

MFS

ZSM-57

Si(98), Al (2)

Contributed by Tracy M. Davis and Christopher M. Lew

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

Type Material: $H_{1.5}(AlO_2)_{1.5}(SiO_2)_{34.5}$ ^[1]
(SDA = N,N,N,N',N',N'-hexaethyl-(1,5-pentanediammonium) dibromide)

Method: Similar to references [2-5]

Batch Composition: 1 SiO₂ : 0.017 Al₂O₃ : 40 H₂O : 0.1 (SDA²⁺)O : 0.5 NaO

Source Materials deionized (DI)

water fumed silica

(Cabosil M-5)

aluminum hydroxide (Reheis F2000, 5.20 mmol Al₂O₃/g)

sodium hydroxide (Fisher, 1N)

N,N,N,N',N',N'-hexaethyl-(1,5-pentanediammonium) dibromide (made in-house; purity confirmed by NMR)

Batch Preparation (for 0.61 g dry product)

(1) Combine 2.37 g DI water, 0.43 g SDA, and 5.1 g sodium hydroxide to a 23 mL Teflon liner; mix.

(2) Add 0.619 g fumed silica and 0.032 g aluminum hydroxide; mix with a spatula to homogenize.

(3) Cover and stir for 12 hours at room temperature.^a

Crystallization

Vessel: Teflon-lined stainless steel autoclave

Temperature: 160° C

Time: 7 days

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: 0.47 g

Product Characterization

XRD: MFS

Elemental analysis: 42.7 SiO₂ : 1 Al₂O₃^b

Crystal size and habit: disks of aggregated nano-sized crystallites

Micropore volume of the proton-form is 0.15 cc/g by nitrogen adsorption

Reference

- [1] J.L. Schlenker, J. B. Higgins, E.W. Valyocsik, *Zeolites* 10 (1990) 293
- [2] S. Ernst, J. Weitkamp, in: G. Ohlmann (Ed.), *Catalysis and Adsorption by Zeolites*, Elsevier Science Publishers B.V., Amsterdam, 1991, p. 645
- [3] S.-H. Lee, D.-K. Lee, C.-H. Shin, W.C. Paik, W.M. Lee, S.B. Hong, *J. Catal.* 196 (2000) 158
- [4] S.-H. Lee, C.-H. Shin, G.J. Choi, T.-J. Park, I.-S. Nam, B. Han, S.B. Hong, *Microporous Mesoporous Mater.* 60 (2003) 237
- [5] E.W. Valyocsik, N.M. Page, C. T.-W. Chu, US Patent 4 873 067, to Mobil Oil Corporation

Notes

- a. pH of the final gel after crystallization is 12.35
- b. as-synthesized; organic content not specified