Studying of (Bacterial and Chromatigraphic)-Behavior for (Nitrogen ,Sulfur)-Heterocycles on Mouths' Bacteria

Dr. Nagham Mahmood Aljamali[1] , Mohammed Alaa Abdulzahra[2] , Jalal Hasan Mohammed[3] ,Dr.Zainab Mahmood Jawad[4]*

[1]Department of Chemistry, Faculty of Education for Girls ,Kufa University, Iraq.

[2]Chemistry Department ,College of Education for Pure sciences., university of karbala, Iraq .

[3]Department of Pharmaceutical Chemistry, College Of Pharmacy, Karbala University, Iraq.

[4]Dentistry Department, College of Dentistry, Babylon University , Iraq.

**Corresponding Author E-mail: Dr.Nagham_mj@yahoo.com*

ABSTRACT:

In past work , more than series of hetero cyclic compounds (four , five , six , seven)- membered ring were synthesized and characterized m but the present work involved bio- chemical studying like (chromatograghy , microbial) applications on types for bacteria of mouth ((Streptococcus Salivarius , Streptococcus Mutans , Pepto Streptococcus , Lactobacillus)) by selection three concentration of prepared compounds which involved (sulfur and nitrogen) atoms in their structures .

Keywords: bacteria ,bicycles ,sulfur, thiazeine , heterocyclic , five , six , seven membered .

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I.INTRODUCTION

Most of the bio-molecules and medical compounds like drugs belong to the class of heterogenius compounds. Heterocyclic compounds played a vital role in the metabolism of all living cells; many of them are four , five, six and seven membered heterocycles having more than one heteroatoms in their structures . The compounds may be thiazole and imidazole basis of genetic material bio-molecule , and these heterocyclic compounds may be isolated or fused heterocyclic systems[(1-4)]. Most of them act as Anti-inflammatory which refers to the property of a substance or treatment that reduces inflammation[(5-15)] .

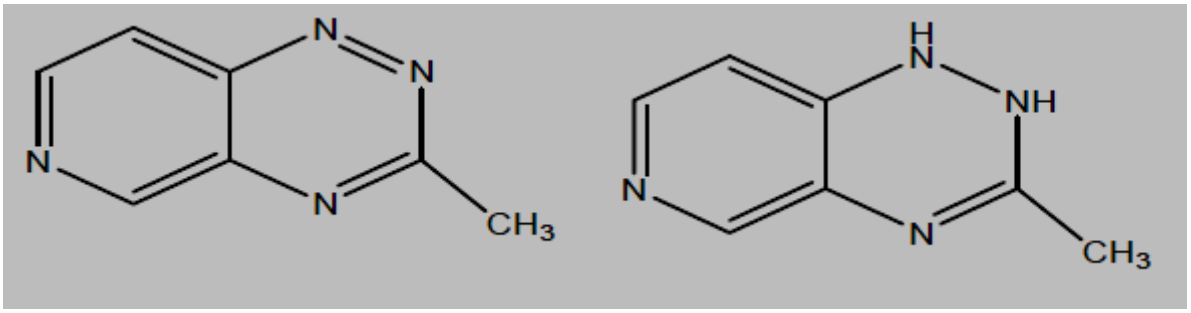


Fig .1 : Nitrogen Cycles as drugs

Another major application of synthesis is in agriculture for control of insects and weeds. Organic synthesis[(16-24)] of hetero cycles (nitrogen or sulfur- atoms) also plays a part in the development of many medical and natural products and drugs:

