World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:13, No:03, 2019

Systematic Study of Mutually Inclusive Influence of Temperature and Substitution on the Coordination Geometry of Co(II) in a Series of Coordination Polymer and Their Properties

Authors : Manasi Roy, Raju Mondal

Abstract : During last two decades the synthesis and design of MOFs or novel coordination polymers (CPs) has flourished as an emerging area of research due to their role as functional materials. Accordingly, ten new cobalt-based MOFs have been synthesized using a simple bispyrazole ligand, 4,4′-methylene-bispyrazole (H2MBP), and isophthalic acid (H2IPA) and its four 5-substituted derivatives R-H2IPA (R = COOH, OH, tBu, NH2). The major aim of this study was to validate the mutual influence of temperature and substitutions on the final structural self-assembly. Five different isophthalic acid derivatives were used to study the influence of substituents while each reaction was carried out at two different temperatures to assess the temperature effect. A clear correlation was observed between the reaction temperature and the coordination number of the cobalt atoms which consequently changes the self assembly pattern. Another fact that the periodical change in coordination number did bring about some systematic changes in the structural network via secondary building unit selectivity. With the presence of a tunable cavity inside the network, and unsaturated metal centers, MOFs show highly encouraging photocatalytic degradation of toxic dye with a potential application in waste water purification. Another fascinating aspect of this work is the construction of magnetic coordination polymers with the occurrence of a not-so-common MCE behavior of cobalt-based MOF.

Keywords : MOFs, temperature effect, MCE, dye degradation
Conference Title : ICCCA 2019 : International Conference on Coordination Chemistry and Applications
Conference Location : Paris, France
Conference Dates : March 28-29, 2019