Chapter II

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AIM AND OBJECTIVES

From the various application of metal complexes in the field of energy, it was considered that the study of aminoguanidine (AMG) and guanidine (GUA) with benzene rings of higher analog will be more advantageous since it was not explored till now. The aromatic mono-carboxylic acid and the iso-carboxylic acid act as versatile ligands to form polymeric composites with the base due to the presence of both -OH and -COOH groups. To better understand the structure, properties, and application of transition metal complexes with naphthoic acid and aminoguanidine/ guanidine as ligands, the current research was carried out. The alkali and alkaline earth metals used for this work are Mn^{2+}, Co^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+}, Cd^{2+}, Mg^{2+}, Ca^{2+}, $Sr^{2+,}$ Ba^{2+}, Li^{+}, Na^{+}, and K^{+}. An attempt has also been made to use these metal complexes as precursors to produce nanometal oxides.

The synthesized compound was characterized by various techniques like elemental analysis, spectral, thermal, powder XRD, single crystal XRD, SEM, TEM, photoluminescence, electrochemical impedance spectroscopy, antimicrobial and cytotoxic studies. The research findings and their applications were described clearly in individual chapters. The structure of acids and the base used for the current research are shown in **Figure 2.1**.

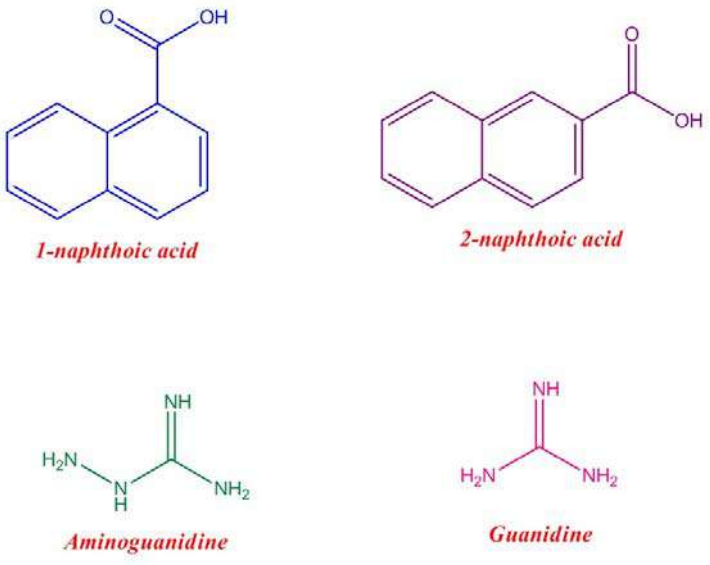

Figure 2.1 *Structure of acids and bases*

***The following are the goals of this work*:**

- To prepare ligands in the ratios of 1:1, 1:2, and 2:1 with 1- naphthoic acid/ 2-naphthoic acid and aminoguanidine/guanidine.
- To synthesize metal complexes and their corresponding metal oxides by slow precipitation method, and their in-depth characterization using techniques like CHNS analysis, FT-IR, UV-visible spectra, TG-DTA, powder- X-ray diffraction, SEM, TEM, photoluminescence, antimicrobial activity, and cytotoxicity assay.
- To grow a single-crystal adduct with 2-naphthoic acid and guanidine using slow evaporation method, and their structural determination.
- To develop a crystalline metal-organic framework with strontium metal ion and 1-naphthoic acid along with their structural investigation.
- To study the application of metal complexes as electrocatalysts for hydrogen evolution reactions and as an organic light-emitting diode.
- Analysis of nanomaterial-based metal oxide as an inhibitor to prevent seawater corrosion resistance and to remove heavy metals in the industrial effluents.

Based on the above aim and scope, this particular research work was planned and the outcomes are deliberated in the subsequent sections.