

An investigation on the Formation of Fe-MIL-88A Metal-Organic Framework through Modulator-Assisted Solvothermal Method

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Abstract

Metal-Organic Frameworks are a new class of crystalline microporous solids with superior properties compared to their inorganic counterparts. The great structural and chemical diversity associated with these materials has made them promising for many applications such as catalysis, gas separation and water treatments. Iron-MIL-88a, is a flexible and biocompatible MOF. It is important to understand the formation mechanism of the product and properly tune the affecting synthetic parameters to obtain particles with narrow size distribution and properties. In the present study, Fe-MIL-88A was prepared through a modulator-assisted solvothermal method. The crucial parameters of time, temperature and initial reactants concentration were varied to investigate the changes in morphology and particle size distribution. The morphology of the products was studied aiding SEM micrographs. It is concluded that the particle size is increased with temperature due to facilitated growth conditions. the same effect was observed with increasing the initial concentration. The effect of time on the product formation is more complicated considering the initial incubation time which is characteristic in nucleation-growth processes. It is observed that the morphology of the product is initially cubic and the particles change it into diamond-like morphology as the temperature, time or concentration is increased. The structure and crystallinity of the produced Fe-MIL-88A samples were approved by XRD patterns.

Keywords: Metal-Organic Framework, Solvothermal Method, Fe-MIL-88A-Morphology

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