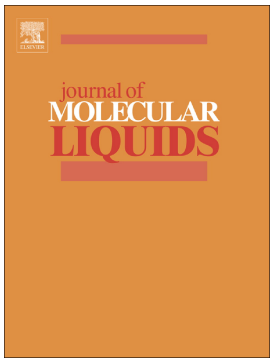

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Hydrothermal tuning of the morphology and crystallite size of zeolite nanostructures for simultaneous adsorption and photocatalytic degradation of methylene blue dye

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Abstract

We herein have reported on tuning of the morphology and crystallite size of the hydrothermally prepared zeolite nanostructures by using different aluminum sources. The investigation revealed that aluminum sulfate and aluminum chloride precursors produced non-crystalline forms, while aluminum isopropoxide, alumina, and aluminum metal precursors generated analcime nanoparticles with crystallite size of ca. 94.79, 112.57, and 105.87 nm, respectively. However, sodium aluminate precursor gave a mixture of analcime and nacrite phases with a crystallite size of ca. 77.95 nm. The as-prepared nanostructures were identified using XRD, FT-IR, FE-SEM, EDS, UV-Vis spectroscopy and BET surface area. The results exhibited that the direct optical energy gaps (E_g) and BET surface area were found to be (3.29eV and 20.18 m^2/g), (3.15eV and 16.28 m^2/g), (3.21eV and 18.67 m^2/g), and (2.69eV and 17.82 m^2/g) for the zeolite products prepared using aluminum isopropoxide, sodium aluminate, alumina, and aluminum metal precursors, respectively. The results also showed that the as-prepared zeolite