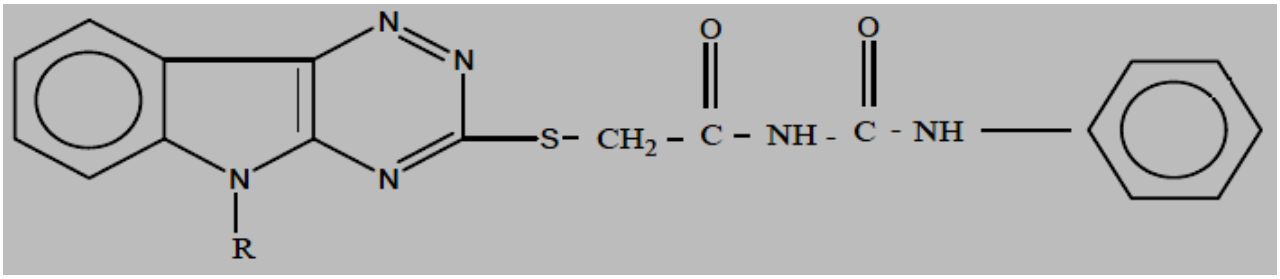
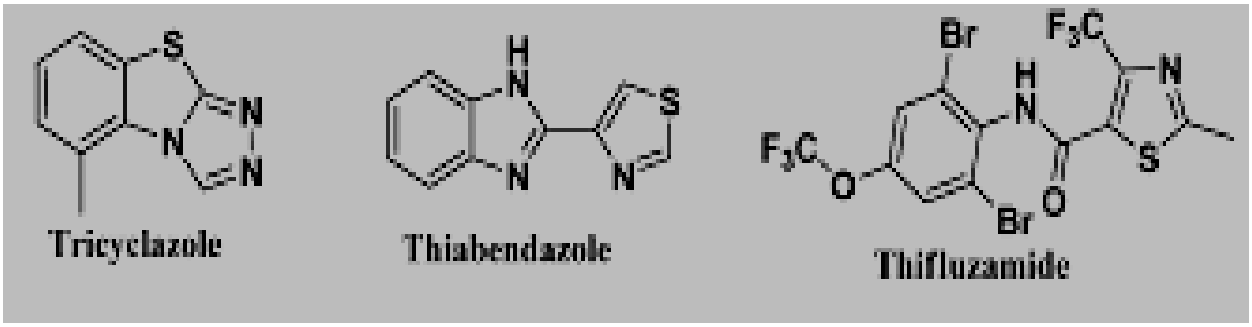


Fig. 2 : N-Bicycles compound as antifungal

The unique power of synthesis is the ability to create new molecules and materials with valuable properties[25-33].



Fig(3) : S- Cycles compound in Bio-Molecule

Heterocyclic compounds are widely distributed in nature. Many are of fundamental importance to living systems: it is striking how often a heterocyclic compound is found as a key component[34-45] in biological processes.

II.EXPERIMENTAL & MATERIALS

The bio materials supplied from ((BDH and Sigma)) Company ,while microbial assay carried out in college of education, in Bio – lab in biological department., Chemical Studying and preparation of concentrations carried out in chemistry department .

