ANTIMICROBIAL ACTIVITY OF SCHIFF BASES ISATIN: A REVIEW

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ABSTRACT

This review article is focused on the studies of Schiff base isatin and their antimicrobial activities. Isatin based Schiff bases are synthesized by the condensation of keto group with different aromatic primary amines carrying functional groups. schiff base isatin showing so many biological properties like – antimicrobial, anti-tubercular, anti tumor, anti-viral, anti-inflammatory, anti-HIV.

Keywords: Isatin, Schiff base, antimicrobial.

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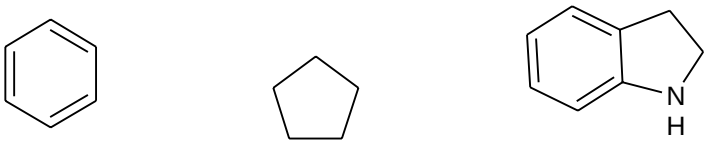
Introduction

The principle of "survival of the fittest" has always applied to individuals as well. The biggest hazards to the population were diseases, which are still being combated with a variety of drugs. Modern medications are the outcome of constant effort made by human civilisation over time. The advent of artificial medicine created a myriad of opportunities for the emergence of several artificial molecules with potential therapeutic effects. However, it wasn't always easy or wise to create a whole new molecule. A by-product of a well-known molecule with well-known features can be synthesized instead of an entirely new molecule, which is how the derivatization concept came about. In terms of reducing toxicity and increasing parent molecule efficiency, it's a prudent move. It is a methodical approach to drug design and development that is based on a variety of physical and physiochemical parameters.

Isatin, a heterocyclic nitrogen molecule, has a wide range of biological and pharmacological effects, which have sparked a lot of interest in recent years. It has numerous medical and biological uses, including as an antibiotic, an anticancer drug, and an anti-diabetic. The isatin molecule can also be made from numerous substrates using a number of different techniques, including those developed by Sandmeyer, Stolle, Gassman, Meanwell, and Hewawasam, among others. On the other hand, there are a number of chemical processes that the isatin molecule can go through, including oxidation, the Friedel-Crafts reaction, ring expansion, aldol condensation, and alkylation processes. These reactions produce a number of biologically beneficial macromolecules, such as 2-oxindoles, tryptanthrin, indirubins, and others. Consequently, the purpose of this review was to give an overview of the synthetic processes for the isatin molecule and its derivatives, as well as to look at the numerous chemical processes it goes through. A list of some of the most current biological activities of isatin derivatives, including their anti-diabetic, anti-bacterial, anti-cancer, and other

capabilities, was also prepared. Isatin has a nitrogen atom at position 1 and two carbonyl groups at position 2 and 3. In its structure two cyclic rings are present, one of which 6 member and the other is 5 members. Six member rings has an aromatic character and the five member ring possesses an anti aromatic character.

In the year of 1841 Erdman and Laurent firstly synthesized isatin (1H-indole-2, 3-Dione) from the oxidation reaction of chromic acid and nitric acid.



6-member **5-member** **Indole**

Figure - (1) (2) (3)

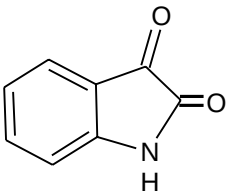


Figure- 4 Isatin

Antibacterial activity of schiff bases of Isatin

S.N. Pandeya *et al* [1] formed Schiff bases with the reaction of Isatin and its derivatives with 4-(4-chlorophenyl)-6-(4-methyl phenyl)-2-aminopyrimidine. The antimicrobial activity of synthesized compounds was investigated by agar dilution method on 28 bacteria and 8 funguses. It has been observed that all the compounds showed mild to moderate activity against the tested bacteria.

R= H, Br, Cl

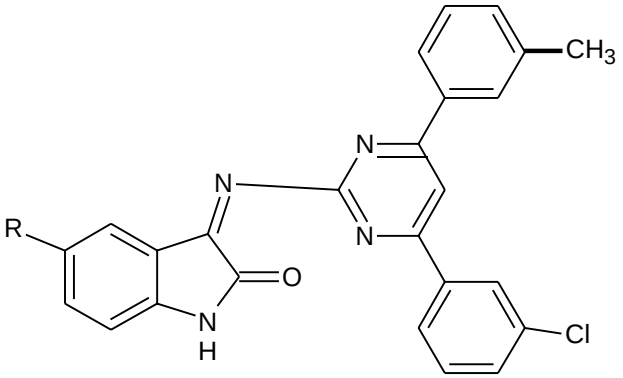


Figure -5

Ankur Patel *et al* [2] some different isatin hydrazones by using condensation with 2-phenyl-5-benzylidene- 3-N (4-acetyl phenyl)-1, 5-dihydro-imidazol-4-one synthesized some new 3-[(5-benzylidene-2-phenyl)-3, 5-dihydro-4-H-imidazol-4-one-3-(4-benzoyl hydra zone)] -indole-2-ones.disk diffusion technique was used for the evaluation of antimicrobial activity of synthesized compounds. The tested compounds showed mild to moderate antibacterial activity against to all four bacteria strain. Where R= 5-Cl, 5-F, 5-Br, and 5-NO_2 containing

compounds showed highest activity against *S. aureus*. The antifungal activity of the compounds was observed R=5-Cl, 5-F, 5-Br had highest activity against *C.albicans* and R= 5-Cl, 5-Br and R= 5-Br & R'= methyl exhibit good activity against *A.niger*. The antibacterial study disclosed that substitution at 5 position of isatin with chlorine, bromine and fluorine produced more active compound in the series.

