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BIOLOGICAL ACTIVITIES OF Cd (II)-POTASSIUM PROPYLENE DIXANTHATE CHELATE

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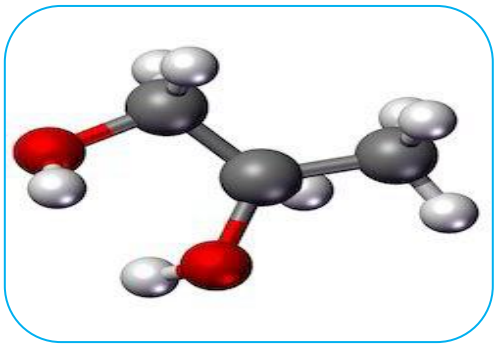
ABSTRACT

Cd (II)-complex of potassium propylene dixanthate (PPDX) was studied to analyse its anti- microbial activities by using disc diffusion method. This complex is highly toxic against common pathogenic fungi. The radial growth of Escherichia coli, Klebsilla pnenmoniae, Psendomonas aeuginosa and Staphylococcus was not inhibited by this complex. In this case disc diffusion method is used to study above said behavior of the complex.



KEYWORDS: *pathogenic organism. potassium propylene di xanthate,antibacterial activity and pathogenic fungi.*

INTRODUCTION

The anti –microbial activities of ordinary complexes and chelates formed by different xanthates are very much interesting in the field of bio-chemistry, but such studies are not done in a systematic pattern. Keeping in view this problem Cd (II)-PPDX complex was studied for its biological activites in broad spectrum. E. Guibal and et. al1. studied the role of uranium complexes against some bacteria. G. M. Gold2 investigated the behaviour of some 3d-metal complexes against fungi and yeast. S. Dayal and et. al3. explain the effect of long term application of oil refinery waste water on soil health with special reference to microbial charaterstics. R. S. Bai4 studied the behaviour of Cr(III)-chelate against rhizopus migricone. R. Rao5 and coworker isolated Cd(II)-chelates formed in polluted effluents. S. Ahmed6 and et. al. studied antifungal properties of Co(II)-chelates in broad spectrum. G. Yan and T. Viroraghvan7 found antimicro-bacterial activities in certain 3d-metal complexes against Escherichia coli, klebsiella pneumonia and Aspergillus flavus etc. J. T. Matheickel8 and et. al. investigated such activities in 3d-metal complexes. B. M. Atkinson9 and coworkers proved that some metal chelates show remarkable anti-bacterial behaviour against some specific living micro-organism. Keeping in view, the above facts regarding the survey of literature, anti-fungal and anti-bacterial activities of metal chelates formed by potassium propylene dixanthate with Cd(II) are studied in detailed.

EXPERIMENTAL MATERIALS AND METHODS:-

Culture Media: Nutrient Broth (Himedia, M002), Nutrient Agar (Himedia, M001), Soyabean Casein Digest Agar (Himedia, M290), Soyabean Choramphenicol Agar (Himedia, M1067), Sobouaud Dextrose Broth (Himedia, M033), Yeast Malt Agar (Himedia, M424) and Yeast Malt Broth (Himedia, M426) were used throughout the study. The composition of media given below.

Nutrient Broth (Himedia, M002), **Nutrient Agar (Himedia, M001) & Soyabean Casein Digest Agar (Himedia, M290**)

Peptic digest of animal tissue	-	5.0 gm.
Beef extract	-	1.5 gm.
Yeast extract	-	1.5 gm.
Sodium chloride	-	5.0 gm.
D/w	-	1 ltr.
Final pH (at 25^{0}C)	-	7.4 + 0.2

13 gram of Nutrient Broth (M002) 40.0 gram of Nutrient Agar (M001) and 40.0 gram of Soyabean Casein Digest Agar (M290) were suspended in 1000 ml. distilled water and sterilized at 15 lbs pressure (1210C) for 15 min. by autoclaving.

Soyabean Choramphenicol Agar (Himedia, M1067)

Casein enzymatic hydrolysate	-	5.0gm.
Peptic digest of animal tissue	-	5.0 gm.
Dextrose	-	40.0gm.
Chloramphenicol	-	0.05 gm.
Agar	-	15 gm.
D/w	-	1 ltr.
Final pH (at 25^{0}C)	-	5.6+ 0.2

Sabouraud Dextrose Broth (Himedia, M033)

Special peptone	-	10.0 gm.
Dextrose	-	20.0 gm.
D/w	-	1 ltr.
Final pH (at 25^{0}C)	-	5.6+ 0.2

In both the above cases, 65.0 gram of medium (M 033) was suspended in 1000 ml. distilled water and autoclaved at 15 lbs pressure (121^0 C) for 15 min.

Yeast Malt Agar (Himedia, M424) **& Yeast Malt Broth (Himedia, M426)**

Peptic digest of animal tissue	-	5.0 gm.
Yeast extract	-	1.5 gm.
Malt extract	-	1.5 gm.
Dextrose	-	5.0 gm.
Agar	-	15.0 gm.
D/w	-	1 ltr.
Final pH (at 25^{0}C)	-	5.6+ 0.2

In the case of Yeast Malt Agar 41.0 gram of medium (M 424) but for Yeast Malt Broth 21.0 gram of medium were suspended in 1000 ml. distilled water and autoclaved at 15 lbs pressure (121^0 C) for 15 min.

