

ABSTRACT

In this research work various coordination complexes of cobalt metal with 1,2,4,5-Benzenetetracarboxylic acid ligand were synthesized by using different synthetic strategies ranging from sonication, reflux and solvothermal methodologies. Effect of co-ligand, choice of solvent, pH and molar ratios of the metal and ligand was also studied to optimize the synthetic conditions of the complexes. The synthesized coordination products were characterized by UV-Visible spectroscopy, FT-IR spectroscopy and Photo-Luminescence spectroscopy. Photocatalytic behaviour of these complexes was also studied by evaluating the degradation pattern of methylene blue dye. The photocatalytic activity of the complexes was assessed under sunlight and findings were compared in the presence and absence of external oxidant (hydrogen peroxide). The result showed that photocatalytic property of the complexes can be enhanced in the presence of oxidant like H_2O_2 . The UV-Visible spectroscopic study was used to identify the possible electronic transitions of these complexes. The UV-Visible spectra obtained for the complexes and ligands were found to be different and exhibited different λ_{max} values. FTIR spectra revealed the significant position shifts of peaks between free ligand and the synthesized metal complexes. The photoluminescence analysis revealed the significant fluorescence of all the complexes. This fluorescent nature of compounds was further utilized to devise the chemosensing behaviour against numerous nitro aromatics and heavy metals. The quantitative relation was found for complex 2 and 3 by constructing stern-volmer plot and the K_{SV} values of the complexes were determined.