Preface

In this Ph.D. thesis, I have attempted to highlight the research work done to design and develop chemical sensors for colorimetric and fluorescence detection of trace amount of moisture/water content present in organic solvents and their possible applications. This thesis comprises five chapters

**Chapter 1: General Introduction & Importance*:* This summarized the recent reports on chemical probes used as a moisture sensor in organic solvents and their possible application.

Chapter 2: Materials & Methods, Synthesis and Characterization of Compounds: This comprises the synthesis of new metal complexes, materials, methods and characterization of compounds used for the moisture detection in organic solvents.

Chapter 3: Off-the-shelf Compounds as an Efficient Moisture Sensors: This chapter deals with commercially available compounds containing phenols and catechol such as Sudan-III (**1**), Alizarin red-S (**2**), Quinizarin (**3**) and Esculetin (**4**) used for the colorimetric detection of trace amount of water in organic solvents. It undergoes deprotonated (anionic) forms by using highly basic fluoride anion, confirmed by ^{19}F-NMR spectra. The re-protonation of the probes with water is the working principle of the sensor system. The probe has been used to detect moisture in raw building materials and applied for fingerprint imaging and sweat pore mapping.

Chapter 4: Metal Complex based Moisture Sensors: This chapter covers the studies of synthesized metal complexes (**5.Cu, 6.Fe(III) and 7.Hg**) with receptors contains fluorophore/chromophore and used for the moisture sensor in organic solvents. In the presence of water, it causes a change in fluorescence emission intensity or color due to partially or completely displacement of metal ion from the receptor because of the weak association constant between the metal ion and the receptor. The real application of the probe was successfully applied for the detection of moisture content in commercial products such as salt, sugar, wheat, washing powder and edible oilseeds such as groundnut, mustard, sunflower, sesame and almond.

Chapter 5: Overall conclusion and Future scope