JOURNAL OF CATALYSIS 34, 327 (1974)

LETTER TO THE EDITORS

Aluminum Site Reactivity in Faujasite-Type Zeolites

The Dempsey proposal (*1*) fits very well with the conclusions on aluminum site reactivity and environment in Y zeolites (*2*, *3*). If one considers that all the aluminum atoms are identical crystallographically, the electrostatic argument explains very satisfyingly a break near 70% of the aluminum content, in acidity strength (*2*) cracking properties (*3*) and chemical reactivity towards organic reagents (*2*, *3*) and steam (*4*, *5*) (ultrastable materials).

We would like to point out some experimental features which could be used to complete the hypothesis proposed. First an infrared study (*6*) of adsorbed pyridine showed that the dealumination removes aluminum atoms related to weak Lewis acidity. The weak Lewis acid sites might then be related to aluminum atoms of doubly occupied square faces (α). Second considering the neutralization of acid sites by Na^+ ions, the question arises as to the number of Na^+ ions related to weak acid sites in the starting zeolite. At first sight the scheme proposed by Dempsey involves four weak acid sites and three strong ones per sodalite cage, i.e., 24 strong acid sites/unit cell (uc). In fact we found 70% of strong acid sites by exchange of Na^+ ions for protons (i.e., 40/uc). Hence it seems that the scheme proposed might be refined to explain the acid properties of nonaluminum deficient samples.

All these features involve Y type zeolites. Acidity data on X type (*2*) also indicate 70% of strong acid sites and between 77 and 60% of aluminum atoms distinct chemically from the others. Such a model proposed for Y zeolites cannot be applied so easily here since in that case a large number of square faces are doubly occupied in the starting X sample. Nevertheless we think that the basic idea of electrostatic interactions is certainly valuable.

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Received April 4, 1974