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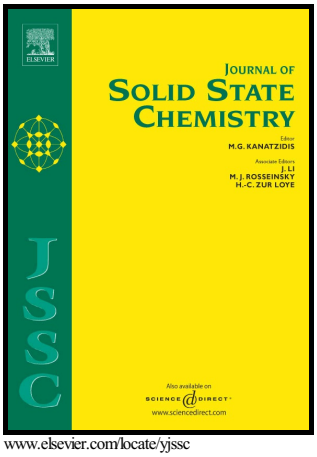


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# SAPO-34/AlMCM-41, as a novel hierarchical nanocomposite: preparation, characterization and investigation of synthesis factors using response surface methodology

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## Abstract

SAPO-34/AlMCM-41, as a new hierarchical nanocomposite was successfully synthesized via hydrothermal and dry-gel conversion. In an experimental and statistical study, effect of five input parameters including synthesis period, drying temperature, NaOH/Si, water/dried-gel and SAPO% were investigated on range-order degree of mesochannels and the relative crystallinity. X-ray diffraction (XRD) patterns were recorded to characterize the ordered AlMCM-41 and crystalline SAPO-34 structures. Nitrogen adsorption-desorption technique, scanning electron microscopy (SEM), field-emission SEM (FESEM) equipped with an energy-dispersive X-ray spectroscopy (EDS-Map) and transmission electron microscopy (TEM) were used to study the textural properties, morphology and surface elemental composition. Two reduced polynomials were fitted to the responses with good precision. Further, based on analysis of variances, SAPO% and time duration of dry-gel conversion were observed as the most effective parameters on the composite structure. The hierarchical porosity, narrow pore size distribution, high external surface area and large specific pore volume were of interesting characteristics for this novel nanocomposite.

***Graphical abstract:***