

SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL ACTIVITY OF TRANSITION METAL IONS COORDINATION POLYMERS BASED ON SCHIFF BASE LIGANDS

Nahid Nishat* and Fahmina Zafar

Inorganic Materials Research Laboratory, Department of Chemistry, Jamia Millia Islamia, New Delhi 110025

*Email: nishat_nchem08@yahoo.com and fahmzafar@gmail.com

ABSTRACT

Coordination polymers have been attracted great attention in the field of inorganic chemistry due to versatile architectures and promising applications. They have been prepared by complexation of polymeric ligands with metal ions as well as by polymerization of monomeric metal complexes. The nature of a coordination polymer depends on the metal ion, the structure of the ligand and the metal–ligand interaction. A wide variety of ligands like multidentate amines, crown ethers, porphyrins, macrocyclic and Schiff bases have been widely used. Amongst them Schiff bases have been most widely studied due to their complex forming ability. The complexation of metal ions with polymeric Schiff bases not only affects their physical characteristics, but also their chemical activity. Schiff bases are a class of materials containing the $-\text{CH}=\text{N}-$ structural unit which formed by condensation reaction of primary amines with aldehydes. They are important class of material due to their good thermal stability, useful mechanical properties, flexibility, structural similarities with natural biological substances, presence of imine ($\text{N}=\text{CH}-$) which imports in elucidating the mechanism of transformation and racemisation reaction in biological system. These novel compounds could also act as valuable ligands whose biological activity has been shown to increase on complexation. The metal complexes/ polymers of Schiff bases have been found applications in catalysis, dyes and important biomedical fields.

In present work, an attempt have been taken to developed transition metal ions coordination polymers based on new Schiff base ligands for their use as biologically active reagents. All transition metal ions coordination polymers based on new Schiff base ligands have been characterized by IR, $^1\text{H-NMR}$ and UV-visible spectral techniques. The elemental analysis, magnetic moment measurement and thermal behaviour of transition metal ions coordination polymers based on new Schiff base ligands along with geometry of the central metal ions have also been discussed. All transition metal ions coordination polymers based on new Schiff base ligands have been screened for their antimicrobial activity against different microbes by agar well diffusion method.

The studies reveals that the geometry of transition metal ions coordination polymers based on Schiff base ligands generally showed octahedral in Mn(II), Ni(II) and Co(II), square planar in Cu(II) and tetrahedral in Zn(II). All the transition metal ions coordination polymers based on new Schiff base ligands showed good antimicrobial activity and high thermal stability. Cu (II) coordination polymers based on Schiff base ligand show more antimicrobial activity and more thermal stability than the other polymers due to its higher stability constant. Due to more toxic behaviour of Schiff based polymers of Cu(II), it may be used as antifungal and antifouling coatings for various projects. The synthesized transition metal ions coordination polymers based on new Schiff base ligands can be used as solvent-resistant, antifungal and antifouling coating materials for various projects such as medical instruments and the bottoms of ships.

References:

- ¹Hasnain, S.; Nishat, N. *Spectrochim Acta. A* **2012**, 95, 452.
- ²Ahamad, T.; Nishat, N.; Parveen, S. *J. Coord. Chem.* **2008**, 61(12) 1963.
- ³Nishat, N.; Parveen, S. Dhyani, S.; Asma. *J. Coord. Chem.* **2009**, 62(7) 1091.
- ⁴Xiang, T.; Liu, X.; Yi, P.; Guo, M.; Chen, Y.; Wesdemiotis, C.; Xud, J.; Pang, Yi. *Polym. Int.* **2013**, 62, 1517–1523
- ⁵Nishat, N.; Rhis-ud-din; Manisha; Dhyani, S. *Spectrosc. Lett.* **2010**, 43, 465.