

**FAU**

**High-Si Faujasite EMC-1<sup>a</sup>**

**Si(79), Al(21)**

**Contributed by** Joël Patarin

**Verified by** C-n. Wu, by I. Dwyer, and by J. Zhao

**Type Material** Na<sub>40</sub>[Al<sub>40</sub>Si<sub>152</sub>O<sub>384</sub>]. (15-Crown-5)<sub>8</sub> (H<sub>2</sub>O)<sub>60</sub>

**Method** T. Chatelain, J. Patarin, M. Soulard, J.-L. Guth, P. Schulz [1]

**Batch Composition** 2.1 Na<sub>2</sub>O : 10 SiO<sub>2</sub> : Al<sub>2</sub>O<sub>3</sub> : 0.5(15-crown-5) : 100 H<sub>2</sub>O

**Source Materials**

distilled water

crown ether (Aldrich 15-crown-5, 98%)

sodium hydroxide (Fluka, 98%)

sodium aluminate (Carlo Erba, 56% Al<sub>2</sub>O<sub>3</sub>, 37% Na<sub>2</sub>O)

silica sol (Ceca, 40% SiO<sub>2</sub>)

**Batch Preparation<sup>b</sup>** (for 15 g product)<sup>c</sup>

- (1) [17.75 g water + 2.25 g crown ether], dissolve under continuous stirring
- (2) [(1) + 1.65 g sodium hydroxide], dissolve under continuous stirring
- (3) [(2) + 3.64 g sodium aluminate], dissolve under continuous stirring
- (4) [(3) 30.00 g silica sol] stir with a magnetic bar at approximately 200 rpm Continue stirring for 24 hours at room temperature.<sup>d</sup> Gel pH = 13.5-14

**Crystallization**

Vessel: Teflon-lined stainless steel autoclave (150 mL)

Temperature: 110°C

Time: 8 days

Agitation: none

Final pH = approximately 12.5

**Product Recovery**

- (1) Filter and wash with distilled water until pH of the filtrate is close to 6
- (2) Dry at 60-70°C overnight
- (3) Yield: 99% based on alumina (as-synthesized product containing the organic template and some water)<sup>e</sup>

**Product Characterization**

XRD FAU, a<sub>0</sub>=24.57Å

Elemental Analysis: SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> 7.6 (by atomic absorption spectroscopy and <sup>29</sup>Si MAS NMR)

Crystal Size and Habit: truncated octahedra, 1 μm dia.

**References**

- [1] T. Chatelain, J. Patarin, M. Soulard, J.-L. Guth, P. Schulz, Zeolites 15 (1995) 90

- [2] D. Anglerot, F. Fitoussi, P. Schulz, T. Chatelain, F. Dognier, J. Patarin, J.-L. Guth, in *Synthesis of Porous Materials, Zeolites, Clays and Nanostructures*, M. L. Occelli, H. Kessler (eds.), Marcel Dekker, New York, 1996, p. 325

**Notes**

- a. EMC-1 = Elf Mulhouse Chemistry number one.
- b. The starting mixture is prepared in a polypropylene bottle.
- c. This synthesis has been successfully carried out at the kilogram scale [2].
- d. The mixture is aged in a closed polypropylene bottle.
- e. Calcination at 450°C in air removes the template.