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DIELECTRICAL DIFFERENTIAL THERMAL ANALYSIS

III. Some relations in faujasite

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Sodium faujasites with different Si/Al ratios were studied by means of thermodielectrical method.

With the thermodielectrical analyser previously described [1], sodium faujasites with different Si/Al ratios (Table 1), and faujasites with Si/Al = 1.57 and different sodium contents (Table 2) were studied. The Si/Al ratio was determined using the empirical relation $a = 0.0086\ N(\mathrm{Al}) + 24.191$ between the cell parameter a and the aluminium content $N(\mathrm{Al})$ in the faujasite [2]. The majority of the samples were

Table 1 Description of the used faujasites

Sample	Si/Al	Faujasite content, %	Precedence
a	3.8	90–100	Na *Y*
b	1.9	60	synthetised (4)
c	1.8	60	synthetised (4)
d	1.6	90–100	Reachim Na *X*
e	1.5	70	synthetised (4)

Table 2 Description of the Na—NH_4-faujasites

Sample	Si/Al	Na, %
1	1.57	100
2	1.57	97
3	1.57	68
4	1.57	45
5	1.57	39

Note: The samples were obtained by boiling Na-faujasite in a 3 molar solution of NH_4Cl at 380 K

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obtained by synthesis in 7.5 molal NaOH solution with a ratio of 1 part of solution for 1 part of natural mordenite (80% of mordenite in the rock and 20% of quartz, montmorillonite and volcanic glass with an elemental composition as follows: SiO_2: 66.9%; Al_2O_3: 11.5%; Fe_2O_3: 2.7%; CaO: 4.4%; MgO: 1.8%; K_2O: 0.76%; Na_2O: 1.83%) previously fully exchanged with Na at 380 K [3, 4]. The faujasite content in the synthetic sample and the mordenite content in the natural sample were determined by adsorption of NH_3 [5], and the sodium content by atomic absorption.

Table 3 Dependence of ΔT with Si/Al relation

Sample	Si/Al	*T*, K
a	3.8	275
b	1.9	320
c	1.8	330
d	1.6	375
e	1.5	400

Table 4 Dependence of ΔT with sodium content

Sample	Na, %	*T*, K
1	100.0	475
2	97.4	540
3	68.5	625
4	44.8	670
5	39.3	700

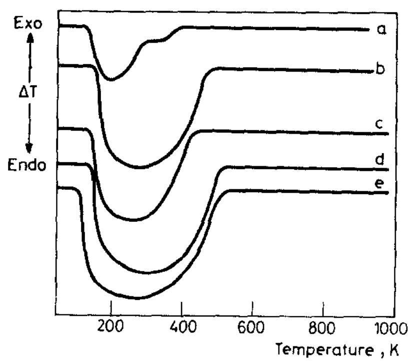

Fig. 1 Thermal curves of samples a, b, c, d, e. Relation between ΔT and Si/Al

In Figs 1 and 2 the dielectrical curves for samples $a-e$ and samples 1–5 are shown, while Tables 3 and 4 give the dependence between ΔT, the Si/Al ratio and the sodium content.

As found previously [6], the first thermal effect is related with the polarization of the cations and the adsorbed zeolitic water, and the second peak is a consequence of cationic conduction. In this way it is possible to understand that, as sodium has a high mobility in faujasite [7], the decrement in sodium content implies an increment in ΔT. On the other hand, the increment in ΔT with the decrement in Si/Al is in contradiction with the reported data on the conductivity in faujasites [7] and must be related with structural changes in faujasites with different Si/Al ratios. These results (Fig. 1) must be treated with care, and only as a tendency.

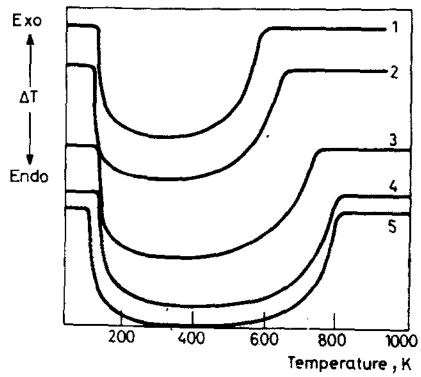

Fig. 2 Thermal curves of samples 1, 2, 3, 4, 5. Relation between ΔT and the sodium content in a Na—NH-faujasite

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