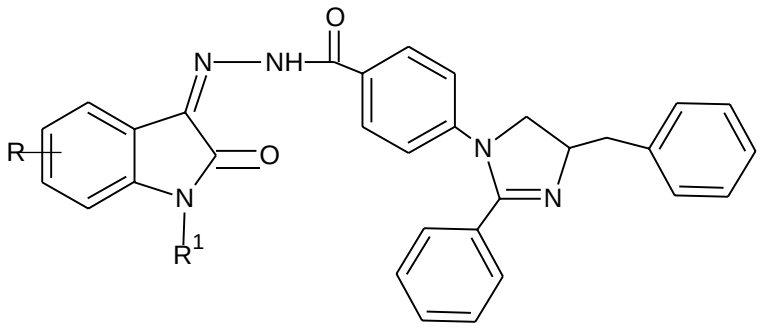


Figure-6

Where

R	R^1
H	H
5-Cl	H
5-F	H
5-Br	H
4-Cl,5-F	H
5-CH_3	H
5-NO_2	H
5-COOH	H
7-COOH	H
7-$COOH_3$	CH_3
5-Br	CH_3

Aliasghar Jarrahpour *et al* [3] produce the series of schiff bases Isatin with the help of condensation process of benzyl Isatin and 5-fluoroisatin. The compounds were investigated for their antibacterial,antiviral and antifungal activity. Antiviral activity was also tested in human embryonic lungs and human epithelial cells and African green monkey kidney (vero) cells with well established methods. The compounds were screened for antibacterial activity against the DNA and RNA viruses. Minimum virus inhibitory and minimum cytotoxic concentrations of these compounds were determined. C and I compounds were the most cytotoxic in HEL cells.

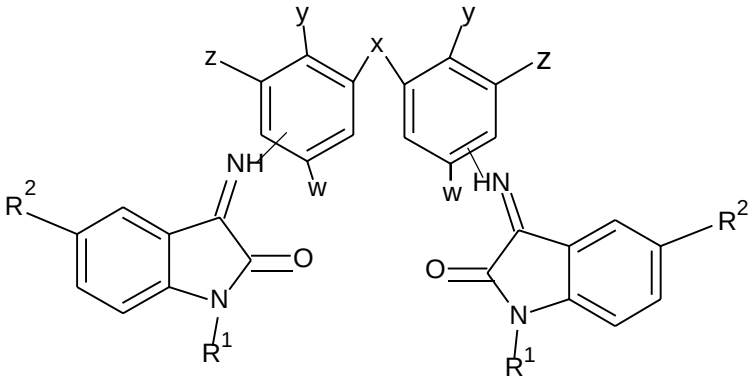


Figure-7

Where	**X**	**Y**	**Z**	**W**	**R1**	**R2**
A	CH_2	H	H	H	H	H
B	CH_2	H	H	H	H	H
C	CH_2	H	H	H	H	F
D	CH_2	H	H	H	H	F
E	CH_2	Cl	Et	Et	H	H
F	CH_2	H	H	H	Bn	H
G	CH_2	H	H	H	Bn	H
H	O	H	H	H	H	H
I	O	H	H	H	H	F
J	O	H	H	H	Bn	H
K	CO	H	H	H	H	H

S.N. Pandya *et al* [4] were synthesized isatin 3 semicarbazone with the help of a aqueous mixture of semicarbazide hydrochloride, acetate and a mixture of isatin and alcohol. Similarly they were also prepared 5-substituted isatin-3-semicarbazones from corresponding isatin. The antifungal activity of prepared compounds was investigated with tube slant culture method against *candida albicons* and *aspergillus niger* at different concentrations and semicarbazone compounds shows inhibitory action at 100 & 500 μg/ml. The isatin-3-semicarbazone (5-H) was found to active at the both concentration and isatin-3-semicarbazone (5-chloro and 5-bromo) showed inhibitory activity against *candida albicons* at 500 μg/ml of concentration.

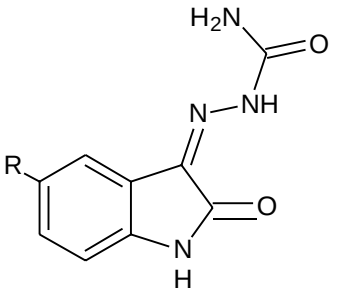


Figure-8

Where R= H, CH_3, Cl, Br, NO_2,OCH_3

U. K. Singh *et al* [5] produces a series of Schiff bases to Isatin and substituted isatin were reacted with 4-amino-N-carbamimidoyl benzene sulphonamide. The evaluations of antimicrobial activity of synthesized compounds were tube dilution methods. The synthesized compounds were screened for antibacterial activity against three gram positive and gram negative bacteria. It has been observed all compounds showed very significant and better antibacterial activity in comparison to standard drug against both gram negative and gram positive bacteria. Chlorine substitution at 5- position showed most active compound in the series.

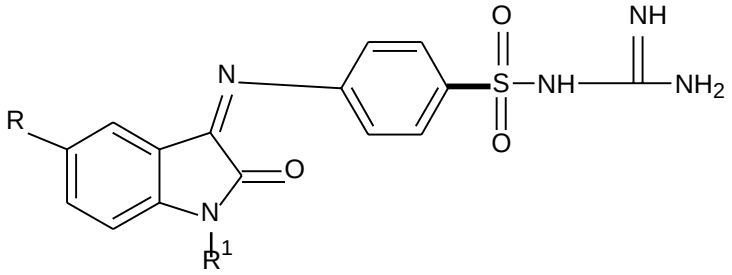


Figure-9

Where	R	R1
1	H	H
2	Br	H
3	NO_2	H
4	CH_3	H
5	Cl	H
6	H	$COCH_3$
7	H	CH_3

Ahlam J. Abdulghani and Nada M. Abbas [6] was prepared new Schiff base 3-(1-N dithiooxamide) iminoisatin by the condensation reaction with secondary amine, morpholine, or diphenylamine in the presence of formaldehyde. The antibacterial activities of synthesized compounds were tested against three types of bacteria Proteus mirabilis, Escherichia coli, and Staphylococcus aureus by using DMSO. The results obtained from these study compounds showed inhibition of bacterial growth. The Schiff base precursor and L1H were potent against all spectrums of bacteria while LIIH was inactive. The results indicate the inhibition of bacterial growth is highly dependent on the structure of legends, metal complex and type of metal ion.

