Green synthesis of aluminum based metal-organic framework

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Porous materials, known as metal-organic frameworks (MOFs)[1], have attracted particular interest for their high surface area, properties and structural design, which made them suitable to be used in gas storage, drug delivery, as adsorbents, and in catalysis. MOFs are crystalline materials generated by the association of metal ions and organic ligands, which assemble 2D and 3D structures. MOFs have potential advantages over 'classical' materials that are used widely in the industry, including a tunable organic pore surface, large range of pore sizes and lower activation temperatures. Among the MOFs reported so far, some of the most interesting frameworks have been synthesized in metal carboxylate systems under hydrothermal or solvothermal route, where di- and trivalent metals have been combined with di- and tricarboxylic acids dissolved or dispersed in solvents. As far as green chemistry is concerned, volatile organic solvents have many implications as environmental pollutants [3]. In this work we present a simple synthetic route to prepare an aluminium MOF known as MIL-96(Al). The synthesis of MIL-96(Al) was carried out under solvent free conditions avoiding the use of organic solvents, in relatively short reaction time. This green synthesis yielded nano-sized particles. The morphology and distribution of particle size was analysed by measurements on SEM images and powder X-ray diffraction. The SEM images indicate that the material have crystals of 55-74 nm in size. The adsorption properties of the MOF were explored using nitrogen and carbon dioxide adsorption.

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