

## Abstract

This thesis deals with the supramolecular networks of ligands containing sulfonic acids, phenols and pyridine functionalities. The materials were characterized by single crystal, powder X-ray diffractions, IR, NMR and elemental analysis. Some of these compounds were explored for their ability to form co-crystals, solvates and coordination networks. The crystal structures of these materials were determined and analyzed in detail. Hydrogen bonding networks based on phenolic-OH and pyridine functionalities exhibit variable supramolecular aggregations *via* O-H $\cdots$ N hydrogen bonding interaction in the presence of polar and non-polar guest molecules. A new supramolecular synthon between sulfonic acids and pyridine derivatives has been extensively explored in the thesis to understand the finer details. Some of these systems were found to include various aromatic guest molecules and produce colored crystals depending on the nature of guest molecules. The formation of these colors facilitated to use these systems as colorimetric indicators for the detection/identification of compounds such as anthracene, pyrene, *p*-cresol, *m*-cresol, 1-naphthol, 2-naphthol, naphthalene, biphenyl, phenanthrene and 2,7-dihydroxynaphthalene. The coordination polymers of silver complexes with N-heterocyclesulfonic acids in the presence of different co-ligands show that flat longer exobidentate N-donor ligands template Ag(I) $\cdots$ Ag(I) interactions. The overall size and shape of the ligands was found to play major role in the formation of various coordination complexes. Further the properties such as porosity, topology, guest inclusion, separation and templating effects have been extensively explored in the thesis.

Keywords: Exploration of robustness of well-known synthon, New supramolecular synthons, Colorimetric indicator, Separation, Coordination complexes.