

MTW

ZSM-12

Si(97), Al(3)

Contributed by Girolamo Giordano

Verified by Nguyen Huu Phu, A. Souza de Araujo and G. Kuhl

Type Material $\text{Na}_{0.5}(\text{MTEA})_{1.3}[\text{Al}_{0.8}\text{Si}_{27.2}\text{O}_{56}] : 0.6 \text{ H}_2\text{O}$ (MTEA = methyltriethylammonium)

Method S. Ernst, P. A. Jacobs, J. A. Martens, J. Weitkamp [1], P. Chu, G. H. Kuhl [2]

Batch Composition 10 Na_2O : Al_2O_3 :100 SiO_2 :2000 H_2O : 20 MTEABr

Source Materials

distilled water
sodium hydroxide (Carlo Erba RPF, 99+% NaOH)
aluminum hydroxide hydrate $[\text{Al}(\text{OH})_3]$ (Aldrich)
methyltriethylammonium bromide [MTEA Br] (Fluka)
precipitated silica (BDH, 99+% SiO_2)

Batch Preparation (for ~2.5 g product)

- (1) [9 g distilled water + 0.4 g sodium hydroxide + 0.078 g aluminum hydroxide hydrate], stir until dissolved
- (2) [9 g distilled water + 1.96 g MTEA Br], stir until dissolved
- (3) [(1)+ (2)], stir until homogenized
- (4) [(3) + 3 g precipitated silica], stir for 1 hour at room temperature and seal in the reactor

Crystallization

Vessel: Teflon-lined autoclave, 20 mL
Time: 6 days
Temperature: 140°C
Agitation: none

Product Recovery

- (1) Cool to room temperature and filter to recover solids
- (2) Wash with distilled water until filtrate pH = 9
- (3) Dry at 105°C

Product Characterization

XRD: MTW only crystalline phase; competing phases: MFI (high alumina), cristobalite (high temperature or high pH)
Elemental Analyses: 0.66 Na_2O : Al_2O_3 : 66.7 SiO_2 : 1.5 H_2O : 1.58 $(\text{MTEA})_2\text{O}$
Crystal Size and Habit: rice-grain shaped, length 5 μm

References

- [1] S. Ernst, P. A. Jacobs, J. A. Martens, J. Weitkamp, Zeolites 7 (1987) 458
- [2] P. Chu, G. H. Kuhl, US Patent 4452 769 (1983)
- [3] A. Katovic, G. Giordano, Chem. Express 6 (1991) 969

Note

- a. MTW zeolite can also be obtained when tetraethylammonium bromide (TEA Br) substitutes for MTEA Br in the hydrogel described in the Batch Composition section. In this case spheroidal crystals of about 0.6 μm diameter are obtained. [3]