

## The study of Biological Activity of Some Schiff Bases against some pathogenic bacteria

May.J.Abd, chemistry department, college of medicine  
university of Al-Qadisiya

Mohammad.A.Aboud, chemistry department, college of  
medicine university of Al-Qadisiya

Heba.A.Aziz, microbiology department, collage of medicine  
university of Al-Qadisiya

Abdul-Khaliq.A.Abbas, chemistry department, college of  
education university of Al-Qadisiya

### Abstract:-

Schiff bases are an organic compound prepared from condensation reaction between aliphatic or aromatic aldehydes and aliphatic or aromatic amines., This research included study of the biological activity for some compounds (Schiff bases) which newly prepared from condensation of aldehydic derivative of pentose with some of aniline derivative:(paratoludine ,para hydroxyl aniline ,parachloro aniline) ., The study explained that complexes have a clear biological effect on the species of bacteria were studied which are(*proteus mirabilis*, *staphylococcus* spp ,*streptococcus* spp &*E.Coli* spp)., According to the different concentration within inhibition range about(0-51)Mm.

### Introduction:-

Azomethines are generally known as Schiff bases to Honour Hugo Schiff ,who synthesized such compounds., They are more frequently applied for the better of human welfare<sup>(1)</sup>., Schiff base can be synthesized from an aromatic amine and carbonyl compound by nucleophilic addition forming a hemiaminal followed by dehydration to generate an imine<sup>(2)</sup> ., They are well known intermediates for the preparation of azetidinones ,thiazolidinones ,oxadiazolines and many other derivatives<sup>(3,4)</sup> .

The importance of the Schiff bases is due to their versatile nature. Literature survey shows that many Schiff bases exhibit biological activities<sup>(5-8)</sup>, Such as antifungal ,antibacterial ,antitumor , anti-inflammatory ,and antipyretic ,among others, some of them have been used as complexing agent<sup>(9,10)</sup> and powerful corrosion inhibitors<sup>(11)</sup>. They synthesized from various compounds<sup>(12-14)</sup>.

Schiff bases are important class of ligands due to their synthetic flexibility, their selectivity and sensitivity towards the central metal atom, structural similarities with natural biological substances and also due to

presence of imine group (-N=C-) which imports in elucidating the mechanism of transformation and rasemination reaction in biological system<sup>(15)</sup>.

The main aim of the present work is to detection on the biological effect of some of prepared molecules by synthesizing several Schiff bases from aromatic amine and aldehydic derivatives of pentose.

Experimental

**1-Materials and method<sup>(16)</sup>**

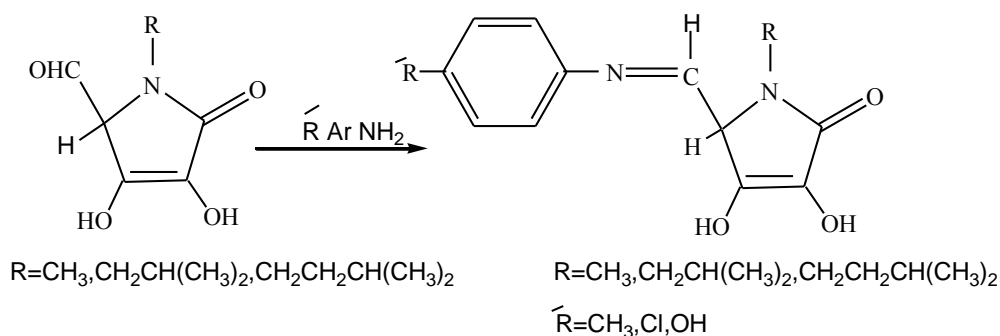
All chemicals are obtained from (BDH, Fluka and Merck).,The solvents were dried and distilled before use according to standard procedures

**2-Synthesis**

**2-1-Synthesis of Schiff bases<sup>(16)</sup>**

The schiff bases were synthesized by condensation of (2.85gm, 0.28mol) of aldehydes below in (30) ml absolute ethanol with equal quantity moles of different aromatic amines (P-Cl C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>, P-CH<sub>3</sub>C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub> , P-OHC<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>). The mixture which results from the above reaction refluxed for nearly three hours.

