Investigation of Dealumination of Mordenite Zeolite by UV Diffuse Reflectance Spectroscopy

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Abstract: Dealumination is a common phenomena occures during acid leaching or acid refluxing of mordenite to prepare acidic zeolite. But there is no comprehensive report on dealumination which can take place in mordenites that are made acidic by ion-exchange with ammonium salt solution followed by calcination. Our UV Diffuse Reflectance Spectroscopy on acidic mordenite prepared by ion-exchange with \( \text{NH}_4^+ \) and followed by calcination at 550\(^\circ\)C shows dislodging some of the framework aluminium from their tetrahedral sites. Inspection of UV absorption spectrum of the as-synthesized mordenite reveals existence of one type of structural Al only. Whereas, in acidic form of mordenite two types of aluminium were observed. Two bands of 220 and 280 nm in the acidic mordenite were assigned to lattice and extra-lattice aluminium respectively. Appearing 280 nm band in the acidic mordenite prepared by treatment with nitric acid shows extra-lattice aluminium in both types of acidic mordenites may arise from the same Al species and the same environment.

Keywords: Acidic Mordenite, Dealumination, Diffuse Reflectance Spectra