MER Linde W Si(65), Al(35)

Contributed by Karl Strohmaier

Verified by P. Piccione and Huann-Jih Lo

Type Material $K_{11}Al_{11}Si_{21}O_{64} \cdot 20H_2O$

Method R M. Milton [1]

Batch Composition 3 K_2O : 0.05 Na_2O : Al_2O_3 : 5 SiO_2 : 100 H_2O

Source Materials

deionized water
potassium hydroxide (J. T. Baker, 87.6% KOH)
alumina (Alcoa C-31, 65% Al_2O_3)
colloidal silica (duPont Ludox HS-40, 40% SiO_2) [a]

Batch Preparation (for 15 g dry product)

(1) [20 g water + 12.4 g potassium hydroxide + 5.0 g alumina], heat to a gentle boil with stirring until clear. Cool to room temperature and add water to attain the original weight
(2) [24.2 g colloidal silica + 18.5 g water + (1)]. Add components sequentially with mixing in a beaker [b]

Crystallization

Vessel: 125 Teflon-lined autoclave (Parr #4748 acid digestion bomb)
Time: 48 hours
Temperature: 150˚C [c]
Agitation: None

Product Recovery

(1) Vacuum filter on a Buechner funnel
(2) Wash to pH < 10
(3) Dry at 110˚C
(4) Yield 15 g, near quantitative on Al_2O_3

Characterization

XRD excellent MER, unit cell dimensions (space group I4/*mmm* - No. 139) a = 14.15 Å, c = 10.03 Å
Elemental Analyses: K_2O : Al_2O_3 : 3.66 SiO_2
Crystal size and Habit: barbell-shaped aggregates (40-50 μm long and 20-30 μm dia.) of needle-like crystals.

Reference

[1] R M. Milton, US Patent 3 012 853 (1961)

Notes

a. Available from Aldrich or Alpha.
b. Solution gels in about 5 minutes.
c. If mixture is crystallized at 100°C, a mixture of chabazite and Linde W is made.