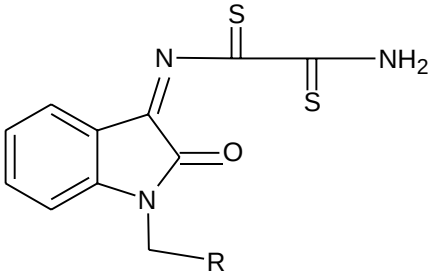
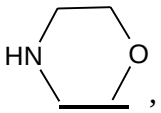


Figure-10

Where R=



,

C1: $[Mn(LIH)Cl_2(H_2O)]\cdot 2.5H_2O$

C2: $[Co(LIH)(NO_3)_2]\cdot H_2O$

C3: $[Ni(LIH)_2]_2(NO_3)\cdot H_2O$

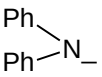
C4: $[Cu_2(LIH)_2Cl(H_2O)_4]Cl_3$

C5: $[PdLI]Cl\cdot 1.5H_2O$

C6: $[Ir(LIH)_2Cl_2]Cl\cdot (0.5)H2O$

C7: $[Pt(LI)Cl_3]\cdot (0.5)H2O$

Where R=



C8: $[Co_2(LIIH)_2(NO_3)_4]\cdot 2H_2O$

C9: $[Ni(LIIH)(OAc)_2]\cdot H_2O$

C10: $[Pd(LIICl)]_2\cdot H2O$

C 11: $[Pt(LII)Cl_2(H_2O)]Cl\cdot H_2O$

C12: $[Cd_2(LII)_2(OAc)_2(H_2O)_4]$

Har Lal Singh, Jangbhadur Singh [7] 5-chloroindoline-2,3-dione, indoline- 2,3-dione with amino acids synthesized new dibutyltin complex of Schiff base. Newly synthesized compounds ligands and their corresponding organotin complexes was tested against Gram-positive and Gram-negative (Enterobacter aero- genes and Bacillus cereus) bacteria by the well diffusion method. All the compounds exhibit antibacterial activity. The results say that all the synthesized compounds produces antibacterial activity .the organotin complexs are more potent than the free ligands. High lipid solubility increases the antibacterial activity.
Newly synthesized complexes are more active against gram positive than gram negative bacteria.

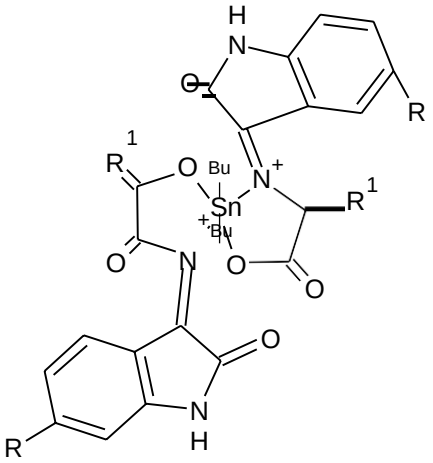
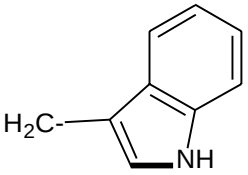
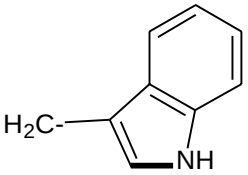


Figure-11

Where	R	R1	Abbriviation
1	H	CH_3	L^1H
2	H	$CH(CH_3)_2$	L^2H
3	H		L^3H
4	Cl	CH_3	L^4H
5	Cl	$CH(CH_3)_2$	L^5H
6	Cl		L^6H

Chinnasamy Rajaram Prakash, Sundararajan Raja [8] was preparing a series of novel ciprofloxacin methylene derivatives assimilated with different aromatic aldehydes. The in vitro antibacterial activity were tested against four gram positive bacteria Staphylococcus aureus, Staphylococcus epidermidis, Micrococcus luteus and Bacillus cereus and three Gram-negative bacteria Escherichia coli, Pseudomonas aeruginosa,and Klebsiella pneumoniae. It was observed that electron donating group substituted showed more antimicrobial properties than electron withdrawing compounds. The electron withdrawing groups like chloro and nitro substituted derivatives showed least activity against tested microorganism.

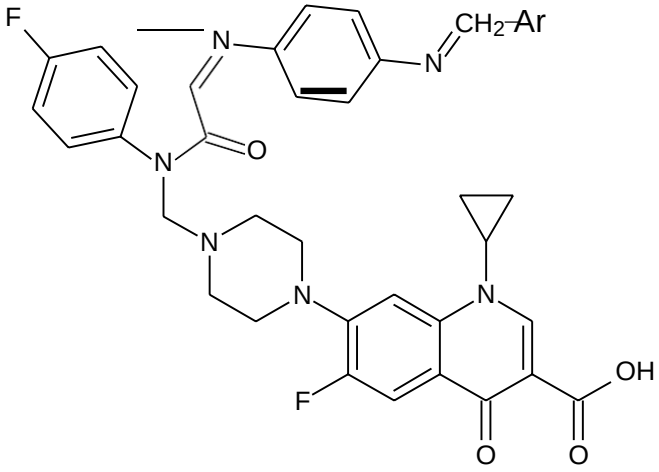
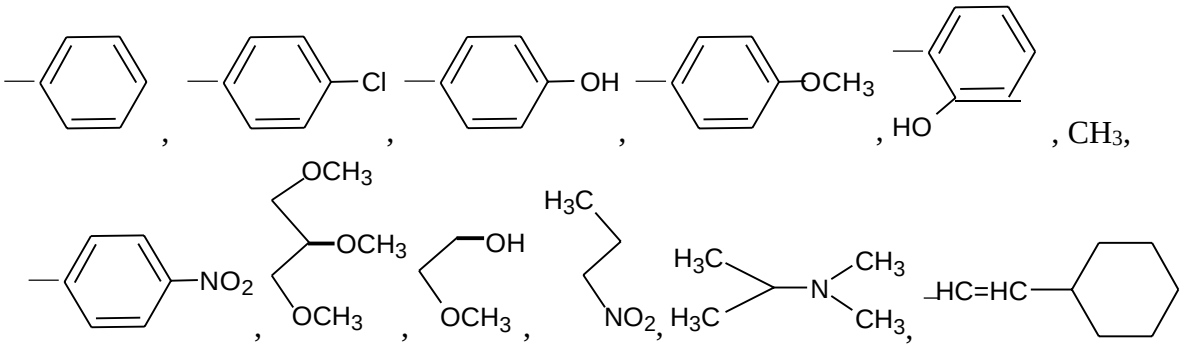


Figure-12

Where Ar-



K Meenakshi, *et al*[9] a sequence of novel Schiff bases of Isatin were incorporated with isatin refluxing with p-amino ethyl benzoate and 4-(4'-amino phenyl)-6-substituted phenyl pyrimidin-2-thiol. Antimicrobial studies of newly synthesized compounds were in six set of different concentrations of gram-positive (Staphylococcus aureus and Bacillus subtilis) and gram-negative (Escherichia coli and Proteus vulgaris) bacteria in muller hinton broth by turbidity method. And the compounds showed significant activity against Bacillus subtilis, staphylococcus aureus and Escherichia coli.