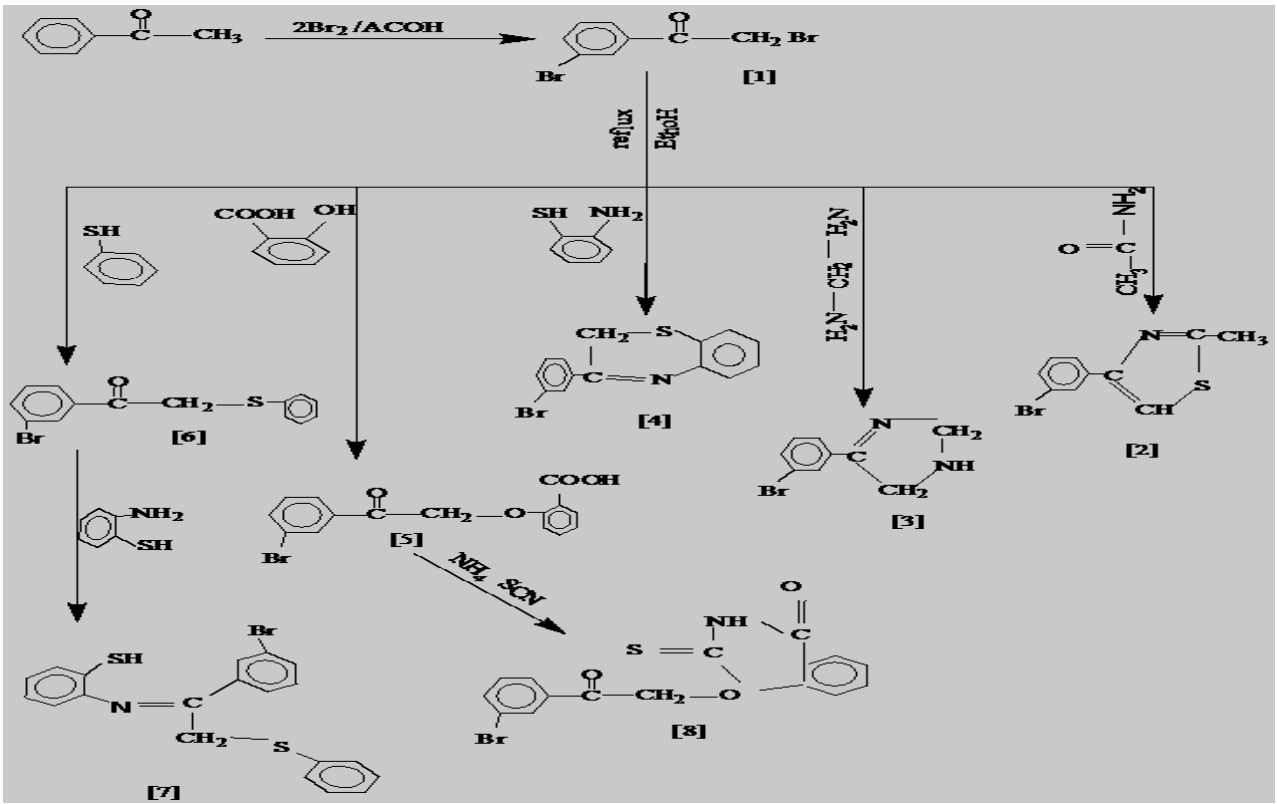
EXPERIMENTAL PART:

STEP . 1: Schemes of Synthesized Heteroycles Compounds:

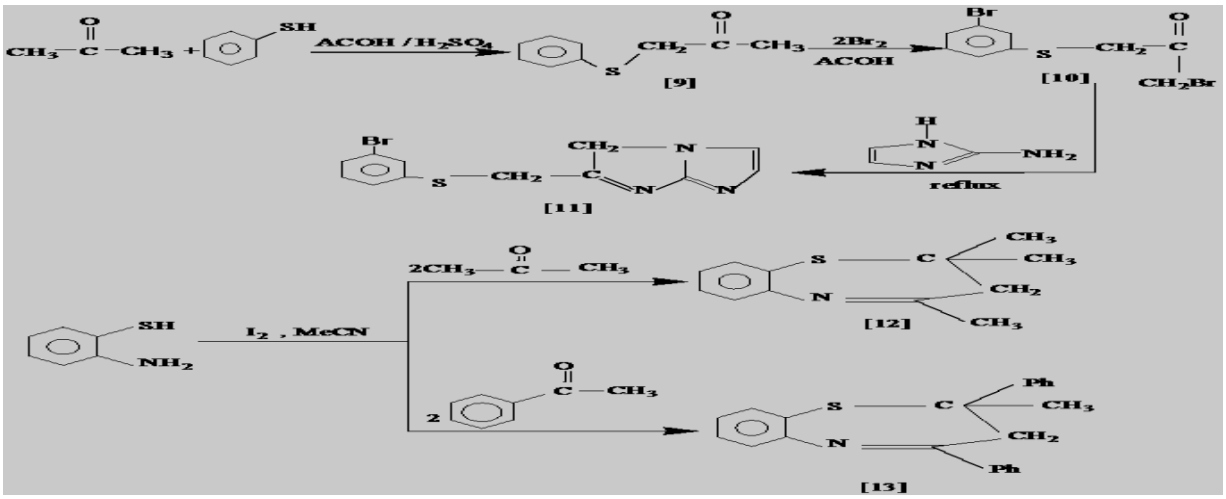
In our schemes , we synthesized compounds in previously work , while now we will screened the bacterial activity for them in this studying.

