

# SUMMARY OF THE FINAL REPORT OF MINOR RESEARCH PROJECT

## 1. Title of the research project :

Comparative antimicrobial studies of some orthohydroxy naphthoquinone derivatives and their Magnesium (II) And Calcium(II) chelates

## 2 Central object of the project –

This project is a part of the extensive and advance research related to the coordination Chemistry of orthohydroxy 1,4 naphtho quinones and its applicaton to antimicrobial investigations with an object to study the effect of chelation, isomerism and change of donor system on the antimicrobial properties.

## 3 Object of the present research project –

Lawsone which is 2-hydroxy 1,4 naphthoquinone and phthiocol which is 2 – hydroxy, 3- methyl 1.4 naphthoquinone are the two important parent members of Lawsone series which are powerful chelating ligands and due to their natural occurance possess significant antimicrobial activities. Lawsone monoxime and phthiocol monoxime are their oxime derivatives which are also powerful chelating agents. Lawsone and phthiocol involve O O donor system, while their oxime derivatives involve O N donor system. Therefore, for examining the effect of oximation or change of donor system from O O to O N, these pairs are suitable.

Due to 1,4 naphthoquinone base and natural occurrence, the biological properties of these ligands as well as their metal chelates are of special interest. Among the metals, calcium and magnesium are two metals which are more important from

biological point of view. Therefore metal chelates of Ca (II) and Mg (II) with the four ligands under present investigations are preferred to study their antimicrobial activities.

#### 4 Ex-perimental Aspects -

Out of the four ligands selected for this project ,only lawsone is commercially available (Fluka A.G) while the three were synthesized in Laboratory by following literature methods. All the four ligands were recrystallized and their purity was tested with the help of their melting points and TLC. Their Ca(II) and Mg(II) chelates were prepared also by following literature methods, whose chemical identities, which corresponds to  $ML_2 \cdot 2H_2O$ , was established through elemental analysis and thermogravimetry.

#### 5 Achievements of the projects :-

Through this project a comparative study of antimicrobial activities of Ca (II) and Mg (II) chelates of Lawsone and Lawsone monoximes as well as phthiocol and phthiocolmonoxime has been reported first time with an object to explore the effect of oximation and methyl substitution on the antimicrobial activity of three microorganisms. *Aspergillus flavus*, *Micrococcus luteus* and *Klebsiella pneumoniae* is reported.

A modified way to express the antimicrobial activities in terms of inhibition zone areas calculated from  $\pi r^2$  instead of zone inhibition diameters.  $2r$  where  $r$  is the radius and  $2r$  is the diameter of the inhibition zone has been employed. This is more convenient and useful way and may be a guideline for future investigations.

Lawsone and phthiocol being medicinally and biologically important 1,4 naphthoquinone derivatives, the results and conclusions of this study will be useful for the medicinal as well as other biological applications of these ligands as well as their Mg (II) and Ca(II) chelates

## **6 Publication of Research work :-**

During the periods of this minor research project the important and significant aspects of the topic selected for this project have been presented in national as well as international conference and the work has been appreciated by related researchers with their useful and constructive suggestions. Two of these international conferences include (i) 17<sup>th</sup> International conference on expanding horizons in chemical and Biological Sciences held at Solapur during January 2012 and (ii) first International Conference on functional materials for Defence by DIAT Pune during 18-20 May 2012. The two national conference include (i) UGC sponsored National seminar on New challenges in chemistry and Nano science organized by Bharati Vidyapeeth Deemed University, Y.M.College, Pune on Feb 2012 and (ii) Indian Council of chemists conference held at Kuala Lumpur ( Malaysia) on "Trends in chemical Science going Beyond Frontiers " during 10<sup>th</sup> – 12<sup>th</sup> Jan 2012.

This work will be now published in some national/ International journals of high repute.

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