# Microbial Activity of Coordination Polymers

**Research Paper—Home Science**

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The organic compounds are classified as drugs, dyes, insecticides, fungicides, fertilizers, food additives etc. The area for drug synthesis is much developed recently. Numbers of the drugs are derived either naturally or synthetically and they are mostly heterocyclic compounds. The heterocyclic compounds, nicotine, morphine, vitamins, are well known for their drug activity. One of the hetero ring discussed earlier i.e. Quinoline is well known for drug synthesis for curing of malaria and dioerrea deceases. Numbers of quinoline containing compounds are known for drugs [1]. However the area of insecticides are mostly phosphorous and chlorinated compounds. Some of the inorganic compounds e.g. arsenite are also known as insecticides. Certain organic compounds are not much toxic as 100% insecticides. That time these compounds can effect on microorganisms. Thus they are known as fungicides, bactericides etc. Such type of ligands and their metal chelates are known as antifungal agents [2-5]. Polymers derived from these ligands are also known for their biological activities [6-9]. The polymers of salicylic acid derivatives and their metal chelates are reported for better antifungal activity [10].

**EXPERIMENTAL MATERIALS:** All the polymers described in were used for their antimicrobial study. All other chemicals used were of laboratory grade. To test the fungicidal activity of coordination polymers various plant pathogenic organisms were employed. There are [a] Penicillium expansum [b] Botrydepladia thiobromine [c] Nigrospora sp. [d] Trichothesium sp. [e] Rhizopus nigricans [f] Aspergillus niger [g] Trichoderma lignorum

**ANTIFUNGAL ACTIVITY MEASUREMENT** — The fungicidal activity of all the compounds was studied at 1000ppm concentration in vitro. Plant pathogenic organisms used were as above. The antifungal activity of the coordination polymers was measured ( by plate method ) on each of these plant pathogenic stains on a potato dextrose agar (PDA) Medium. Such PDA medium contained potato 200g dextrose 20g and water 1 L [11]. Five-day-old cultures were suspended (1000 rpm) in PDA medium and autoclaved at 120°C for 15 mins at 15 atm. pressure. These media were poured into inoculated after cooling the petriplates. The percentage inhibition of fungi was calculated after 5 days using the formula given below.

$$\text{Percentage of inhibition} = 100\,\frac{(X-Y)}{X}$$

Where X = area of colony in control plate (without sample)

Y = area of colony in test plate.

**RESULTS AND DISCUSSION—**The toxic effect of all the coordination polymers on fungi is shown in tables 6.1 to 6.5. The results give the following conclusion. [I] All the coordination polymers are equally toxic against fungi. [II] The introduction of R group of alkoxy segment does not more effect on the fungicidal activity of polymers. [III] In each series the Cu coordination polymers have much toxicity. This is expected because the copper salts are mostly used as fungicides. [IV] The toxicity of each series has following trend :

**Cu > Ni > Co > Zn > Mn**

[V] The overall trend for all series of coordination polymers is as follows. $[H_2L\text{-}1] > [H_2L\text{-}2] > [H_2L\text{-}3] > [H_2L\text{-}4] > [H_2L\text{-}5]$,

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[VI] Most of the coordination polymers inhibit the growth of the above organism, which cause disease in many plants. Hence such type of polymers may find use as agricultural and garden fertilizer.

Table - 1

ANTI FUNGAL ACTIVITY OF [$H_2L$-1]-M CO-ORDINATION POLYMERS

Zone of inhibition at 1000 ppm(%)

| Coordinaton Polymers | Penicillium expansum | Botrydeplodia thiobromine | Nigrospora sp. | Trichothesium sp. | Rhizopus nigricans | Aspergillusniger | Trichoderma lignorum |
|---|---|---|---|---|---|---|---|
| [$H_2L$-1]-Cu(II) | 90 | 95 | 85 | 90 | 75 | 90 | 90 |
| [$H_2L$-1]-Zn(II) | 88 | 90 | 81 | 86 | 71 | 85 | 85 |
| [$H_2L$-1]-Ni(II) | 87 | 89 | 79 | 84 | 70 | 83 | 82 |
| [$H_2L$-1]-Co(II) | 85 | 89 | 77 | 82 | 69 | 81 | 80 |
| [$H_2L$-1]-Mn(II) | 82 | 85 | 75 | 80 | 68 | 79 | 78 |

$H_2L$-1 = [illegible]

