

# ABSTRACT

This study presents the synthesis and comprehensive characterization of two novel nickel complexes employing 4,4-diaminodiphenyl methane as the primary ligand and acetonitrile as the solvent. The complexes were formed via a sonochemical approach, demonstrating the potential of this technique in the controlled synthesis of coordination compounds. Distinct coligands were utilized to investigate their influence on the structural and physicochemical properties of the resulting complexes. One complex was generated with benzoic acid as the coligand, while the other complex featured pyridine-2,4,6-tricarboxylic acid. This variation in coligands led to distinctive coordination environments around the central nickel atom, imparting diverse electronic and spectroscopic characteristics. The synthesized complexes were subjected to a variety of characterization techniques. Photoluminescence spectroscopy provided insight into their optical properties, revealing intriguing fluorescence behavior with potential applications in optoelectronic devices. Fourier transform infrared spectroscopy confirmed the binding of the ligand and metal, offering essential structural information. UV-Vis spectroscopy elucidated the electronic transitions within the complexes, shedding light on their electronic band structures. Thermogravimetry was employed to investigate the thermal stability and decomposition patterns of the complexes, offering valuable information for potential applications in catalytic processes or as precursors for materials synthesis. This research contributes to the understanding of sonochemical synthesis methodologies for nickel complexes and underscores the pivotal role of coligands in modulating their properties. The obtained results pave the way for further exploration of these complexes in various technological applications, including catalysis, luminescent materials, and beyond.