Then the yield precipitation were filtered, washed with ethanol recrystallised by ethanol result pure Schiff bases



**Table (1):some physical properties of prepared Schiff base<sup>(16)</sup>**

No.	Structure	M.F.	M. wt.	(m. p) <sup>o</sup> C	Yield %
1		C <sub>16</sub> H <sub>20</sub> O <sub>4</sub> N <sub>2</sub>	304	244-245	51%
2		C <sub>15</sub> H <sub>17</sub> O <sub>3</sub> N <sub>2</sub> Cl	308.5	207-208	54%
3		C <sub>13</sub> H <sub>14</sub> O <sub>3</sub> N <sub>2</sub>	246	32-33	52%

R<sub>f1</sub>=0.916

R<sub>f2</sub>=0.94

R<sub>f3</sub>=0.91

2-2-Preparation of sensitive disks<sup>(17)</sup>

Sensitive disks were prepared by using filter paper whattman (No.1) after cutting it into small disks then treated in autoglave about (15 min)., The concentrations( $10^{-1}$ , $10^{-2}$ )M from Schiff bases were synthesized by dissolving (0.28)mol of schiff bases in(10%)M conc. of absolute ethanol in, Then these disks sanked in (1ml) of prepared complexes(10 disk in 1ml),finally dried them in oven at 37 °C for (10 min) without air.

2-3preparation the culture media of Mueller Hinton agar<sup>(18)</sup>

The culture media prepared by dissolving 38gm of Mueller Hinton agar in 1 liter of distilled water with mixing and heating ,Then skirled the culture media in autoglave for 15 min., Finally put in plastic Petri dish.

Sensitivity test

In this study we used the following four species of bacteria which isolated from patient in educational hospital of Al-Diwaniya which are:

1-*Proteus mirabilis* G-Ve

2-*E.Coli* G-Ve

3-*Staphylococcus* G+Ve

4-*Streptococcus* G+Ve

Then the broth of bacteria are studied on vial for each species in average with  $10^{-3}$  M Conc.<sup>(19)</sup> .,Then put the broth on the solid culture media which previously prepared, After that moved for mixing and left for 30 min to absorb the broth enhance distributed the disks in average 3 disks each dish on the solid culture which saturated with bacteria<sup>(20)</sup> .,later incubated for (18-24)hr at 37 °C., Finally the zone of inhibition was calculated<sup>(21)</sup>.

**Results and discussion:-**

Tables 1 show the molecular formula molecular weight, melting point, percent yield and  $R_f$  values for a three prepared complexes.

Schiff bases have active heredity and upper oxide dismutas also as antioxidant agent<sup>(22)</sup> in addition they have moderately active against all tested bacteria., This activity due to their contain different atoms such as nitrogen help to bind with many elements<sup>(23)</sup>.,For this work we used anovia test<sup>(24)</sup> significant differences to calculate the effect concentration ,The zone of inhibition for schiff bases that we used shown in the following data:

**Table(3)the area of inhibition that result from the biological effect of the compounds in a Conc. 0. 1M against the pathogenic bacteria.**

No. of compounds	compounds	Inhibition area			
		streptococcus	proteus	E.coli	staphylococcus
1	N-iso pentyl-5-(4-hydroxy pheniline imine)-3,4-dihydroxyl-2-N-pyroline	36.6 a ±0.06A	51 b ±0.06A	31 c ±0.05A	23.6 D ±0.08 A
2	N-iso butyl -5-(4-chloro pheniline imine)-3,4-dihydroxyl-2-N-pyroline	32a ±0.01 B	31.3 a ±0.06 B	10.3 b ±0.03 B	12.3 c ±0.03 B
3	N-methyl-5-(4-methyl pheniline imine)-3,4-dihydroxyl-2-N-pyroline	13.6 a ±0.01C	17b ±0.2C	0C ±0C	11.3D ±0.08 B
4	Ethanol 10%	0 a ±0 C	0 a ±0 C	0 a ±0 B	
	percentage	75%	75%	50%	75%

