PDF - SYNTHESIS, CHARACTERISTICS, OF MIXED LIGAND COMPLEX OF ZN(II) ION WITH 8-HYDROXYQUINOLINE AND BENZOIC ACID. - researchcub.info**CHAPTER ONE**

INTRODUCTION

1.1 Background of Study

With the rate at which population is increasing and the usage of fossil fuels, the need for alternative and sustainable energy development has become a necessity. There is therefore need for energy saving materials that are affordable and that pose no threat to our environment. Areas of interests such as fuel cells, batteries, capacitors, solar cells, etc. afford much opportunity for improvement and research focus. (Lacey *et al*., 2014)

Detection of hazardous materials is a significant concern for homeland security, and portable sensors are potentially desirable to avoid the complexity of such materials, such as explosives. Luminescent metal organic frameworks (MOFs) are potentially useful as chemically-selective sensors.The study of luminescence behaviour in metal organic frameworks is an active area of research in inorganic chemistry. A large numberof 3d element have been employed to investigate the ligand luminescence. The most commonly reported metal organic framework structures are based on Zn^{2+} and Cd^{2+} ions, which have filled d orbitals and thus d–d transitions are not possible. In these compounds, intra-ligand and/or ligand metal charge transfer effects have been observed. The photoluminescence studies are important to understand the charge-transfer pathways. The studies on the luminescence behavior in MOFs clearly indicate that the energy transfer from the organic ligands to the metal center is easy. The life-time studies also suggest that the excited state possess considerable stability and allows for exploitation in many important applications. (Zhou, X *et al*., 2009; Konar *et al.,* 2013)

Metal-organic frameworks (MOFs), also known as metal-organic networks, or coordination polymers, represent a new class of compounds containing metal ions linked by organic bridging ligands. A metal-organic framework (MOF) material can be thought of as the composition of two major components: a metal ion (or cluster of metal ions) and an organic molecule called a linker (or bridging ligands).

Metal ions + Organic linkers??? Coordination polymers/ MOFs

The organic ligands or linkers are groups that can donate multiple lone pairs of electrons (polydendate) to the metal ions, whereas the metal ions are made up of vacant orbital shells that can accept these lone pairs of electrons to form a metal-organic framework material.

Metal-organic framework materials are well-defined, adjustable and highly porous materials, with spatial confinement, often crystalline, sensitive to air and resistant to structural collapse upon heating. (Zang *et al*., 2006)

1.1.1 Metal-Organic Frameworks as Functional Materials

Early research in MOFs tended to concentrate on synthesis of a wide variety of new compounds with novel topologies and compositions. Although the design of new structures remains highly topical and a significant amount of research efforts are still devoted to the discovery of unprecedented network topologies, the primary motivation in crystal engineering of MOFs has shifted toward constructing materials that possess specific physical properties and supramolecular functions, such as catalysis, gas storage, luminescence, nonlinear optical properties (NLO), and magnetism. Photoluminescence is a form of luminescence. Phosphors are luminescent materials that emit light when excited by radiation, and are usually microcrystalline powders or thin-films designed to provide visible color emission. It is a light emission from any form of matter after the absorption of photons. It is a process whereby molecules absorb, stores and emits light and is initiated by photo excitation. (Shinde *et al*., 2013)

1.2 Synthesis of metal organic framework

Two methods are adopted, namely: (i) conventional (ii) unconventional methods.

1. Conventional synthesis is frequently performed by solvothermal methods; i.e. heating a mixture of organic linker and metal salt in a solvent system. The materials produced from this method are thermally unstable or reactive to solvent used, and this could lead to breaking of bonds or creation of metal sites for guest species such as gases to gain access into the framework's micropores. In some cases, assisted microwave-solvothermal synthesis can be used, to monitor or regulate the temperature whilst the reaction is in progress. Precipitation and crystallization follows immediately after heating a mixture of a chosen metal ion and organic linker in the presence of a solvent. Thereafter, filtration and drying follows. Slow evaporation method is a conventional method and is advantageous because the crystals assemble themselves though it is time consuming. (Tella *et al*., 2012)

2. Unconventional Synthesis is frequently performed by grinding a mixture of organic linker and metal salt in an agate mortar and pestle or in a ball mill and in the absence of solvent. This method is known as mechanochemical method. The metal sites are exposed when the mixture is gently heated, thus allowing gases such as hydrogen to bind at these sites. The mechanochemically initiated reactions are comparable to those of solvent reactions. The method is known to be environmentally friendly and can possibly give high yield of products.

(Alex *et al*., 2005; Tella *et al*., 2012)

1.2.1 Chemistry of 8-Hydroxyquinoline

8-hydroxyquinoline is an organic compound with the formula C_9H_7NO. It is a derivative of the heterocyclic quinoline by placement of an OH group on carbon number 8. It is a monoprotic bidentate chelating agent. 8-hydroxyquinoline has a hydrogen atom that is replaceable by a metal, and a heterocyclic nitrogen atom, which forms with these metals a five membered ring. It forms stable complexes with several metal ions.(Shar*et al*., 2005)

1.2.2 Chemistry of Benzoic acid

Benzoic acid (C_6H_5COOH) is a colourless crystalline solid and a simple aromatic carboxylic acid. Benzoic acid occurs naturally in many plants and it serves as an intermediate in the biosynthesis of many secondary metabolites. Benzoic acid is an important precursor for the industrial synthesis of many other organic substances. Benzoic acid is mainly consumed in the production of phenol by oxidative decarboxylation at 300-400 ^{0}C. It is one of the ligands used in this research work. (Jarad *et al*., 2011)

technology, Account Number: 0424875728

Bank: Zenith Bank, Account name: Emi-Aware technology, Account Number: 1222004869

or visit the website and pay online. For more info: Visit https://researchcub.info/payment-instruct.html
After payment send your depositor's name, amount paid, project topic, email address or your phone number (in which instructions will sent to you to download the material) to +234 70 6329 8784 via text message/ whatsapp or Email address: info@allprojectmaterials.com.
Once payment is confirmed, the material will be sent to you immediately.
It takes 5min to 30min to confirm and send the material to you.
For more project topics and materials visit: https://researchcub.info/ or For enquries: info@allprojectmaterials.com or call/whatsapp: +234 70 6329 8784
Regards!!!