

Non-Random Nature of Al Substitution in Zeolite ZSM-5 Investigated by ^{27}Al MAS and ^{27}Al MQ MAS NMR

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Results from the ^{27}Al MAS and ^{27}Al MQ MAS NMR measurements on a series of as-made ZSM-5 zeolites with 0.3 - 6.4 Al atoms per unit cell ($\text{Si}/\text{Al} = 250 - 14$) provide the first direct evidence that the substitution of Al atoms over the 12 distinct tetrahedral sites (T-sites) in this particular structure type of zeolites during their crystallization process occurs in a non-random manner that is not thermodynamically hindered but kinetically controlled.