

Synthesis of CHA type zeolite with higher Si/Al₂ ratio in the absence of organic structure-directing agent

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Chabazite (CHA) type zeolite has 3-dimensional channel system with relatively small pore (0.38 nm) and large cavity. Recently, copper-exchanged CHA-type zeolite catalyst is found to be promising catalysts for selective catalytic reduction by ammonia (NH₃-SCR) reaction due to its exceptional hydrothermal stability. To have this property, high content of silica in zeolite is crucial. CHA-type aluminosilicate with high Si/Al₂ ratio (~ 12) is typically synthesized by using organic structure-directing agent (OSDA). However, the use of OSDA is cost-ineffective and produce environmentally harmful chemicals during calcination. Chabazite synthesized by using inorganic structure-directing agent has low Si/Al₂ ratio (~ 5)

In this study, OSDA-free CHA-type zeolite with relatively high Si/Al₂ ratio is synthesized in the presence of zeolite Y and fluoride ion. Effect of synthesis time, KF concentration and Si/Al₂ ratio in the gel was discovered on the synthesis of chabazite. Physicochemical properties of the prepared zeolite were investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM) and inductively coupled plasma atomic emission spectrometry (ICP-AES).