Synthesis, Characterization and Biological Activity of Transition Metal Complexes Supported

Munusamy Rani , Srinivasan Sathiya, MaheswaranVimala

Abstract:- Mn (II) and vanadium (II) complexes were synthesized purified by repeated recrystallisation and characterized by IR data. Metal complexes were also tested for their antimicrobial activity. Analysis reveals that all the ligands showed its greater activity against S.Typhi & B.cereus, complex showed moderate activity against p. argeniosa. N (hydroxybenzylidene) 2- chloro aniline found to be moderate against s.typhi and less active against B.cereus. Analysis reveals that all the ligands showed its greater activity against P.aeruginosa and S.typhi,

Keywords: - Schiff base,N (2hydroxy benzylidene) 2-amino phenol and N (hydroxybenzylidene) 4-amino azo benzene (2hydroxy benzylidene) Para Toluene sulphonamide

I. Introduction

Manganese (atomic symbol: Mn, atomic number: 25) is a block D, Group, 7, period 4 element with an atomic weight of 54.938045. The number of electrons in each of manganese's shells is [2, 8, 13, 2] and its electron configuration is [Ar] $3d^5$ $4s^2$. Manganese has a silvery metallic appearance. It is a paramagnetic metal that oxidizes easily in addition to being very hard and brittle. Manganese is found as a free element in nature and also in the minerals pyrolusite, braunite, psilomelane, and rhodochrosite. The name Mn originates from the Latin word "manganese" meaning "magnet".

Manganese is an important metal for human health, being absolutely necessary for development metabolism and the antioxidant system (Emsley and John, 2012; Silva Avila *et al*., 2013). Manganese SOD is the type of SOD present in eukaryotic mitochondria and also in most bacteria. The manganese SOD enzyme is probably one of the most ancient, for nearly all organisms living in the presence of oxygen use it to deal with the toxic effects of superoxide, formed from the electron reduction of dioxygen.

Manganese is also important in photo synthetic oxygen evolution in chloroplasts in plants. The oxygen – evolving complex is a part of photo system contained in the thylakoid membranes of chloroplast; it is responsible for the terminal photo oxidation of water during the light reactions of photosynthesis and has a metalloenzyme core containing four atoms of manganese (Dismukes*et al*., 2006). For this reason most broad – spectrum plant fertilizers. Vanadium is a chemical element which has the symbol V' and atomic number 23 and electron configuration [$1s^2$,$2s^2$,$2p^6$,$3s^2$,$3p^6$,$4s^2$,$3d^3$].

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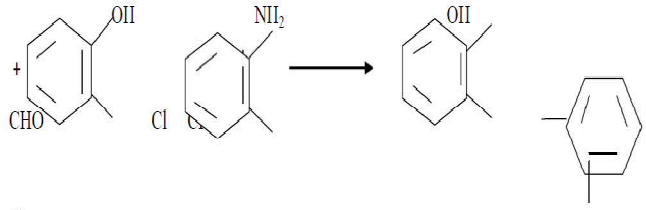
Vanadium is rare, soft ductile gray-white element found combined in certain minerals and used mainly to produce certain alloys. Vanadium resists corrosion due to a protective film of oxide on the surface. Common oxidation states of vanadium include +2, +3, +4, and+5. The six salen Schiff base were prepared and purified by reported recrystallisation, purity tested by TLC and characterized by physical and IR data, finally they are screened for biological activity. Also Mn (II) and vanadium (II) complexes were synthesized purified by repeated recrystallisation and characterized by IR data. Metal complexes were also tested for their antimicrobial activity.

II. Materials and Methods

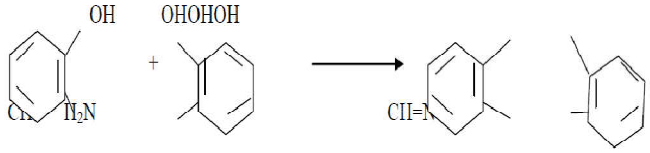
Biological Activity

The ligand Mn (II) and vanadium (II) complexes were also being screened against selected microorganisms for their biological activity by disc diffusion method. Synthesis of ligand N (2 hydroxybenzilidene) 2- chloro aniline from salicylaldehyde with 2- chloro aniline



Salicylaldehyde 2-Chloro aniline N- hydroxybenzilidene -2- Chloro aniline

Synthesis of ligand N (2-hydroxy benzylidene) 2-amino phenol from salicylaldehyde with 2-amino phenol.



Salicyaldehyde 2-Amino phenol N (2 hydroxybenzylidene) 2-Amino phenol

III. Preparation of Schiff Base Compounds

Schiff base ligands were prepared according to the known method from the condensation of salicylaldehyde with 2-chloro aniline, 4- chloro 2- nitro aniline and 3- amino benzene sulfonic acid and 2-amino phenol, 4-amino azo benzene and Para toluene sulphonamide in a molar ratio of 1:1 respectively.

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Preparation of Crude Solution

The Schiff base ligands N (2hydroxy benzylidene) 2-amino phenol and N (hydroxybenzylidene) 4-amino azo benzene (2hydroxy benzylidene) Para Toluene sulphonamide&of its metal complexes were used for the antimicrobial screening. The sterile discs (Himedia) diameter 6mm were impregnated with different concentrations of six Schiff base ligands and six complexes.

The concentrations were prepared as follows 30, 50µl and 10mg of the Schiff base ligands and complexes were dissolved separately inn l md of DMSO. Each concentration was loaded on to the disc.Thus for the first concentration (40µl) contains 300mcg. (10mg/ml 1000 µl =10,000 mcg. 25µl contains 250mcg.The loaded discs will contain 300mcg 500mcg and 10,000mcg of the Schiff base ligands and complexes respectively.