Small letters refer to vertical reading

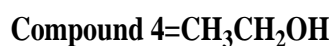
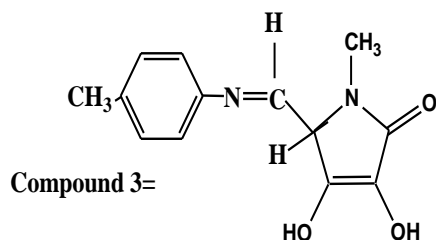
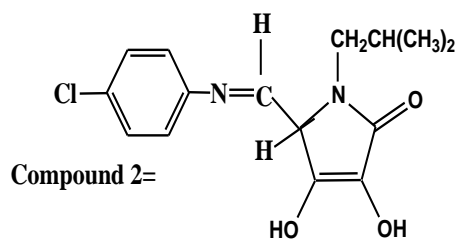
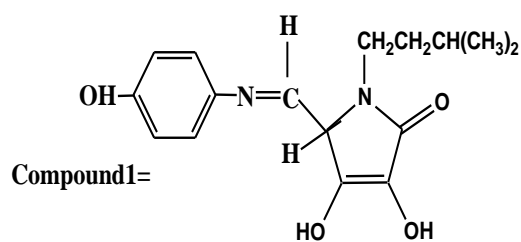
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Similar letters refer to no present significant differences under probability level (0.05)

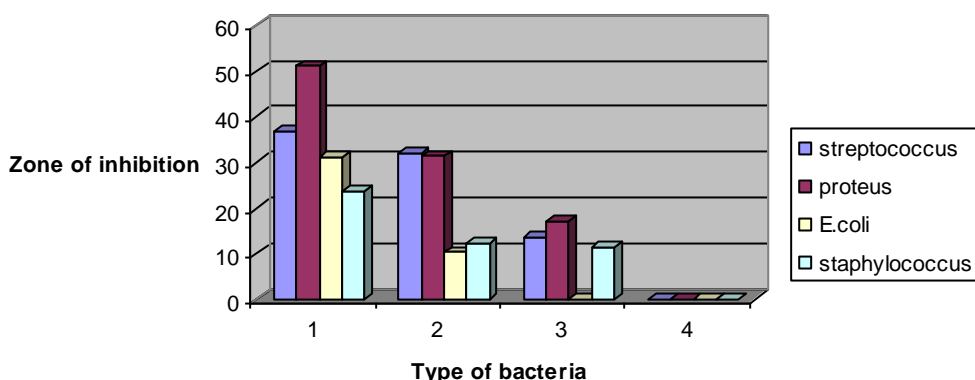
Different letters refer to present significant difference under probability level(0.05).

Table(4)the area of inhibition that result from the biological effect of the compounds in a Conc. 0. 01M against some pathogenic bacteria .

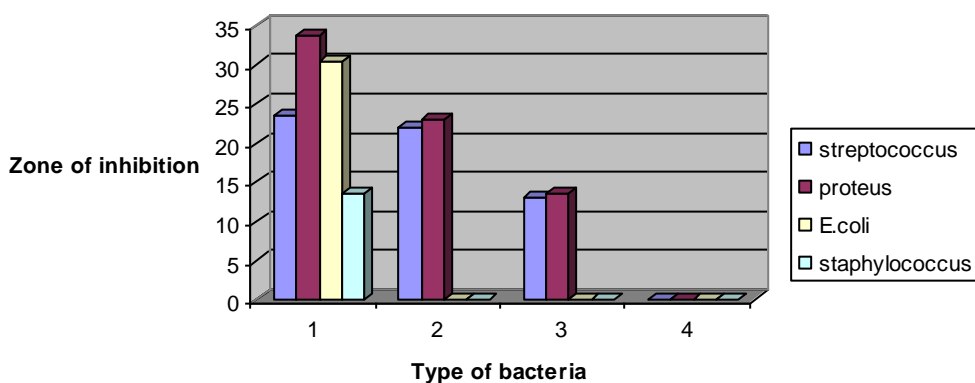
No. of compounds	compounds	Inhibition area			
		streptococcus	proteus	E.coli	staphylococcus
1	N-iso pentyl-5-(4-hydroxy pheniline imine)-3,4-di hydroxyl-2-N-pyroline	23.6a ±0.03A	33.6b ±0.08A	30.3c ±0.3A	13.6D ±0.08A
2	N-iso butyl -5-(4-chloro pheniline imine)-3,4-di hydroxyl-2-N-pyroline	22a ±0.01A	23a ±0.05B	0b ±0B	0b ±0B
3	N-methyl-5-(4-methyl pheniline imine)-3,4-di hydroxyl-2-N-pyroline	13a 0.1B	13.6a ±0.03C	0b ±0B	0b ±0B
4	Ethanol 10%	0 a ±0 C	0 a ±0 C	0 a ±0 B	0 a ±0 C
	percentage	75%	75%	25%	25%



