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Adsorption of Dyes and Iodine: Reaching Outstanding Kinetics with CuII-Based Metal–Organic Nanoballs

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Abstract : Metal Organic Frameworks (MOFs) have attracted great interest in recent years, taking a lead role in the field of catalysis, drug delivery, sensors and absorption. In the past decade, promising results have been reported specifically in the field of adsorption, based on the topology and chemical features of this type of porous material. Thus, its application in industry and environment for the adsorption of pollutants is presented as a response to an increasingly important need. In this area, organic dyes are nowadays widely used in many industries including medicine, textile, leather, printing and plastics. The consequence of this fact is that dyes are present as emerging pollutants in soils and water where they remain for long periods of time due to their high stability, with a potential risk of toxicity in wildlife and in humans. On the other hand, the presence of iodine in soils, water and gas as a nuclear activity pollutant product or its extended use as a germicide is still a problem in many countries, which indicates the imperative need for its removal. In this context, this work presents the characterization as an adsorbent of the activated compound αMOP@Ei2-1 obtained from the already reported [Cu_{24}(m-BDC)$_{24}$(DMF)$_{20}$(H_2O)$_4$]•24DMF•40H_2O (MOP@Ei2-1), where m-BDC is the 1,3-benzenedicarboxylic ligand and DMF is N,N′-dimethylformamide. The structure of MOP@Ei2-1 consists of Cu24 clusters arranged in such a way that 12 paddle-wheels are connected through m-BDC ligands. The clusters exhibit an internal cavity where crystallization molecules of DMF and water are located. Adsorption of dyes and iodine as pollutant examples has been carried out, focusing attention on the kinetics of the rapid process.

Keywords : adsorption, organic dyes, iodine, metal organic frameworks
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