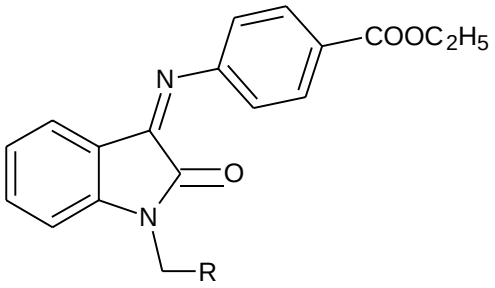
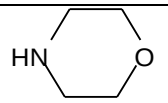
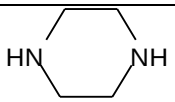
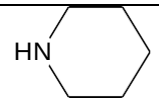


Figure-13

Where	R
A	-N(Me)$_2$
B	-N(Et)$_2$
C	-N(Ph)

D	
E	
F	

Ahmed M. Naglah *et al* [10] prepared isatin by microwave irradiation technique by the coupling reaction of nicotinic acid with L-amino acid methyl esters was done by the use of acid chloride method. The evaluation of antibacterial activity of prepared compounds was done by agar diffusion method. After evaluation most of the compounds showed powerful antibacterial activity against both gram positive as Bacillus subtilis and S. aureus and gram negative as Escherichia coli

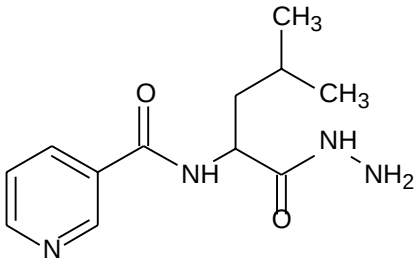


Figure- 14(a)

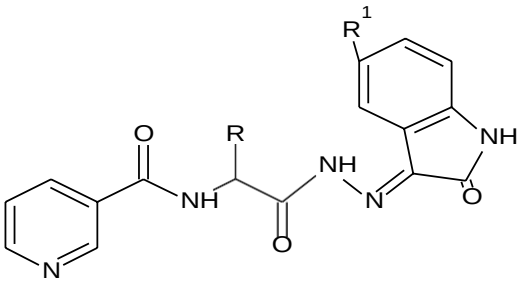
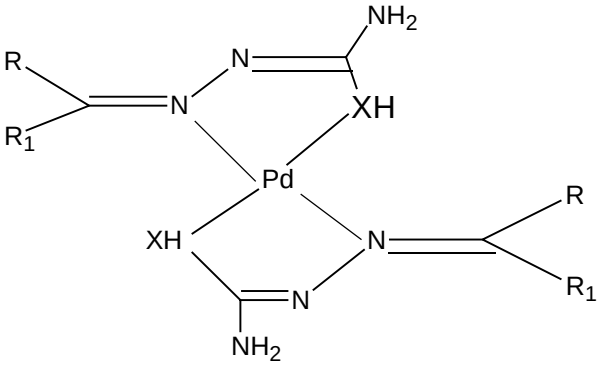


Figure- 14(b)

Where	R	R1
A	$CH(Me)_2$	Cl
B	CH_2-$CH(Me)_2$	H
C	CH_2-$CH(Me)_2$	Br
D	CH_2-$CH(Me)_2$	Cl
E	CH_2-Ph	H
F	CH_2-Ph	Br
G	CH_2-Ph	Cl

Ashok N Patange *et al* [11] were prepared new series of palladium complexes of thiosemicarbazone and semicarbazone derived of 5-bromo isatin. The entire new synthesized

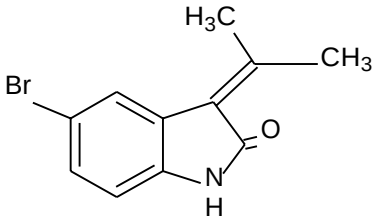
metal complexes were screened for antibacterial activity against four species of bacterial strain *Bacilluspumilus, Micrococcus Lutes, E. coli, Salmonella abony*. Plate diffusion method was used for screened. The result was showed the sulphur containing ligand and their metal complexes are more active than oxygen containing ligand and their metal complexes.

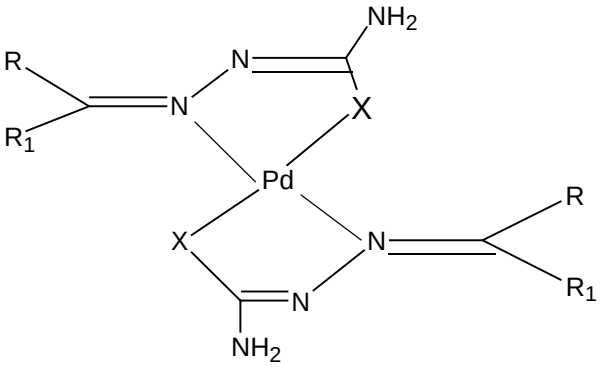


Ligand -1

Figure-15(a)

Where X=S

Where	R
1	$C_6H_5Pd(L_1H)_2Cl_2$
2	$C_6H_4CH_3$ $Pd(L_1H)_2Cl_2$
3	C_6H_4Cl $Pd(L_1H)_2Cl_2$
4	$C_6H_4OCH_3$ $Pd(L_1H)_2Cl_2$
R_1	

