SEW SSZ-82 Si(98), B(2)

Contributed by Christopher M. Lew and Tracy M. Davis

Verified by J. Cejka, F. Rey, A. Khartchenko

Type Material: $(H_2O)_{15.7}[Si_{61.3}B_{4.7}O_{132}]$[a]
(SDA = 1,6-bis(N-cyclohexylpyrrolidinium)hexane dihydroxide)

Method: A. W. Burton, Jr. [1]

Batch Composition: 1 SiO_2 : 0.02 B_2O_3 : 51 H_2O : 0.1 $(SDA^{2+})O$: 0.05 Na_2O

Source Materials deionized
water (DI) fumed silica
(Cabosil M-5)
sodium tetraborate (Sigma-Aldrich)
sodium hydroxide (Fisher, 1N)
1,6-bis(N-cyclohexylpyrrolidinium)hexane dihydroxide (made in-house; 13.46 wt%; purity confirmed by NMR and CHN)

Batch Preparation (for 0.8 g dry product)
(1) Combine 7.28 g DI water, 4.07 g SDA, and 1.06 g sodium hydroxide in a 23 mL Teflon liner; stir for 10 minutes.
(2) Add 0.05 g sodium tetraborate; stir for 10 minutes.
(3) Add 0.80 g fumed silica; mix with a spatula for 10 minutes to homogenize.[b]

Crystallization
Vessel: Teflon-lined stainless steel autoclave
Temperature: 160° C
Time: 21 days[c]
Agitation: 43 rpm (tumbling oven)

Product Recovery
(1) Remove reactor from oven and quench
(2) Filter (with glass-frit funnel) to recover solids
(3) Wash product with ~300 mL DI water
(4) Air dry overnight while pulling vacuum on frit
(5) Dry at ambient temperature or at 80°C
(6) Yield: 0.51 g

Product Characterization
XRD: SEW
Elemental analysis: 59.8 SiO_2 : 1 B_2O_3 [d]
Crystal size and habit: clusters of thin platelet-like crystals
Micropore volume of the sodium-form is 0.16 cc/g by nitrogen adsorption

Reference

[1] A. W. Burton Jr., U.S. Patent 7,820,141 B2 (2010)
[2] D. Xie, L. B. McCusker, and C. Baerlocher, *J. Amer. Chem. Soc.* 133 (2011) 20604

Notes

a. calcined form; from ref. 2
b. pH of the final gel is 13.16
c. adding 5 wt% (to SiO_2) seeds of as-made SEW and increasing the synthesis temperature to 170 °C will reduce the synthesis time to six days
d. as-synthesized; organic content not specified