The discs were spread out on the Petri at a distance of approximately (25µl) were loaded accurately according to the concentration onto the sterile discs with micropipette.

The discs were allowed to dry and were secured in sterile dry contains.

IV. Antibacterial procedure

a. *Preparation of inoculums*

Stock cultures were maintained at 4^{o}C on slopes of nutrient agar. Active cultures of experiment were prepared by transferring a loopful of cells from the stock cultures to test tube of Muller-Hinton broth (MHB) for bacteria that were incubated without agitation for 24 hrs at 37^{o}C and 25^{o}C respectively. The cultures were diluted with fresh Muller-Hinton broth to achieve optical densities corresponding to 2.0$\cdot$ 10^{6} colony forming units (CFU/ml) for bacteria.

b. *Antibacterial susceptibility test*

The disc diffusion method (Bauer *et al.*, 1966) was used to screen the antimicrobial activity. *In vitro* antibacterial activity was screened by using Muller Hinton Agar (MHA) obtained from Hi-media (Mumbai). The MHA plates were prepared by pouring 15 ml of molten media into sterile petriplates. The plates were allowed to solidify for 5 minutes and 0.1% inoculums suspension was swabbed uniformly and the inoculums were allowed to dry for 5 minutes. The concentration of extracts is 40 mg/disc was loaded on 6 mm sterile disc. The loaded disc was placed on the surface of medium and the extract was allowed to diffuse for 5 minutes and the plates were kept for incubation at 37^{o}C for 24 hrs. At the end of incubation, inhibition zones formed around the disc were measured with transparent ruler in millimeter.

V. Results and Discussion

Bacterial studies were carried for ligands and metal complexes. The organism which was taken such as *pseudomonas argeniosa, S.Typhi, B.cereus, B.subtilis* medium concentration was implied such as of 40µl. N (hydroxybenzylidene) 2 – amino phenol. Less active against *p.argeniosa*and *B.cereus*, (N hydroxybenzylidene) 4- amino azo benzene found to be moderate active against *B.cereus* and *B.subtilis* it is inactive against *P.aeruginosa*, para toluene sulphonamide found to be moderate active against *p.argeniosa*&*S. Typhi*. Vanadium (II) Complex N (2 hydroxybenzylidene) 2- amino phenol less active against *B.substiles, B.cereus*& moderately active against *p. argeniosa*N (2 hydroxybenzylidene) 4–amino azo benzene less active against *B.cereus&p. argeniosa*&*B.subtilis*. Analysis reveals that all the ligands showed its greater activity against *S.Typhi&B.cereus*, complex showed moderate activity against *p. argeniosa*. In medium concentration N (2hydroxy benzylidene) 2-amino phenol & Vanadium (II) Complex showed its activity against microorganism, if concentration been increased the activity will also increase. N (hydroxybenzylidene) 2- chloro aniline found to be moderate against *s.typhi* and less active against *B.cereus*. 4-chloro 2- nitro aniline found to less active against *S.typhi* and moderate against *P.aeruginosa* and *B.cereus*. 3-amino benzene sulfonic acid found to be moderate against *B.cereus* and less active against *S.typhi*. Manganese(II) complex N (2 hydroxybenzylidene) 2- chloro aniline less active against *B.substilis*, moderate against *S.typhi*Manganese(II) complex N (2 hydroxybenzylidene) 4-chloro 2- nitro aniline moderate against *B.substilis* and less active against *B.cereus*. Manganese (II) complex N (2 hydroxybenzylidene) 3- amino benzene sulfonic acid less active against *B.substilis* and moderate against *P.aeruginosa*. Analysis reveals that all the ligands showed its greater activity against *P.aeruginosa* and *S.typhi*, complexes showed its greater activity against *B.cereus* and *S.typhi*. In medium concentration ligand and complex showed its activity against microorganism, if concentration been increased the activity will also been increased.

Reports on Bacterial Studies (I) for ligands

S.NO	Name Of Organism	Control	A_1	Control	B_1	Control	C_1
1	P.aereginoe	29	13	28	12	28	20
2	S.typhi	20	18	21	13	21	21
3	B.cereus	23	12	23	15	23	20
4	B.substilis	18	14	18	13	18	23

Reports on Bacterial Studies (II) for metal complex

S.NO	Name of Organism	Control	A_2	Control	B_2	Control	C_2
1	P.aereginoe	29	19	26	23	26	19
2	S.typhi	20	22	28	21	28	24
3	B.cereus	23	16	22	23	28	08
4	B.substilis	18	11	18	10	24	18

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Table. 1 Reports on Bacterial Studies for ligands

S.NO	Name of Organism	Control	A_2	Control	B_2	Control	C_2
1	P. Aeruginoa	29	_	28	25	28	24
2	S. Typhi	20	13	21	17	21	15
3	B. Cereus	23	10	23	16	23	22
4	B. Substilis	18	09	18	09	18	18

Table. 2 Reports on Bacterial Studies for Metal Complex

S.NO	Name of Organism	Control	D_2	Control	E_2	Control	F_2
1	P. Aeruginoa	29	15	26	14	26	22
2	S. Typhi	20	22	28	15	28	18
3	B. Cereus	23	11	22	23	22	23
4	B. Substilis	18	16	18	10	18	11

Further work on this line maybe done in future by comparing the activity of the compound with the activity of known drugs. All the six compounds subjected to antibacterial screening. Only complexes were found to be effective.

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