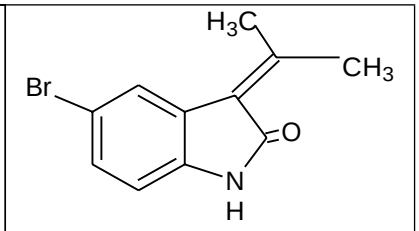


Ligand-2

Figure-15(b)

Where X=O

Where	R
1	$C_6H_5Pd(L_1H)_2Cl_2$
2	$C_6H_4CH_3$ $Pd(L_1H)_2Cl_2$
3	C_6H_4Cl $Pd(L_1H)_2Cl_2$
4	$C_6H_4OCH_3$ $Pd(L_1H)_2Cl_2$

R_1	

Kamaleddin Haj Mohammad Ebrahim Tehrani *et al* [12] researchers research on the antibacterial activity on Schiff base isatin. They were synthesized from a number of Schiff bases by the reaction of 5-substituted isatin and amine/hydrazides and their derivatives. Evaluation of antibacterial activity of synthesized derivative was using a microtiter plate method against the bacterial strains of Pseudomonas aeruginosa, Escherichia coli, Enterococcus faecalis , Staphylococcus aureus and Methicillin resistant S. aureus .

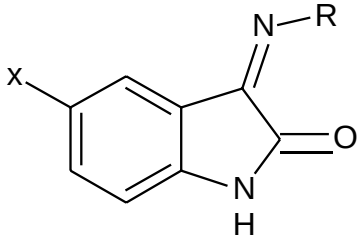


Figure-16(a)

Where	R	X
1	$NONH_2$	Me
2	$NONH_2$	F
3	NOC_6H_5OH	Cl
4	NOC_5NH_6	H

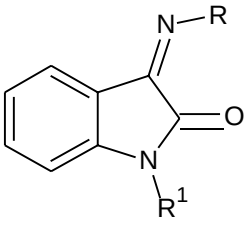
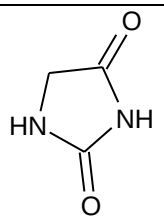


Figure-16(b)

Where R^1	

R= 2-fluorobenzyl, 3- fluorobenzyl, 4- fluorobenzyl

Zhi-Min Lian *et al* [13] were to design 7 compounds of benzohydrazide derivatives with the help of reflux of substituted benzohydrazide and isatin with dichloromethane. The synthesized compounded antibacterial activity was tested against Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa and Staphylococcus aureus using LB medium (Luria Bertani medium). Determination was of tested compounds by colorimetric method using the dye MTT (3-(4, 5-dimethylth-iazol-2-yl)-2,5-diphenyl tetrazoliumbromide).based on the result abtained . We found compounds a-g possess high selectivity to exhibit better antibacterial activity.

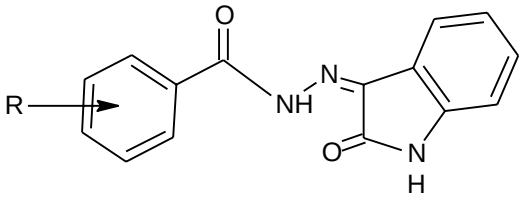


Figure-17

R = a) H, b) 2-F, c) 3-Cl, d) 3-Br, e) 3-CH_3, f) 2-Br, g) 3-F

Vinod Ugale *at el* [14] were synthesized a new series of novel benzofuran isatin derivatives. All the synthesized compounds were evaluated antimicrobial activity against some bacterial and fungal strain. Determine the antibacterial activity against the gram positive bacteria *S.aureus* and *bacillus subtillis*, the gram negative bacteria *E coli* and *Psedomonas vulgaris*. Compound "O " containing nitro group at c-7 of isatin exhibit excellent antibacterial activity against *E coli* and *Psedomonas vulgaris* and the compound "P" having floro group at c-7 of isatin also exhibit good antibacterial activity against *bacillus subtillis*, *E coli* and *Psedomonas vulgaris*. But both compounds O & P are less active against *S.aureus*. other synthesized and tested compound series C,D,I,J,K,M,N showed moderate antibacterial activity against gram positive and gram negative bacteria and remaining synthesized compounds showed very less

antibacterial activity. The antifungal activity was determined against *Candida albicans* and *Aspergillus niger*. Copmpoud O & P are showed good activity against *Aspergillus niger* and the series of C,D,G,I,J,M,N compounds showed moderate activity against *Aspergillus niger* .

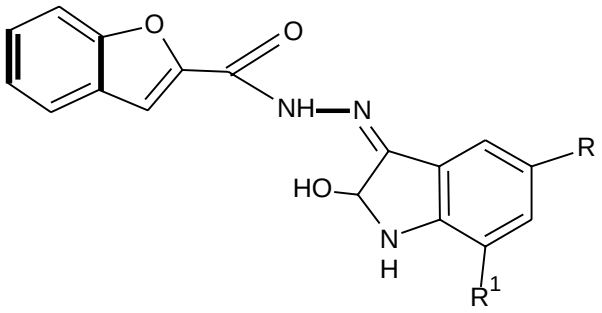


Figure-18

Where	R	R^1		R	R^1
A	H	H	**I**	H	Br
B	Br	H	**J**	H	Cl
C	Cl	H	**K**	H	OH
D	F	H	**L**	H	CH_3
E	CH_3	H	**M**	H	OCH_3
F	OCH_3	H	**N**	H	OC_2H_5
G	NO_2	H	**O**	H	NO_2
H	OH	H	**P**	H	F

Feng gao *et al* [15] a variety of natural biological active products are constituted by isatin and benzofuran. Benzofuran with isatin and their derivatives have various biological activities such as antibacterial, antiviral, anti tuberculosis and anti cancer. Many benzofuran and isatin derivatives have been used for the treatment of various diseases. The novel compounds of isatin and benzofuran derivatives have potential in vitro broad spectrum antibacterial activity. The novel benzofuran isatin imine has shown antimycobacterial activity and antibacterial activity also.

