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Synthesis of Zeolites from Pure and Natural Products, Modification andApplication in Wastewater Treatment

Ikram Yssaad*, Fatiha Hamidi

[1]Laboratory of Functional and Nano-structured Eco-materials (LEMFN), Department of Chemistry, Faculty of Sciences, University of Science and Technology of Oran Mohamed Boudiaf USTO-MB, B.P.1505 Elmenaouar, Oran, Algeria

*Corresponding author

ABSTRACT

Introduction

Zeolites are microporous solids with a structure based on a rigid anionic framework with channels and cavities of well defined dimensions. They are perfectly crystallized aluminosilicates of general formula M_2/nO, Al_2O_3, $zSiO_2$ where n is the valence of the cation M[1]. Their structure is based ona three-dimensional arrangement of TO4 tetrahedra (SiO_4 or AlO_4^-) linked by oxygen atoms to form subunits and then large networks of identical blocks(the elementary meshes). The microporous structureof zeolites gives them properties that allow them to find applications in adsorption as well as in catalysis[2]. Our choice is the mordenite type zeolite which presents remarkable properties, thanks to a microporous structure with large pores allowing theconversion of organic molecules and a great thermal stability in acidic media and at high temperatures. In our work, we have studied the synthesis and characterization of mordenite by proceeding to variations of the synthesis conditions and to the optimization of the preparation methods of this zeolite in order to obtain solids with the properties sought for catalytic applications.

Experimental/Theoretical Study

In this work, we examined the effect of temperatureand curing time of the reaction mixture on the properties of the synthesized mordenites. The synthesis method we employed is based on the hydrothermal crystallization of a sodium aluminosilicate gel of stoichiometric composition:
5.8 Na2O: Al2O3: 30 SiO2: 780 H2O, prepared from aluminum and silicon sources: sodium aluminate (Riedel de Haên) and aerosil silica (Dégussa). Crystallization of the synthesis gels was performed at 160 °C and 170 °C, under autogenous pressure. The synthesized materials were characterized by X-ray diffraction, infrared spectroscopy, scanning electron microscopy and volumetric nitrogen adsorption analysis.

Results and Discussion

The experimental results showed that the sample obtained at 160 °C after 96 hours of crystallization corresponds to a pure and well-crystallized mordenite and that the crystallization time of the sample synthesized at 170 °C is 48 hours. The X- ray diffraction spectra of these solids reveal intense peaks that correspond entirely to those of a mordenite-type zeolite.

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Conclusion

The increase in temperature favors the crystallization of mordenite but leads to the formation of undesirable phases. The results obtained also showed that gel ripening before hydrothermal treatment improves the selectivity of the mordenite synthesis.

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References

1. Guisne.M, and Ribeiro.F. « Les zéolithes, unnanomonde au service de la catalyse ».France
2. Hamidi.F, Bengueddach.A, Di Renzo.F, Fajula.F. « Control of size and morphology of mordenite,catalysis Letters,Vol.87,3-4 (2003) 149-152.»

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