STEP .2 : Assay of Bacterial Activity:

Microbial Assay of formatted cyclic compounds have been studied for their antibacterial activities by agar through biological methods[16] . The antibacterial activities were done at (0.003 M) concentrations in (DMSO) - solvent through using four types of bacteria ((***Streptococcus Salivarius*** , ***Streptococcus Mutans*** , ***Pepto Streptococcus*** , ***Lactobacillus***)). These bacterial strains were incubated for 24 hr at 37°C.



Scheme .1 : Prepared Compounds [1-8]



Scheme .2 : Prepared Compounds [9-13]

II.RESULTS AND DISCUSSION

The formatted cyclic compounds studied for Biological Activity against two types of bacteria .

Collection of Samples and Antibacterial Assay :

According to studying[18-20] ,the biological activity for compounds was tested on four types of bacteria which collected from mouth of patients in hospital , The antimicrobial results are summarized in table (1). From results of antibacterial studies it was found to be potentially activity against all types of bacteria . while antifungal activity at concentrations (10, 20, 30 $mg.ml^{-1}$)were summarized in tables (1 and 2).

The four types of mouths, bacteria which tested: (***Streptococcus Salivarius , Streptococcus Mutans , Pepto Streptococcus , Lactobacillus***):

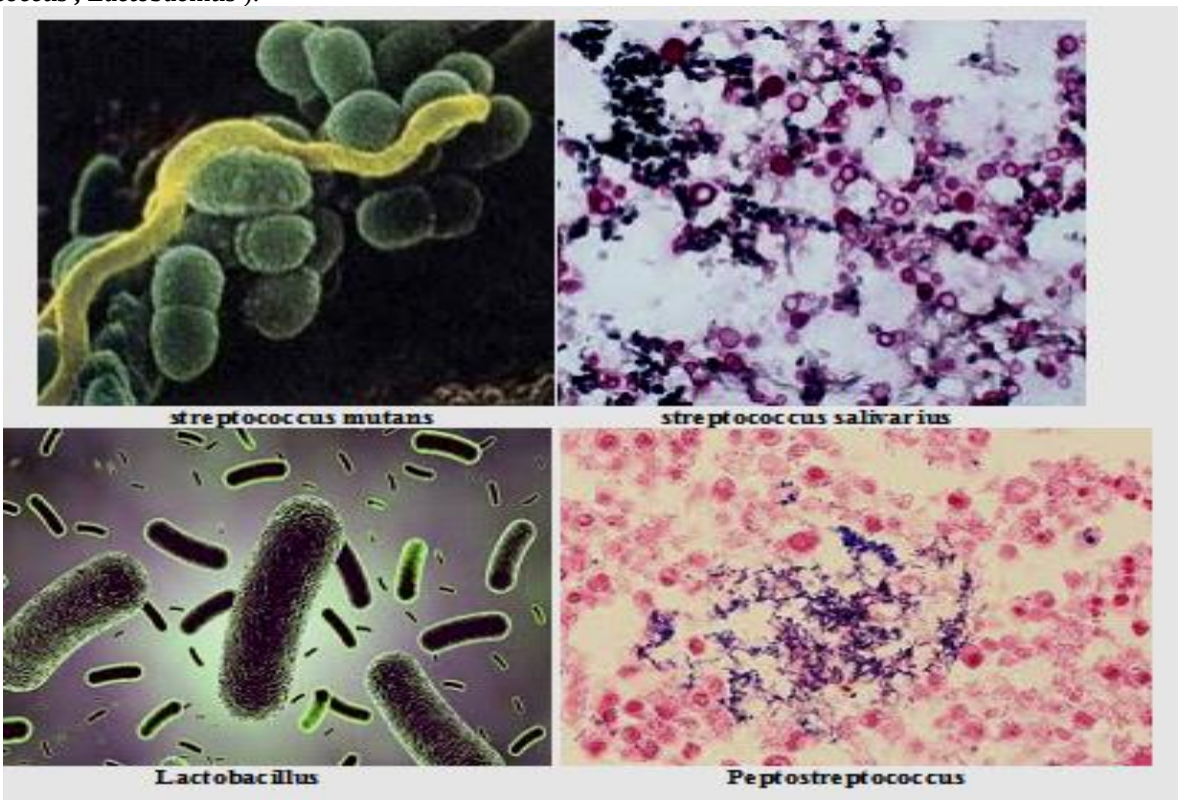


Fig . 4 : Types of Selected Bcteria

Effect of Synthesized Compounds on Mouths Bacteria :

The compounds [1-13] were screened according to their action against bacteria are described tables (1 , 2). The presence of heterocyclic ring which represented in thiazepine , imidazole are reported to posses antibacterial effect

may enhance or increase the biological activity of the nitrogen and sulfur atoms.
