterial growth.

Furthermore, the mechanism of action of the compounds may involve the formation of hydrogen bond with the active centers of the cell constituents resulting in the interference with the normal cell process.

In general, the intake of a drug depends on the balance between hydrophilic and lipophilic properties (11-15) and the solubility which are substituent dependent which increases the lipophilicity of a drug and this may be the reason for the enhanced activity upon sulfur compounds . Hydrogen bonding and the antimetabolite action of the compound may be an important factor in antimicrobial activity.

Table (2):Antibacterial Activity of Compounds (Inhibition Zone in (mm)) of Compounds [1– 10] in Concentration (100 mg.ml⁻¹)

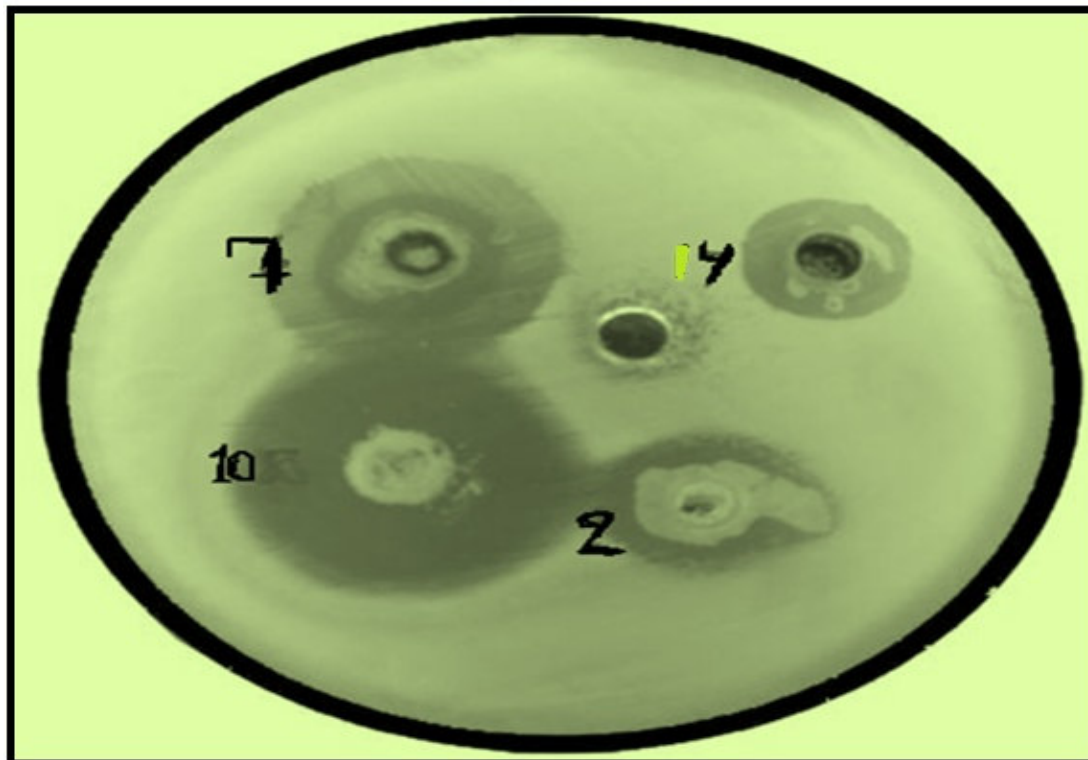
| Comp. No. | <i>Pseudomonas aeruginosa</i> | <i>B. subtilis</i> | <i>Salmonella typhi</i> |
|-----------|-------------------------------|--------------------|-------------------------|
| {1} | 10 | 12 | 8 |
| {2} | 14 | 14 | 10 |
| {3} | 22 | 20 | 20 |
| {4} | 26 | 22 | 22 |
| {5} | 18 | 16 | 20 |
| {6} | 18 | 14 | 16 |
| {7} | 30 | 26 | 24 |
| {8} | 26 | 20 | 22 |
| {9} | 28 | 24 | 28 |
| {10} | 34 | 30 | 32 |

The synthesized compounds showed excellent activity against bacteria and fungi.

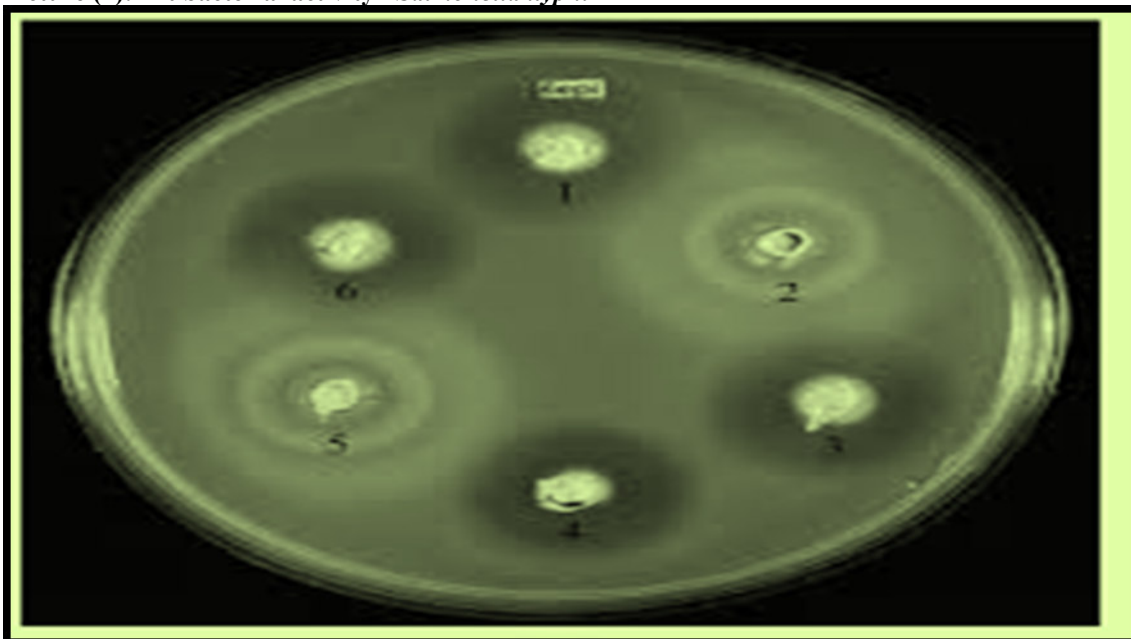
Table (3):Antifungal Activity of Compounds [1– 10] in Concentration (100 mg.ml⁻¹)

| Comp. No. | <i>A. niger</i> | <i>P. chrysogenum</i> |
|-----------|-----------------|-----------------------|
| {1} | 10 | 14 |
| {2} | 16 | 14 |
| {3} | 20 | 16 |
| {4} | 16 | 16 |
| {5} | 20 | 18 |
| {6} | 20 | 20 |
| {7} | 26 | 26 |
| {8} | 26 | 24 |
| {9} | 28 | 26 |
| {10} | 26 | 24 |

Some of Pictures for Antimicrobial for some Compounds :



Picture (1):Antibacterial activity - *Salmonella .typhi*



Picture (2):Antibacterial activity – *B. subtilis*

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