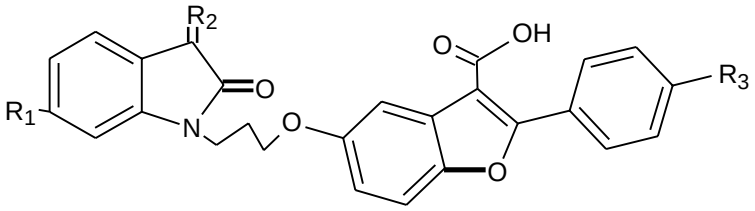


Figure-19

Where	R_1	R_2	R_3
	H,F,OMe	NOMe, NOEt	H,OMe,F

Justin Ebuka Ezekwem *at el* [16] was prepared Schiff base isatin with the treatment of isatin and 4 amino acetanilide. Newly synthesized Schiff base isatin produced chalcon derivative with the reaction of aromatic aldehydes in the presence of potassium hydroxide and ethanol. Antibacterial activity and antifungal activity of all synthesized compounds was determined by using agar disc diffusion method against two gram positive bacteria *Staphylococcus aureus & Bacillus subtilis* and two gram negative bacteria *Pseudomonas aeruginosa* & *Escherichia coli*. All synthesized compounds showed significant antibacterial activity against all tested bacterial strains. it was found in the study of antibacterial activity, the compound was having electron withdrawing group showed better activity than electron releasing group.

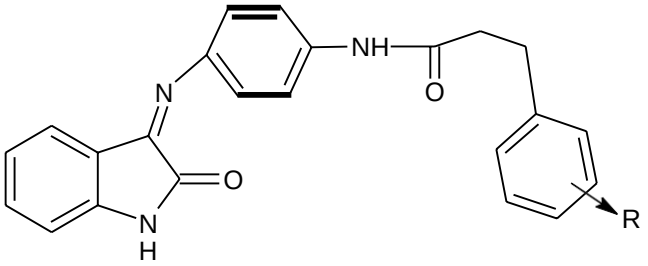
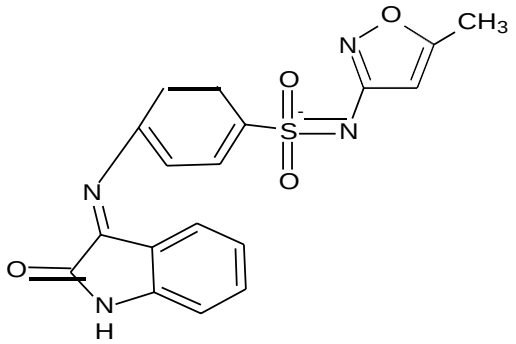


Figure-20

Where	R
1	4-OCH3
2	H
3	3-Br,
4	4- Cl
5	4-OH, 3-OCH3
6	3-NO2
7	2-OH

I.T. Siraj and H.B. Ado [17] synthesized Schiff base metal complexes from the condensation reaction of isatin and sulfamethaoxazole. Schiff base and their metal complexes were screened their antimicrobial activity against six pathogenic microbes. The antibacterial activity were evaluated against *Staphylococcus aureus, Escherichia coli,*and *Salmonella typhi* by using Kirby-Bauer disc diffusion method. The antifungal activity was screened against *Aspergillus flavus, Aspergillus niger and Mucorinducus*. The *Staphylococcus aureus* showed resistant against Schiff base, Cu complex showed highest activity against *Staphylococcus aureus* . *Escherichia coli* was showed resistant against Co complex while Cu and Zn complex showed mild activity. All the compounds including Schiff base showed antibacterial activity against *Salmonella typhi*. Schiff base showed the high activity against *Mucorinducus* and *Aspergillus flavus,*but no activity found against *Aspergillus niger*. Cobalt complex showed good activity against all the fungal speciestested replicating its strong antibacterial activity. Cu and Zn complexes were found to be inactive against *Aspergillusflavus*but mildly active against *Aspergillus niger* and *Mucorindicus*



Schiff base

Figure-21(a)

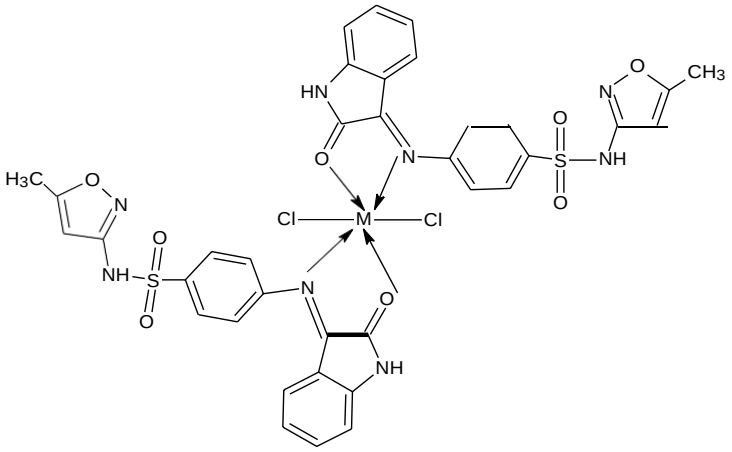


Figure-21(b)

Where M = Mn^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+}, Cu^{2+}, or Zn^{2+}

Anjali *et al* [18] synthesized Schiff bases Isatin with the reaction of Isatin and substituted aniline in the presence of alcohol. Paper disc diffusion method was used for the determination of zone inhibition. Antimicribial activity of synthesized compounds was tested against *S. Aureus, E. Faecalis, E. Coli, P. Aeruginosa* bacteria. Standard drug Amoxicillin was used for antibacterial activity of synthesized compounds. Some synthesized compounds such as 2-oxo-1,2-dihydro-3H-indol-3-ylidene] formamide, 2-oxo-1,2-dihydro-3H-indol-3-ylidene] amino} benzene sulfonic acid, 3-hydroxy-4-[(2-oxo-2,3-dihydro-1H-indol-3-yl)amino] naphthalene-1-sulfonic acid, 3-[(2-nitrophenyl) imino]-1,3-dihydro-2H-indol-2-one, 3-[(2,4,5-trifluorophenyl) imio]-1,3-dihydro-2H-indole-2-one, 2-chloro-4-{[(3Z)-2-oxo-1,2-dihydro-3H-indol-3-ylidene] benzonitrile, 3-[(3-nitrophenyl) imino-1,3-dihydro-2H-indol-2-one, 3-{[2-methyl-3-(trifluoromethyl)phenyl] imino}-1,3-dihydro-2H-indol-2-one are Showed broad spectrum antibacterial activity.