Figure(1) The biological effect of compounds in a concentration 0.1 M against some pathogenic bacteria



Figure(2) The biological effect of compounds in a concentration 0.01 M against some pathogenic bacteria



Picture (1) show the effect of compounds (1) in a conc. 0.1 M against *proteus*.



Picture (2) show the effect of compounds (2) in a conc. 0.1 M against *proteus*.



Picture (3) show the effect of compounds (1) in a conc. 0.1 M against *E.coli*



Picture (4) show the effect of compounds in a conc.01 M against *proteus*



**Picture (5) show the effect of compounds in a conc. 0.01 M against E.coli.**

We notice from tables (3,4), figures (1,2) and pictures (1,2,3,4,5) the effect of the three prepared compounds against the pathogenic bacteria studied.

The result in tables (3,4) showed that there was proportional relationship between the concentrations of all compounds that had been used and the inhibition zones of bacteria growth in betri dish at a confidence interval ( $P < 0.05$ ), This may be return to increase concentrations of complexes accompanied by increase in the active substance or substances which present in the complexes.

In addition to recorded more sensitive to concentrations of shiff bases compared with gram negative bacteria ., This may be return to the nature cell membrane between these bacteria <sup>(25)</sup>. Also noted that complex substituted by hydroxyl group more effect than which substituted by chloro group and the last was by it's role give more zone of inhibition than methyl group ., This differences due to that hydroxyl group act more role in action from chloro which has high effect on growth from methyl group because the high toxicity of oxygen atom comare with other atoms<sup>(26)</sup>.

Also the increased toxicity of complexes may be due to the effect of isomethen group on the normal cell., So that the result suggest s that the hydroxyl group in p-position of the phynel ring is more sutable for antibacterial activity.



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## دراسة الفاعلية البيولوجية لبعض قواعد شف ضد نمو بعض الجراثيم المرضية

مي جليل عبد، فرع الكيمياء، كلية الطب، جامعة القادسية  
محمد عباس عبود، فرع الكيمياء، كلية الطب، جامعة القادسية  
هبة عدنان عزيز، فرع الأحياء المجهرية، كلية الطب، جامعة القادسية  
عبد الخالق عبد العباس، كلية التربية، جامعة القادسية، قسم الكيمياء

### الخلاصة:-

قواعد شف هي مركبات عضوية تحضر من تفاعل التكتيف بين الألديهيد الأليفاتي أو الأروماتي مع أمين أليفاتي أو أروماتي.  
يتضمن البحث دراسة الفعالية البيولوجية لبعض قواعد شف التي حضرت حديثاً من تكتيف ثلاث مشتقات ألديهيدية للسكر الخماسي مع بعض مشتقات الأنيلين: (بارا تولدين، بارا هيدوكسي أنيلين، بارا كلورو أنيلين).  
وتوضح هذه الدراسة تأثير هذه المركبات على أصناف بكتيرية مختلفة (Proteus , Staphylococcus , Streptococcus and E Coli) وقد أظهرت نتائج البحث تأثيراً بيولوجياً واضحاً لهذه المعقدات على البكتريا قيد الدراسة في تراكيز مختلفة حيث كان مدى التثبيط يتراوح بين (0-51) ملم