

KFI

High-Silica KFI

Si(79), Al(21)

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Type Material $K_{18}Sr[Al_{20}Si_{76}O_{192}] \cdot 72 H_2O \cdot (18-C-6)$ (18-C-6 = Cycl. $(C_2H_4O)_6$)

Method T. Chatelain, J. Patarin, R Farré, O. Pétigny, P. Schulz [1]

Batch Composition 2.3 K_2O : 0.1 SrO : Al_2O_3 : 10 SiO_2 : 220 H_2O : 1.0(18-C-6)

Source Materials

distilled water

potassium hydroxide (Prolabo, 86% KOH)

aluminum hydroxide (Fluka, 99+% $Al(OH)_3$)

strontium nitrate (Prolabo >97% $Sr(NO_3)_2$)

silica sol (Dupont Ludox AS-40, 40% SiO_2)

18-C-6 (Lancaster, > 98% cycl. $(C_2H_4O)_6$)

Batch Preparation (for 7 g of as-synthesized product)

- (1) [11.00 g water + 3.00 g potassium hydroxide + 1.57 g aluminum hydroxide], heat to boiling until clear, cool to room temperature and correct weight loss due to boiling^a
- (2) [18.63 g water + 0.22 g strontium nitrate + 2.70 g 18-C-6 + 15.00 g silica soil, stir until homogenized
- (3) [(1) + (2)], mix for 30 mm. (forms a thick gel). Transfer to a 120 mL PTFE-lined stainless steel autoclave. Final pH:14

Crystallization

Vessel: PTFE-lined stainless steel autoclave

Time: 120 hours

Temperature: 150°C in a preheated oven

Agitation: none; final pH: approximately 13

Product Recovery

- (1) Dilute the reaction mixture with distilled water
- (2) Filter and wash until pH ~ 10
- (3) Dry at 60°C overnight
- (4) Yield: Total ~ 7 g of as-synthesized KFI-type sample (product contains 18-C-6 as organic template, ~ one molecule per unit cell^b)

Product Characterization

XRD Highly crystalline KFI; can be indexed with cubic symmetry, $a_0=18.671(1)\text{Å}$ ^b

Elemental Analyses: Si/Al = 3.7^b

Crystal Size and Habit: by SEM, the crystals display a cubic morphology; most of them are aggregated and their sizes range from 2 to 4 μm

Reference

[1] T. Chatelain, J. Patarin, R. Farré, O. Pétigny, P. Schulz, *Zeolites* 17 (1996) 328

Notes

- a. The starting mixture is prepared in a polyethylene vessel.
- b. According to ref. [1].