

at $m=3$ corresponds to the addition of the secondary ligand (Cat/TRA/CTA) to the initially formed 1:2, Cu(II)-HQ complex resulting in the formation of 1:1:1, Cu(II)-HQ-Cat/TRA/CTA protonated insoluble ternary species. One more inflection at $m=4$ with the partial dissolution of solid phase may probably be ascribed to the titration of the coordinated hydroxy proton forming 1:1:1, Cu(II)-HQ-Cat/TRA/CTA normal complexes. The formation of such protonated species may further be supported by the appearance of different coloured solids during titrations and also by the elemental analyses and IR studies.

Elemental analyses:

The results of chemical analyses agreed with the calculated values within the limits of experimental errors.

IR Studies:

For the sake of brevity, only shifted or altogether new peaks appearing in the spectra of metal chelates, have been discussed. A sharp absorption band at 3270 cm^{-1} due to OH stretching vibrations in the free ligand (HQ) disappears in the spectra of metal chelates probably due to the involvement of OH group in chelation. The appearance of a new band in the reported region⁸ $640\text{--}420\text{ cm}^{-1}$ is probably due to M—O stretching vibrations. The M—M stretching vibration in the metal complexes has been observed in the reported region⁸ $400\text{--}300\text{ cm}^{-1}$. However, the presence of some strong bands at ca. 710 cm^{-1} and in the region of $1170\text{--}1100\text{ cm}^{-1}$ indicates the presence of coordinated oxine molecule⁹.

Biocidal Studies:

The MIC values given in table I indicate that although metal ions and ligands are almost biologically inactive to bacteria (A, B, C and D) and fungi (A_1 , B_1 , C_1 and D_1) they become effective in the form of their mixed-ligand complexes.

ACKNOWLEDGEMENT

Authors are grateful to Prof. J. P. Tandon, Jaipur and Prof. K. N. Mehrotra, Agra University, for their keen interest and valuable suggestions.

4 September 1982; Revised 7 December 1982

1. Heda, B. D., Khadilkar, P. V. and Kaskadikar, G. S., *Indian J. Hosp. Pharm.*, 1980, **17**, 39.
2. Mittal, S. P., Sharma, S. K., Singh, R. V. and Tandon, J. P., *Curr. Sci.*, 1981, **50**, 483.
3. Sorenson, J. R. J., *J. Med. Chem.*, 1976, **19**, 135.
4. Rao, D. S. and Ganorkar, M. C., *J. Indian Chem. Soc.*, 1981, **58**, 217.
5. Albert, A., Rabbo, S. D., Goldacre, R. J. and Balfour, B. G., *Br. J. Expt. Pathol.*, 1947, **28**, 69.
6. Donald, C. G. and Williams, A. R., *Assay methods of antibiotics, A Laboratory Manual*, 188, Medical encyclopedia INC, 1955.
7. Cruickshank, R., *Medical Microbiology. The Practice of Medical Microbiology*, Churchill Livington, Edinburgh, 12 Ed., 1975.
8. Ferraro, J. R., *Low frequency vibrations of inorganic coordinated compounds*, Plenum Press, New York, 1971.
9. Charles, R. C., Fraizer, H., Friedal, R., Hill, L. E. and Johnston, W. D., *Spectrochim. Acta*, 1956, **8**, 1.

ANNOUNCEMENT

HARI OM AWARDS

The Hari Om Ashram Alembic Research Awards for 1982, totalling to Rs. 20,000 for basic research in medical sciences has been awarded to the following four scientists:

Prof. A. Krishnamurti, Head of the Anatomy Department, Post Graduate Institute of Basic Medical Sciences, Madras University; Prof. Ramakrishnan, Head of Biochemistry Department,

JIPMER, Pondicherry; Prof. V. K. Vinayak, Department of Experimental Medicine, Post Graduate Institute of Medical Education and Research, Chandigarh and Dr. (Mrs.) Surinder Kaur, Head of Biochemistry Department, PIMER, Chandigarh. Each award carried a medal and Rs. 5000 in cash.
