EAB TMA-E Si(74), Al(26)

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Type Material $[Na_{6.84}(TMA)_{3.05}]$ $[(AlO_2)_{9.25}(SiO_2)_{26.75}]$. 17.12 H_2O [a] (TMA = tetraxnethylainmonium)

Method R. Aiello, R. M. Barrer [1]

Batch Composition 5 $(TMA)_2O$: 3 Na_2O : Al_2O_3:15 SiO_2 : 500 H_2O

Source Materials

distilled water
tetramethylammonium hydroxide (Fluka, purum, 25% aqueous solution)
sodium hydroxide (Carlo Erba, pellets, reagent grade, 30% aqueous solution)
alumina (Pfaltz and Bauer, $Al(OH)_3$, 65% Al_2O_3)
silica (Sigma, fumed, 99+% SiO_2)

Batch Preparation (for 1.4 g dry product)

(1) [13.78 g water + 9.10 g tetramethylammonium hydroxide solution + 2.00 g sodium hydroxide solution], mix until dissolved
(2) [(1) + 0.39 g alumina], mix until homogeneous
(3) [(2) + 2.25 g silica], mix thoroughly

Crystallization

Vessel Teflon container
Time: 14 days
Temperature: 80 ± 2°C
Agitation: container is rotated

Product Recovery

(1) Filter and wash thoroughly
(2) Dry at ambient temperature
(3) Yield: near 100% on Al_2O_3

Product Characterization

XRD: EAB (only phase observed); competing phase: FAU (trace sometimes present) [b]
Elemental Analyses: $(Na_2O)_{0.74}$: $((TMA)_2O)_{0.33}$: Al_2O_3 : 5.74 SiO_2 [c]
Crystal Size and habit: 1-2 μm faceted spherulites [d,e]

Reference

[1] R. Aiello, R. M. Barrer, J. Chem. Soc. A (1970) 1470

Notes

a. Excess cations attributed to SiO^- fragments in the framework.

b. FAU traces were observed from systems with lower TMA/Na ratio and with lower H_2O content.
c. As reported in Ref. [1] for samples obtained both from batches with Na^+/ $(TMA)^+$ = 0.5/0.5 and 0.2/0.8.
d. TMA^+ could not be removed by $NaNO_3$ exchange.
e. By thermal analysis, water is first lost endothermally, followed by exothermal oxidative decomposition of TMA^+.