The antimicrobial results are listed at tables (1, 2). From results of antibacterial studies it was found to be potentially activity against towards four types of bacteria ,which gave good indicators from the results that the biological activity of all compounds have high biological activity which inhibit the growth of bacteria .

Fig . 5 : Bacteria of Mouth

The prepared compounds [8, 11 , 12 , 13] have higher activity than other compounds which due to presence of sulfur atoms in their structures[18-20] ,the mechanism of action for this compounds involved formation of hydrogen bonding with the active centers of the cell constituents resulting in the interference with the normal cell process.

Table(1):Antibacterial Activity of Compounds (Inhibition Zone in (mm))as average of three Concentrations (10, 20, 30 **mg.ml^{-1})**

Compounds	(average of three Measurements) *Streptococcus Salivarius*	(average of three Measurements) *Streptococcus Mutans*
[1]	4	4
[2]	14	14
[3]	4	6
[4]	12	10
[5]	4	6
[6]	6	6
[7]	8	8
[8]	18	16
[9]	8	6
[10]	8	6
[11]	20	22
[12]	18	20
[13]	20	20

The cleaning with fluoride apparently selects for the more desirable bacterial types, such as*(S sanguis* and *S mitis*) , which are capable of rapidly colonizing the tooth surfaces. While *(S. mutans*) presumably does not have an opportunity to become dominant, because the frequent debridement neutralizes its ability to be selected for by the low pH values that characterize an undisturbed plaque. Also, the 7% of fluoride paste has an immediate bacterio static effect on the plaque organisms.

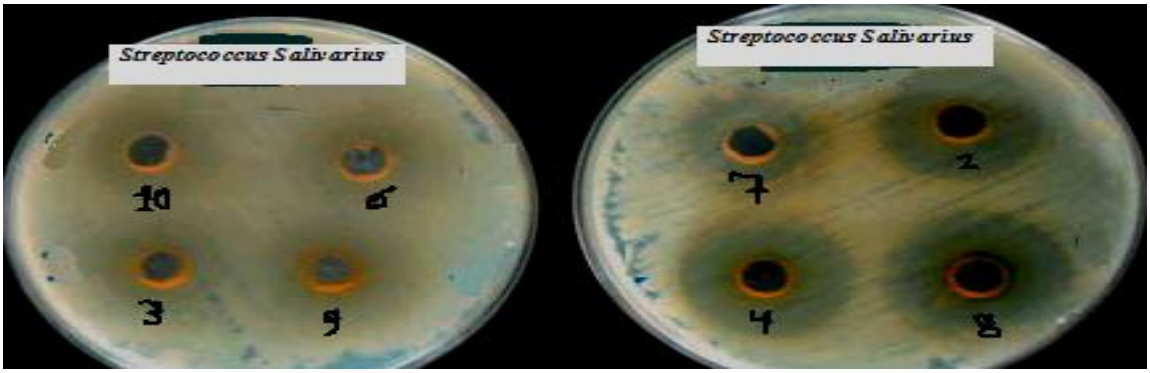


Fig .6 :Antibacterial activity – *Streptococcus Salivarius*

The relationship between sucrose ingestion and dental caries is reasonably well understood. The supra gingival plaque flora

derives its nutrients from various sources that include diet, saliva, sloughed epithelial cells, dead microbes, and gingival crevice fluid or exudate. All sources, except the foods in the diet provide only small amounts of nutrients.