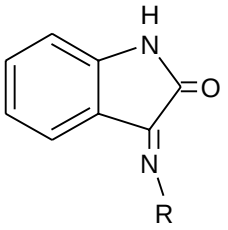
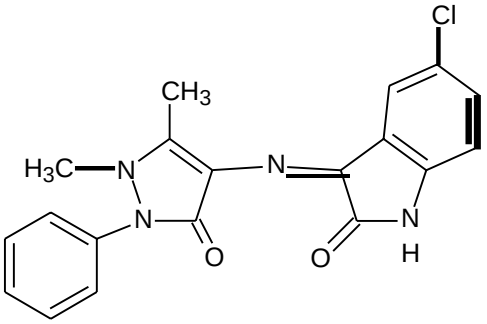


Figure -22

Where R=

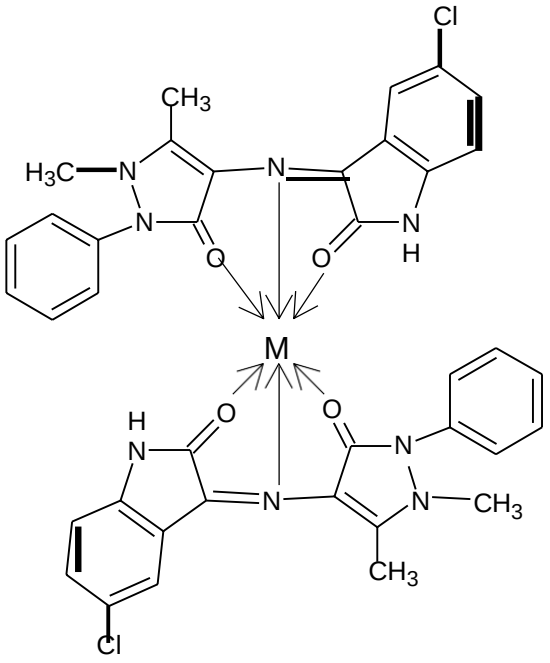
-COH	-OH	$-COCH_3$	-CO-Ph	$-Ph-4-NO_2$	$-Ph-4-SO_3H$
$-Ph-2-OH\ 4-SO_3H$	$-Ph-3-CH_3\ 4-CN$	$-Ph-2-NO_2\ 4-Cl$	-Ph-2-Cl 4-CN	$-Ph-2-NO_2$	$-Ph-4-SO_2NH_2$
-Ph-2,4,5-F	-Ph-3-Cl 4-CN	$-Ph-3-NO_2$	$-Ph-2-CH_3\ 3-CF_3$	$-Ph-2-Cl\ 4-NO_2$	$-Ph-3,5-\ OCH_3$

Murugan Selvariammal and Maruthappan Malarvizhi [19] was synthesized some novel schif base 5-chloro isatin and 4-aminoantipyrine with transition metal complexes. The antibacterial and antifungal activity of prepared compounds were analyzed against some gram positive bacteria like *Bacillis subtilis* and gram negative bacteria *Pseudomonas aeruginosa* and the fungus *Aspergillus nige*. Amikacin (antibacterial) and clotrimazole (antibiotics) was used as a standard. All the synthesized transition metal complexes with 5- chloro isatin and pyrazolzon exhibit satisfactory antimicrobial activity. Nickel complex having remarkable binding affinity while cobalt complex shows potential activity than other metal complexes.



Schiff base ligand

Figure-23(a)



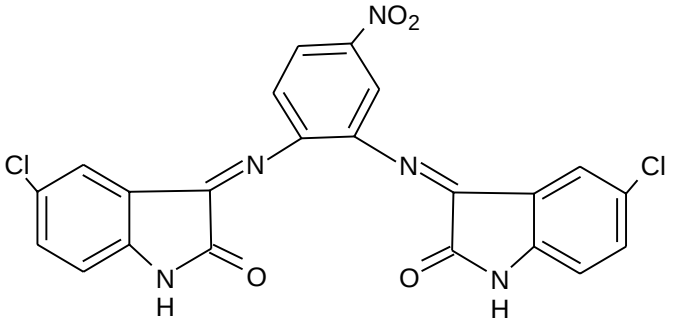
Metal complex

Figure-23(b)

Where M =

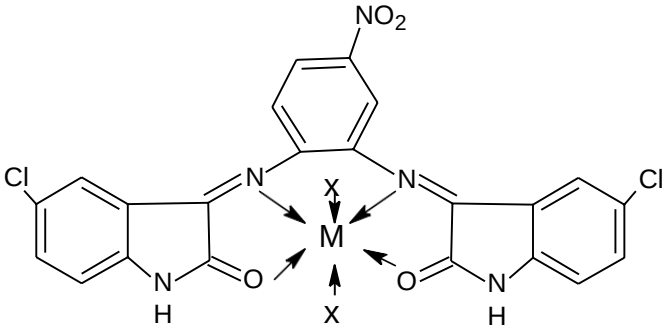
Zn	Co	Cu	Ni

Netra pal singh *et al* [20] was prepared a series of transition metal complexes of Schiff base ligand derived from 5-chloro isatin and 4-nitrobenzene. The antimicrobial activity of all synthesized transition metal complexes were analyzed against gram positive bacteria *Staphylococcus aureus*, *Bacillus subtilis* and gram negative bacteria *Pseudomonas aeruginosa*, *Escherichia coli*, *Salmonella typhi* and fungi *Rizoctonia* sp., *Aspergillus* sp., *Penicillium* sp. The transition metal complexes showed better antimicrobial activity than ligand. The antibacterial activity of all synthesized metal complexes was more effective towards gram positive bacteria than gram negative bacteria because of their more complex cell wall. The nickel metal complex shoes best antibacterial activity than other metal complexes.



