Designing flexible linkers for the synthesis of Metal-Organic Frameworks

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Abstract

A relatively new and popular class of porous materials known as Metal-Organic Frameworks (MOFs), are crystalline structures constructed from coordinative bonding between an organic ligand and a metal ion. Over the years, MOFs have gained significant attention due to their incredibly versatile applications and implementation in various scientific fields. Their cage-like structure can be utilized for gas storage or filtration, liquid purification, catalysis, drug delivery, magnetism, and sensing. Due to MOFs being a rapidly growing field of study, this research involves in the synthesis and analysis of organic ligands and resulting MOFs. Previous work in our lab utilized resorcinol to synthesize a flexible dicarboxylic acid ligand which was investigated for the construction of porous MOFs. This project expands upon that work and attempts to synthesize a flexible dicarboxylic acid ligand from 1,1-bis(4-hydroxyphenyl)cyclohexane and ethyl bromoisobutyrate for the preparation of a novel MOF. Solvothermal reactions were performed to investigate the coordination chemistry of the ligand using a variety of metal salts. These ligands and MOFs were analyzed via ^{1}H NMR, single-crystal X-ray diffraction and powder X-ray diffraction.