Synthesis and characterization of Zeolites FAU, EMT and their Intergrowths variation molar template/alumina ratio.

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The development and use of molecular sieves has caused a great impact in different industrial processes due to its versatility, related directly to the structural, acidic and sorption properties. These properties can be modified through the variation of the parameters of synthesis, and in this way is possible to obtain materials with new structures and potentially better catalyst . In the search of new topologies it has been considered that materials with controlled stacking disorder could be an interesting alternative for catalytic applications. The structural disorder and its correlation with the catalytic activity have not been very well studied, neither the controlled synthesis of structural disorder. This is the fundamental base for the controlled design of microporous materials of disorder structures

.Zeolites FAU, EMT and their intergrowths FAU/EMT were synthesized by using 15-crown-5 for FAU and 18-crown-6 for EMT and a mixture of 50% molar of both organic templates for the intergrowth material. The samples were obtained according to the procedure reported by Delprato(1) employing different molar template/alumina ratio.
In all the syntheses the relationship templante/Al_2O_3 were 0.3 and 0.7 M for crystallization times of 6, 9 and 15 days. The synthesis were carried out with agitation during aging and without agitation during crystallization for both concentrations. The materials were characterized by high resolution scanning electron microscopy (HRSEM), X-ray diffraction (XRD), IR, X-ray modeling through DIFFaX program. EDX, TPD.
The average particle size by HRSEM for FAU is 0.5 μm and for EMT is 4 μm. The intergrowth particles have an average particle size of 4 μm and are formed by hexagonal plates of EMT on which regions with the characteristic FAU morphology are observed. Detailed surface measurements using AFM on the intergrowth particles showed a minimum step size of 2.1 nm and multiples of this height were always found. Through the x-ray modeling it was determined the formation of clusters of intergrowth material (blocks of FAU and blocks of EMT) rather than random stacking arrangement of layers of FAU/EMT.
The results obtained by XRD and HRSEM showed that pure and crystalline phases of the intergrowths of the FAU/EMT systems were obtained under continuous agitation during aging for 15 days. The zeolites synthesized with 6 and 9 days of crystallization resulted in amorphous and crystalline mixture of phases. Additionally, by SEM observation it was observed that the molar relationship template/Al_2O_3 synthesis plays an important paper in

the length of the cluster of the intergrowths obtained affecting the morphology of the obtained crystals . The simulation of the XRD patterns using DIFFaX allowed to estimate the real proportion of intergrowths obtained[2,3].

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2.- Treacy, M. M. J., Newsam, J. M. and Deem, M. W. A general recursion method for calculating diffracted intensities from crystals containing planar faults. Proc. R. Soc. Lond. A. 1991, 433, 499-520.
3.-Treacy, M. M., Deem, M. W. and Newsan, J. M., Manual de DIFFaX, v. 1.807. Agosto 2000.