

## SUZ-4

Si(86), Al(14)

**Contributed by** Geoffrey L Price

**Verified by** M. Cambor, P. Piccione and E. Creighton

**Type Material:**  $K_x(TEA)_{5-x}[Al_5Si_{31}O_{72}] \cdot WH_2O$  (TEA = tetraethylammonium)

**Method:** G. L Price

**Batch Composition** 7.35 K<sub>2</sub>O: Al<sub>2</sub>O<sub>3</sub>:33.3 SiO<sub>2</sub>: 3.10 (TEA)<sub>2</sub>O: 681 H<sub>2</sub>O

### Source Material

distilled, deionized water

potassium hydroxide (Fisher A.C.S. pellets, 86% KOH)

aluminum pellets (Aldrich, 99.99+% Al)

tetraethylammonium hydroxide (Aldrich aqueous solution, 35% TEA-OH)

silica sol (Dupont Ludox AS-40, ammonium stabilized, 40% SiO<sub>2</sub>)

### Batch Preparation (for 13 g dry product)<sup>a</sup>

- (1) [33.98 g water + 6.709 g potassium hydroxide], stir until dissolved
- (2) [(1) + 0.3776 aluminum pellets], stir overnight or until Al pellets dissolve completely in a loosely capped plastic bottle (hydrogen gas evolved)
- (3) [18.226 g tetraethylammonium hydroxide + 35.00 g silica sol + 29.04 g water]. Stir together
- (4) [(2) + (3)], mix well

### Crystallization

Vessel: 200 mL stainless steel autoclave

Temperature: 150°C

Time: 4 days

Agitation: rotated autoclave<sup>a</sup>

### Product Recovery

- (1) Cool to ambient temperature; decant and discard liquid
- (2) Wash with water to pH < 10
- (3) Dry at 100°C
- (4) Yield: near 100% on Al<sub>2</sub>O<sub>3</sub>

### Product Characterization

XRD: strong SUZ-4 [1, 2]; competing phases MOR<sup>b</sup> plus an unidentified phase<sup>c</sup>

Elemental analysis: wt% Si36, Al5.5, K1.5

Crystal size and habit: rods, 0.1 μm dia. x 1 μm long

### References

- [1] S. L Lawton, J. M. Bennett, J. L Schlenker, M. J. Rubin, J. Chem. Soc., Chem. Commun.(1993) 894

- [2] D. B. Lukyanov, V. L. Zholobenko, J. Dwyer, S. A. I. Barri, W. J. Smith, J. Phys. Chem B 103 (1999) 197

**Notes**

- a. This preparation has been successfully scaled up to a one-liter stirred autoclave.
- b. Na<sup>+</sup> level too high.
- c. Produced by inadequate agitation during crystallization. XRD lines observed at 14.0°(2θ) m, 22.8° ms, 28.3 s, 29.8° ms, 30.6 m and 40.9 mw.  
22.8° ms, 28.3 s, 29.8° ms, 30 m and 40.9 mw.