



**National Conference on Latest Innovations in Engineering,
Science, Management and Humanities (NCLIESMH – 2024)**

26th May, 2024, Raipur, Chhattisgarh, India.

CERTIFICATE NO : NCLIESMH /2024/C0524610

**Synthesis, Characterization, And Sensing Applications of Naphthalene-
Based Schiff Base Chemosensors for Selective Metal Ion Detection**

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ABSTRACT

Naphthalene-based Schiff base chemosensors have emerged as an important class of molecular sensors due to their excellent photophysical properties, ease of synthesis, and high selectivity toward metal ions. These chemosensors are generally synthesized through the condensation reaction between naphthalene-containing aldehydes and suitable amines, resulting in the formation of an imine ($-C=N-$) linkage. The synthesized compounds are characterized using various analytical techniques such as UV-Visible spectroscopy, fluorescence spectroscopy, FT-IR, NMR spectroscopy, and mass spectrometry to confirm their structural and electronic properties. The presence of the naphthalene moiety enhances fluorescence behavior, making these compounds highly effective for sensing applications. Upon interaction with specific metal ions such as Cu^{2+} , Zn^{2+} , Fe^{3+} , Hg^{2+} , and Al^{3+} , significant changes in color or fluorescence intensity are observed due to coordination between the metal ion and the Schiff base ligand. This selective response enables rapid and sensitive detection of metal ions even at low concentrations. Such chemosensors are particularly useful in environmental monitoring, biological analysis, and industrial applications where metal ion contamination poses significant concerns. The combination of simple synthesis, strong fluorescence properties, and high selectivity makes naphthalene-based Schiff base chemosensors promising candidates for the development of efficient and cost-effective metal ion detection systems.