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## MS14-P7 Size-controlled synthesis of a mordenite type zeolite from organic template free initial gel

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One of the widely used zeolite minerals mordenite has chemical formula  $\text{Na}_8(\text{H}_2\text{O})_{24}[\text{Al}_8\text{Si}_{40}\text{O}_{96}]$ . Its structure is characterized by 12-membered and 8-membered rings running along the c axis, and another 8-membered rings running along the b axis; these channels accommodate extraframework cations and water molecules. The mineral, especially synthetic varieties, has many industrial applications such as isomerization catalysts. The structure has an orthorhombic unit cell ( $a = 18.1 \text{ \AA}$ ,  $b = 20.5 \text{ \AA}$ , and  $c = 7.5 \text{ \AA}$ ) with topological space group symmetry Cmcn.

This study reports on the hydrothermal synthesis of mordenite crystals without an organic template and on the characterization of resulting crystals, as the ultimate goal has been to decrease the crystal size. Two synthesis approaches have been applied. The first one involved subjecting a standard initial gel  $18\text{SiO}_2 : \text{Al}_2\text{O}_3 : 1.24\text{K}_2\text{O} : 1.21\text{Na}_2\text{O} : x\text{H}_2\text{O}$  to hydrothermal crystallization for a period of 2 to 7 days ( $x=600, 280$  and  $22.5$ ). The second approach included the usage of seeds employing the same initial gel composition. The crystals growth kinetics of mordenite at a different seed content (1, 2 and 5 wt. %) has been studied. The seed-assisted process enabled us to synthesize mordenite crystals of submicrometric range. Particle size distribution of the resulting products strongly depends on the water content in the initial gel and on the amount of added seed. It has been found that seed concentration and water content in the initial gel are the key factors influencing the crystallization time and the physicochemical properties of crystalline products. Six hours is the shortest time in which zeolite mordenite with high crystallinity is obtained.

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**Keywords:** Nanozeolites, Mordenite, Hydrothermal synthesis, Seed-mediated synthesis