Micro-organisms: From IMTECH Chandigrah and maintained for a long time according to instruction of IMTECH Chandigrah. Escherichia coli (MTCC No. 1687) Klebsiella pneumonia (MTCC No. 109) Staphylococcus aureus (MTCC No. 737) Pseudomonas aeruginosa (MTCC No. 1680) Aspergillus niger (MTCC No. 1344) Aspergillus flavus (MTCC No. 871) Candida albicans (MTCC No. 227)

Compound: Cd(II)-Complex of Potassium Propylene Dixanthate (PPDX) Disc - diffusion method: This method was used by Vincent and Vincent10 in 1944. The organism (inoculum) was prepared by transferring a loop full of the corresponding organism from the stock culture into the

sterile broth after incubating the organism (at related temperature, incubation period). The organisms were transferred by means of a loop of 5 ml. sterile broths. The microbial cultures were incubated as below. Bacterial 370C for 24 hours Fungus 26^0C for 24 hours Yeast like C. albicans 26^0C for 24 hours

20.0 ml. of sterilized base agar was transferred aseptically into sterile petridishes and allowed to set uniformly. Than 0.2 ml. of old broths (fresh 5 ml.) was added uniformly to each petridish. Sterile filter paper disc (whatman 44, dia. 6 mm) thoroughly moistened in the compound samples (different concentrations) were placed on the seeded agar plates. The inhibitory effect of the compounds was noted against tested organisms after proper incubation period for each micro-organism.

Estimation of minimum inhibitory concentration (MIC) by tube dilution method-

Tube dilution method was adopted to estimate MIC of the compounds against the micro-organisms.

In Vitro Antibacterial Testing: - The test bacteria E. coli, K. pneumonia, S. aureus, P. aeuginosa were maintained on nutrient agar slant (Himedia M001). Nutrient broth (M002, Himedia) was used to test anti-microbial activity of compound after incubation with a loop full culture from the slants, the broths were incubated at 370C + 10C for 24 hours. Fresh 20 ml. medium was seeded with 0.25 ml. of 24 hours broth culture. Compound was dissolved in dimethyl sulphoxide (DMSO) to obtained 200 mg/ml. stock solution. 0.2 ml. solution of the test material was added to 1.8 ml. of the seeded broth and this formed the first dilution 1 ml. of this diluted with a further 1 ml. of seeded broth to get the second dilution and so on till eight such dilutions are obtained. A set of tubes containing only seeded broths was kept as a control and suitable solvent (DMSO).

Table No. - 1 Effect of Cd(II) - PPDX on Radial Growth Of Different Bacteria Done By Disc-Diffusion Method.

Cd(II)- PPDX complex	**Zone of inhibition (mm)**			
Conc. (ppm)	E. coli	Kb. pneumoniae	P. aeruginosa	S. aureus
600	0.0	0.0	9.1	10.0
800	8.0	8.5	10.0	12.0
1000	10.0	10.0	12.0	13.0

Disc dia = 6 mm.

Table No. - 2 Effect of Cd(II) - PPDX on Radial Growth Of Different Bacteria Done By Disc-Diffusion Method.

Cd(II) - PPDX complex	**Zone of inhibition (mm)**		
Conc. (ppm)	Aspergillus niger	Aspergillus flavus	Candida albicans
600	10.0	10.0	15.0
800	15.0	16.0	20.0
1000	20.0	23.0	25.0

Disc dia = 6mm.

Table No. - 3 Minimum inhibitory concentration of compounds of Cd (II), complex on growth of some bacteria and fungi by Tube dilution method.

Organ isms	**Esch erichia coli**	**Kleb silla pne umo niae**	**pseud omona s aerugi nosa**	**Staphy lococc us aureus**	**Asp ergil lus nige r**	**Aspe rgillu s flavu s**	**Can dida albic ans**
MIC (mg/m l.)	20.0	20.0	20.0	20.0	2.5	2.5	2.5

RESULTS AND DISCUSSION:-

Antimicrobial activity of Cd(II)-PPDX Complex:

Cd (II) complex was less effective on the radial growth of bacteria at different concentrations. Growth inhibition of P. aeruginosa (9.1mm) and S. aureus (9.0 mm) by Cd (II)-PPDX complex was observed at 600 ppm. But E. coli and Kb. Penumoniae have no inhibition at 600 ppm. At higer concentration Cd(II)- complex do not show against E. coli(10.0 mm), Kb. pneumonia(10.0 mm), P. aeruginosa(12.0 mm) and S. aureus(13.0 mm) by disc diffusion method. .Growth of pathogenic fungi was also inhibited at higher concentration of Cd (II)- complex. At 600 ppm Cd(II)-complex showed against Aspergillus niger, Aspergillus flavus (10.0 mm) and Candida alnicans at 1000 ppm Cd(II)-complex showed more than 20.0 mm zone of inhibition by disc diffusion method.

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