

TRIBOCHEMICAL REACTIONS OF ERIONITE AND Na-LTA ZEOLITES WITH $\text{Fe}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$: A MÖSSBAUER STUDY

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The tribochemical reactions between Na-LTA and natural erionite with $\text{Fe}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$ were studied by Mössbauer spectroscopy, X-ray powder diffraction, IR spectroscopy and NH_3 adsorption experiments. The reactions occur with the consequent zeolite dealumination and the formation of a crystalline compound, a product of the extracted aluminum and the sulfate.

1. Introduction

Tribochemical reactions are a novel method for the modification of molecular sieves. Reactions between synthetic zeolites (Na-FAU, Na-LTA) and $\text{AlPO}_4 \cdot 3\text{H}_2\text{O}$ resulted in the incorporation of Al and P to the zeolite structures [1,2].

Mössbauer spectroscopy has been applied in the study of natural [3,4] and transformed (by ion exchange [5,6], adsorption [7,8] and hydrothermal processes [9]) zeolites in the last years, revealing itself as a powerful tool in the elucidation of the state of iron and the obtainment of information about the structure and transformation of these materials.

In this work, the tribochemical reactions between zeolite (natural erionite and Na-LTA) and $\text{Fe}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$ are studied by Mössbauer spectroscopy and other methods to shed light on the mechanism of the involved tribochemical reactions.

2. Experimental

The starting materials: natural erionite from Aguas Prietas, Sonora, Mexico, labelled ERI (chemical composition in weight percent: SiO_2 : 59.6; Al_2O_3 : 14.2; Fe_2O_3 : 2.3; CaO : 2.2; MgO : 1.5; Na_2O : 2.4; K_2O : 3.3; H_2O : 13.9; other: 0.6*, with 85% of erionite and 15% of other phases: montmorillonite, quartz, calcite, magnetite, feldspars and volcanic glass), synthetic Na-LTA zeolite (85% purity) obtained in our laboratory [10] and $\text{Fe}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$, labelled FS (Fluka analytical grade reagent)

* K_2O , MnO , TiO_2 , BaO , SrO .