

IMF

IM-5

Si(93), Al(7)

Contributed by Suk Bong Hong

Verified by J. Rimer, T. Okubo, W. Chaikittisilp

Type Material: $\text{Na}_{5.9}(\text{SDA})_{13.1}[\text{Al}_{21.1}\text{Si}_{266.9}\text{O}_{576}] : w \text{ H}_2\text{O}$
(SDA = 1,5-bis[*N*-methylpyrrolidinium]pentane (1,5-MPP))

Method: S.-H. Lee, D.-K. Lee, C.-H. Shin, Y.-K. Park, P. A. Wright, W. M. Lee, S. B. Hong [3]

Batch Composition: 4.5 (1,5-MPP) : 11.0 Na_2O : 1.0 Al_2O_3 : 30 SiO_2 : 1200 H_2O

Source Materials

deionized water

1,5-MPP dibromide^a

sodium hydroxide (Aldrich, 50% NaOH solution)

aluminium nitrate nonahydrate (Junsei, 98%, $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$)

silicon dioxide (Degussa Aerosil 200 or Cabot Cab-O-Sil M5)

Batch Preparation (for 3 g dry product)

- (1) [58.31 g water + 1.09 g aluminium nitrate nonahydrate + 5.03 g sodium hydroxide (50% solution)], stir until dissolved
- (2) [(1) + 5.14 g silica], mix thoroughly and stir for 30 minutes
- (3) [(2) + 5.25 g 1,5-MPP dibromide], stir for 24 hours^b

Crystallization

Vessel: Teflon-lined stainless steel autoclave

Temperature: 160 °C

Time: 14 days

Agitation: 100 rpm

Product Recovery

- (1) Dilute reaction mixture with water
- (2) Filter and wash with water
- (3) Dry at ambient temperature or at 90 °C
- (4) Yield: 3.1 g

Product Characterization

XRD: IMF; competing phase: ANA (when $\text{NaOH}/\text{SiO}_2 > 1.00$)

Elemental analysis: $\text{SiO}_2/\text{Al}_2\text{O}_3 = 25.3$ [3]

Crystal size and habit: needle-like crystallites of approximately 0.6–1.0 μm in length and less than 0.1 μm in diameter

References

- [1] E. Benazzi, J.L. Guth, L. Rouleau, PCT WO 98/17581, 1998
- [2] E. Benazzi, J.L. Guth, L. Rouleau, US Patent 6,136,290, 2000

- [3] S.-H. Lee, D.-K. Lee, C.-H. Shin, Y.-K. Park, P. A. Wright, W. M. Lee, S. B. Hong, *J. Catal.* 215 (2003) 151

Notes

- a. template preparation procedure is given in [3].
- b. pH of the final gel is 12.8.