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Hydrothermal synthesis of zeolite T from kaolin using two different structure-directing agents

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Abstract

Zeolite T was synthesized from the molar chemical composition of $1\text{SiO}_2:0.04\text{Al}_2\text{O}_3:0.26\text{Na}_2\text{O}:0.09\text{K}_2\text{O}:14\text{H}_2\text{O}$ in the form of a homogenous milky solution in the presence of the two different structure-directing agents TMAOH and TEAOH respectively. Modification of the composition of silica was undertaken using metakaolin from calcined kaolin at 750 °C for 4 h, while the molar composition of each different SDA was varied from 0.05, 0.10, 0.15, 0.20 and 0.25. The homogenous mixture was left at room temperature for 24 h before undergoing hydrothermal synthesis at 100 °C for 168 h. The synthesized samples were filtered and aged at 120 °C for 2 h and each sample was calcined at high temperatures (545 °C for TMAOH and 520 °C for TEAOH) for template removal before characterization using XRD and SEM. Crystallization of the zeolite T in its major form only took place at a molar ratio of 0.10 of TMAOH, while TEAOH showed the species evolution of zeolite T into zeolite L and W for other molar ratios.