



CERTIFICATE NO : ICRESMH /2025/C0425480**Design and Photophysical Investigation of Pyrene-Derived Schiff Base Chemosensors for Fluorescent Sensing****Anil Kumar Jakhar**

Research Scholar, Ph.D. in Chemistry, NIILM University Kaithal, Haryana.

ABSTRACT

Pyrene-derived Schiff base chemosensors have attracted considerable attention in the field of fluorescent sensing due to their remarkable photophysical properties and high sensitivity toward various analytes. These chemosensors are designed by incorporating a pyrene fluorophore into a Schiff base framework through the condensation of pyrene-containing aldehydes or ketones with suitable amines. The resulting compounds exhibit strong fluorescence emission, excellent photostability, and tunable electronic properties, making them ideal candidates for sensing applications. The synthesized chemosensors are characterized using techniques such as UV-Visible spectroscopy, fluorescence spectroscopy, FT-IR, NMR spectroscopy, and mass spectrometry to confirm their molecular structures and optical behavior. Photophysical investigations focus on studying absorption and emission characteristics, fluorescence quantum yield, and the interaction of the sensor with target analytes. Upon binding with specific metal ions or other chemical species, the fluorescence intensity or emission wavelength of the pyrene-based chemosensor changes significantly, providing a convenient and sensitive detection method. The unique excimer and monomer emission properties of pyrene further enhance sensing performance and selectivity. These fluorescent chemosensors have potential applications in environmental monitoring, biomedical diagnostics, and industrial quality control. Their high sensitivity, rapid response, and ease of detection make pyrene-derived Schiff base chemosensors valuable tools for the development of advanced fluorescence-based sensing technologies.