Schiff base ligand

Figure-24(a)



Metal complex

Figure-24(b)

Where –M

CO	Ni	Fe	Mn

X

CH_3COO^-	Cl^-

Ruchi Bhatanagar *at el* [21] were synthesized some series of new Schiff base isatin derivative. New compoundes are based on some proven pharmacophoric element with the combination of isatin derivative. Alkylated compound were synthesized of a set of isatin derivatives by imine formation at c-3 position. Antibacterial and antifungal activity was determined by using arag disc diffusion method against *P. aeruginosa*, *S. aureus* and *K. Pneumonia* bacterial strain and *Aspergillus flavus* and *Aspergillus niger* fungus . a series of compounds of imine formation at c-3 position with alkylation at N position showed antibacterial and antifungul activity.

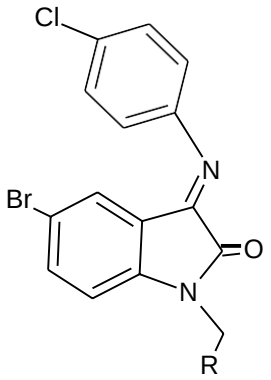


Figure-25(a)

Where R= Ethyl pyrrolidine, Ethyl piperidine, Dimethyl ethylamine, Triethylamine

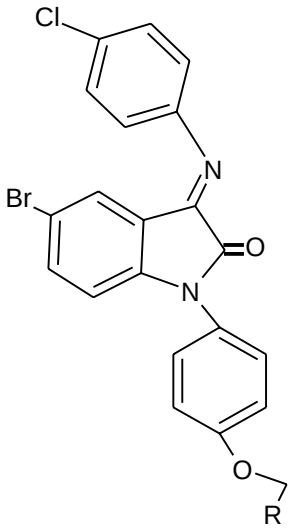


Figure-25(b)

Where R= Ethyl pyrrolidine, Ethyl piperidine, Dimethyl ethylamine, Triethylamine

Ch Jithendra *at el* [22] was prepared a new series of isoxazole Schiff and mannich base 5-nitro isatin derivatives. The entire synthesized compound were tested their antimicrobial activity by using agar streak dilution technique. Evaluated antibacterial activity against 4

gram positive bacteria *B.cereus, S. Epidermidis, S.aureus* & *M. Luteus* and three gram negative bacteria *E.coli, P.aeruginosa* & *K.Pneumonia*. The antifungal activity was tested against two fungi *A. Fumigates* & *A. Niger*. Compound B & D exhibit excellent antibacterial activity, compound A,F,H,J showed moderate activity and compounds C,E,G,I,K showed less activity.

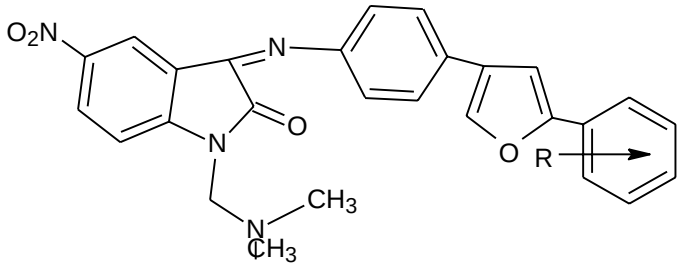
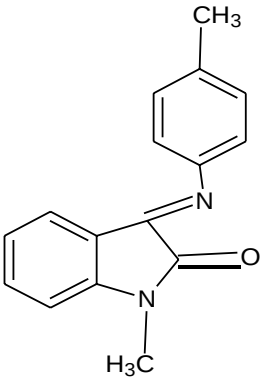


Figure-26

Where	R
A	H
B	4-NO_2
C	3-NO_2
D	4-Cl
E	3-Cl
F	4-CH_3
G	3-CH_3
H	4-OCH_3
I	3-OCH_3
J	4-OH
K	3-OH

Manish Kumar, *at el* [23] was prepared six new hexa coordinated complex of organotellurium and N-methylisatin derivative. All the organotellurium complexes were synthesized by ligand NMeIPT [1-methyl-3-(*p*-tolylimino) indolin-2-one**].** Antibacterial screened of all the synthesized complexes against bacteria *Bacillus cereus* and *Xanthomonas Campestris* and antifungal activity evaluated against *Candida albicans, Fusarium oxysporum* and *Sclerotinia sclerotium*. the result showed Schiff base ligand and tellurium complexes had moderate antibacterial activity while showed better activity against fungal species. Organotellurium(IV) complexes **a** and **e** showed good antibacterial activity against *Bacillus cereus* and **a** and **d** possess better antibacterial activity against *Xanthomonas campestris.* Complex **a** is the most active against all fungi.



Schiff base ligand

Figure-27(a)

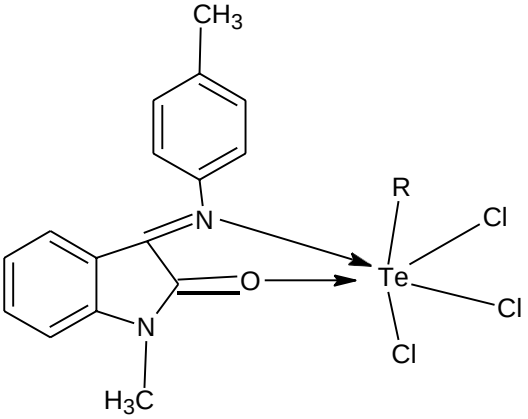


Figure-27(b)

Where R= a= 4- hydrophenyl
b= 4- methoxyphenyl
c= 3-methyl-4-hydroxyphenyl

Conclusion

Isatin is a significant molecule with special biological characteristics that make it appropriate for a variety of medical and pharmaceutical uses, such as an anti microbial, antibiotic, anticancer, and anti-diabetic drug. In order to find innovative, environmentally acceptable ways to synthesize isatin and get beyond its challenges, research in this area has significantly increased. In addition, isatin reactions have received a great deal of attention since they open up a wide range of novel derivatives with potent biological properties that can be exploited in a wide range of biological and medicinal applications. Isatin is a crucial nucleus and opens up new avenues for future research because of all these factors.

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