Table -2

ANTI FUNGAL ACTIVITY OF [$H_2L$-2]-M CO-ORDINATION POLYMERS

Zone of inhibition at 1000 ppm(%)

| Coordinaton Polymers | Penicillium expansum | Botrydeplodia thiobromine | Nigrospora sp. | Trichothesium sp. | Rhizopus nigricans | Aspergillusniger | Trichoderma lignorum |
|---|---|---|---|---|---|---|---|
| [$H_2L$-2]-Cu(II) | 98 | 94 | 92 | 95 | 83 | 98 | 98 |
| [$H_2L$-2]-Zn(II) | 96 | 97 | 89 | 91 | 89 | 93 | 93 |
| [$H_2L$-2]-Ni(II) | 95 | 98 | 87 | 87 | 78 | 91 | 89 |
| [$H_2L$-2]-Co(II) | 93 | 95 | 85 | 91 | 76 | 89 | 87 |
| [$H_2L$-2]-Mn(II) | 91 | 91 | 85 | 93 | 75 | 87 | 85 |

$H_2L$-2 = [illegible]

Table -3

ANTI FUNGAL ACTIVITY OF [$H_2L$-3]-M CO-ORDINATION POLYMERS

Zone of inhibition at 1000 ppm(%)

| Coordinaton Polymers | Penicillium expansum | Botrydeplodia thiobromine | Nigrospora sp. | Trichothesium sp. | Rhizopus nigricans | Aspergillusniger | Trichoderma lignorum |
|---|---|---|---|---|---|---|---|
| [$H_2L$-3]-Cu(II) | 88 | 93 | 83 | 88 | 73 | 88 | 88 |
| [$H_2L$-3]-Zn(II) | 86 | 88 | 79 | 85 | 70 | 83 | 83 |
| [$H_2L$-3]-Ni(II) | 85 | 87 | 77 | 82 | 69 | 81 | 80 |
| [$H_2L$-3]-Co(II) | 83 | 85 | 75 | 80 | 68 | 79 | 78 |
| [$H_2L$-3]-Mn(II) | 81 | 83 | 73 | 87 | 65 | 77 | 76 |

$H_2L$-3 = [illegible]

Table -4

ANTI FUNGAL ACTIVITY OF [$H_2L$-4]-M CO-ORDINATION POLYMERS

Zone of inhibition at 1000 ppm(%)

| Coordinaton Polymers | Penicillium expansum | Botrydeplodia thiobromine | Nigrospora sp. | Trichothesium sp. | Rhizopus nigricans | Aspergillusniger | Trichoderma lignorum |
|---|---|---|---|---|---|---|---|
| [$H_2L$-4]-Cu(II) | 93 | 98 | 88 | 93 | 78 | 92 | 92 |
| [$H_2L$-4]-Zn(II) | 91 | 93 | 84 | 89 | 74 | 88 | 88 |
| [$H_2L$-4]-Ni(II) | 90 | 92 | 82 | 87 | 73 | 86 | 85 |
| [$H_2L$-4]-Co(II) | 88 | 90 | 80 | 85 | 72 | 84 | 83 |
| [$H_2L$-4]-Mn(II) | 86 | 88 | 78 | 83 | 70 | 82 | 81 |

$H_2L$-4 = [illegible]

Table -5

ANTI FUNGAL ACTIVITY OF [$H_2L$-5]-M CO-ORDINATION POLYMERS

Zone of inhibition at 1000 ppm(%)

| Coordinaton Polymers | Penicillium expansum | Botrydeplodia thiobromine | Nigrospora sp. | Trichothesium sp. | Rhizopus nigricans | Aspergillusniger | Trichoderma lignorum |
|---|---|---|---|---|---|---|---|
| [$H_2L$-5]-Cu(II) | 89 | 94 | 85 | 89 | 74 | 89 | 89 |
| [$H_2L$-5]-Zn(II) | 87 | 89 | 80 | 85 | 70 | 74 | 84 |
| [$H_2L$-5]-Ni(II) | 86 | 88 | 78 | 83 | 69 | 82 | 81 |
| [$H_2L$-5]-Co(II) | 84 | 86 | 76 | 81 | 68 | 80 | 79 |
| [$H_2L$-5]-Mn(II) | 82 | 84 | 74 | 79 | 65 | 88 | 77 |

$H_2L$-5 = [illegible]

## R E F E R E N C E

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