Table. 2 :Microbial Activity of Compounds as average of three Concentrations (10, 20, 30 ***mg.ml^{-1})***

Compounds	**(average of three Measurements)** ***Pepto Streptococcus***	**(average of three Measurements)** ***Lactobacillus***
[1]	-----	------
[2]	10	8
[3]	4	> 4
[4]	8	6
[5]	> 4	----
[6]	4	4
[7]	8	6
[8]	12	10
[9]	6	4
[10]	6	6
[11]	18	16
[12]	14	16
[13]	14	14

Dental decay is tested clinically as a cavitation on the tooth surface . The cavitation is a late event in the pathogenesis of decay, being preceded by a clinically detectable subsurface lesion known as a white spot and prior to that by subsurface demineralization that can only be detected microscopically[21-25].The tooth surface normally loses some tooth mineral from the action of the acid formed by plaque bacteria after ingestion of foods containing fermentable carbohydrates, the low pH in the plaque is sustained and a net loss of mineral from the tooth occurs. This low pH selects for acidic organisms, such as *S. mutans* and lactobacilli, which (especially *S mutans*) store polysaccharide and continue to secrete acid long after the food has been swallowed[26, 27].

Chromatographic Studies of Heterocyclic Compounds :

Solutions of heterocyclic compounds were diluted in concentration (1 ppm), and injected through a syringe (Hamilton) in capacity (10ml) by nitrogen (gas flow 25 ml/min) . Our cyclic compounds separated according to their interactions or polarity of terminal cyclic compounds and their molecular weight ., for this reason , compounds [2] and [6] separated in the first time due to[21] its polarity (less than other compounds), while the last one compounds [10] and [13] , because of their high molecular weight more than other compounds , figures (7-10).

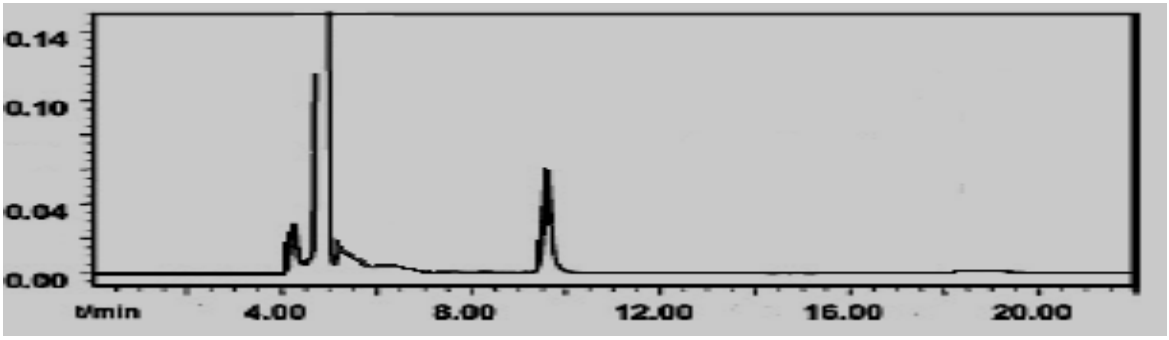


Fig (7): Chromotogram of Compound [2]

