

SYNTHESIS OF LTA ZEOLITE FROM A NATURAL RESOURCE "BENTONITE"

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Introduction & Objectives:

Since antiquity, numerous fields have utilised clays as natural raw materials. The industry is currently undergoing a fresh surge in the use of clays, particularly those high in SiO₂ and Al₂O₃. The synthesis of crystalline aluminosilicate zeolites can be made from clay minerals such as kaolinite [1]. In this work, we investigate the viability of generating zeolite from a source of bentonite. The zeolite was successfully synthesized in a two-step hydrothermal method; the product is applied for the different concentrations of blue methylene adsorption.

Méthodologie (Matériel et méthodes):

In the first step; bentonite clay was activated with sodium carbonate. The second step; The activated product was prepared from an alkaline attack using hydroxide sodium in an autoclave for 72h under a temperature of 100°C. After crystallization, the solid product was filtered, washed with deionized water and dried at 100 °C for 24 h in oven air 6 h in air. For the adsorption application, the produced zeolite was added to the methylene blue solution and agitated for 2 hours at room temperature.

Results and Discussion:

The characterization of the product was achieved using Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), and Raman techniques. XRD and FTIR analyses showed that the zeolite LTA-Fe was obtained as well-shaped crystals. Analcime (zeolite LTA-Fe) may be used in selective adsorption reactions and in heterogeneous catalysis. In many areas such as wastewater processing, the zeolite LTA-Fe was more efficient than the natural analog due to its specific structural properties. In our case, it was used for eliminating the pollutant methylene blue by adsorption. The results from the UV-Visible analyses showed that the zeolite LTA-Fe has a good capability of eliminating high concentrations of methylene blue from aqueous solutions.

Conclusion:

The development and characterization of polycrystalline materials based on local bentonite are the goals of this study. Zeolite LTA-Fe has been prepared successfully using method hydrothermal condition. Results showed well defined morphology of the product and a good ability in the treatment water's.

Key words: Bentonite, LTA-fe- Zeolite, XRD, FTIR, Adsorption.

References

1.Carlos Alberto Ríos Reyes^{1*}, Craig Denver Williams², Oscar Mauricio Castellanos Alarcón³, (Junio 2010), Rev. Fac. Ing. Univ. Antioquia N.°53 pp. 30-41.

