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Cost-effective synthesis of CHA zeolites with controllable morphology and size

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ABSTRACT

Cost-effectively develop zeolites with controllable morphology and size is significant in design and optimization of the physical properties for CO₂/CH₄ adsorption separation. Herein, we report the synthesis of CHA zeolites with tunable morphology and size by a facile one-step dual template-directed strategy. A mixture of organic structure-directing agents (OSDA) composed of N,N,N-trimethyl-1-adamantammonium hydroxide (TMAdaOH) and tetramethylammonium hydroxide (TMAOH) was employed and found to function cooperatively in directing the crystallization of CHA zeolites. Additionally, the dual template strategy reduced the consumption of expensive TMAdaOH to a great extent. The crystal morphology and size were remarkably dependent on TMAOH concentration in the dual template-directed synthesis system, regardless of TMAdaOH concentration. We demonstrate that the gradual decrease of TMAOH concentration in the batch composition enables a fine-tuning of the zeolite morphology from cubic to rough sphere crystals, accompanied by the size ranging from *ca.* 3 μm to 400 nm. We speculate that the two organic species work synergistically in the formation of CHA

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