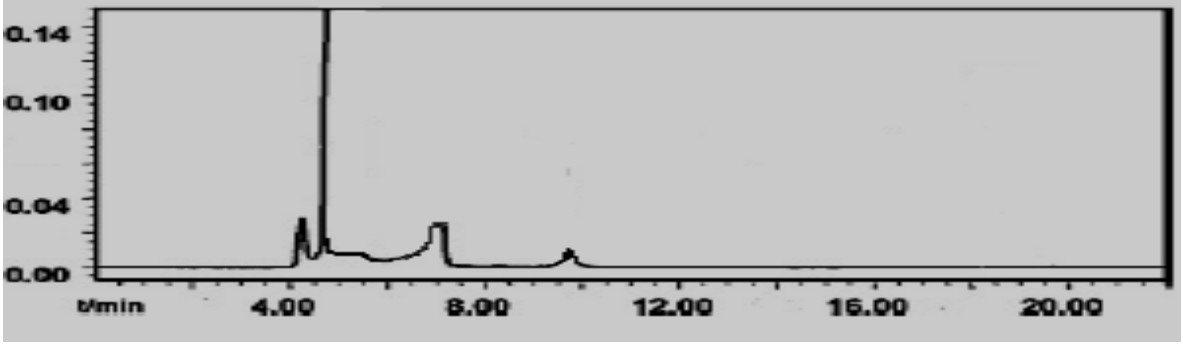


Fig (8): Chromotogram of Compound [6]

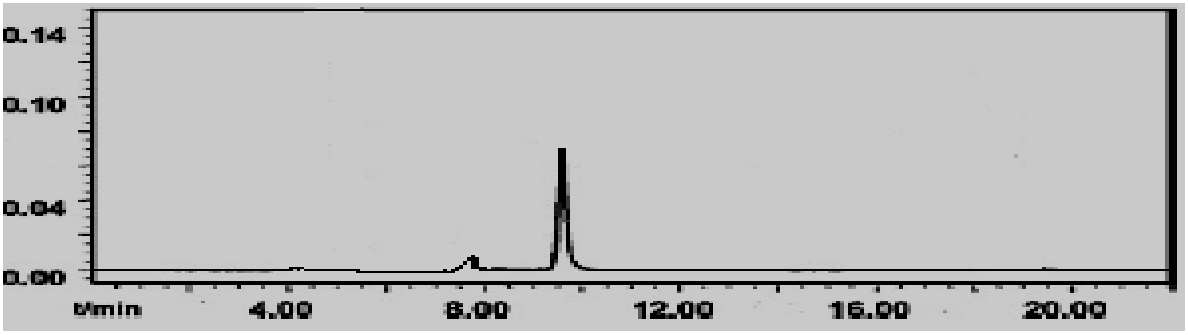


Fig (9): Chromotogram of Compound [10]

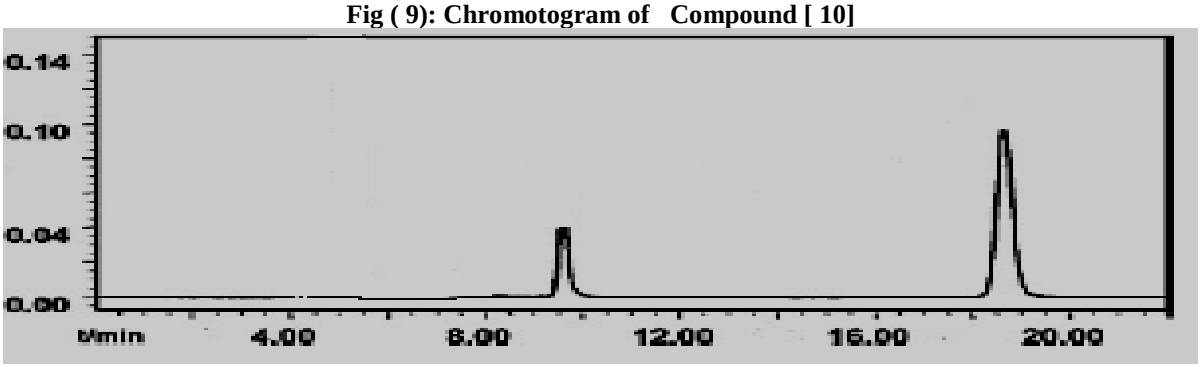


Fig (10): Chromotogram of Compound [13]

Conclusions

The Synthesized heterocyclic compounds separated according to interactions with polarity of terminal cyclic compounds and their molecular weight ., for this reason , and most of our synthesized heterocyclic compounds gave good results against selected bacteria.

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