

CHA

SAPO-44

Al(48), P(34), Si(18)

Contributed by S. Ashtekar, S. V.V. Chilukuri and D. K. Chakrabarty

Verified by A. Prakash and He Chang-Qing

Type Material 5.0 (C₆H₁₁NH₂) [Si_{6.5}Al_{17.3}P_{12.2}O₇₂] wH₂O^a

Method S. Ashtekar, S. V.V. Chilukuri, D. K. Chakrabarty [1]

Batch Composition Al₂O₃:1.0 P₂O₅:1.0 SiO₂:1.9 R : 63 H₂O^b (R = cyclohexylamine)

Source Materials

distilled water
orthophosphoric acid (85% H₃PO₄)
pseudoboehmite (Catapal-B, Vista, 70% Al₂O₃)
cyclohexylamine (99+%)
fumed silica (99+% SiO₂)

Batch Preparation (for 16 g product)

- (1) [90 g water + 34.59 g orthophosphoric acid + 21.86 g pseudoboehmite, mix thoroughly
- (2) [60 g water + 28.27 g cyclohexylamine + 9 g fumed silica], mix thoroughly
- (3) [(1) + (2)], mix thoroughly with vigorous agitation

Crystallization

Vessel: stainless steel autoclave
Temperature: 190°C
Time: 48 hours
Agitation: none

Product Recovery

- (1) Filter and wash with distilled water
- (2) Dry at 110°C
- (3) Yield near 100% on Al₂O₃

Product Characterization

XRD: CHA; competing phase: SAPO-5 (when gel C₆H₁₁NH₂/Al₂O₃ ratio < 1.9)
Elemental Analysis: (Si_{0.18}Al_{0.48}P_{0.34})O₂^a
Crystal Size and Habit: cubical morphology with 10-50 μm diameter [1]

Reference

- [1] S. Ashtekar, S. V. V. Chilukuri, D. K. Chakrabarty, J. Phys. Chem. 98 (1994) 4878

Notes

- a. Cations assumed to be protonated amine or surface hydroxyl.
- b. H₂O includes water from pseudoboehmite and orthophosphoric acid.