Contributed by Thomas R Gaffney

Verified by J. Warzywoda, J. Cejka and Liu Xinjin

Type Material $\text{K}_{11}[\text{Al}_{11}\text{Si}_{25}\text{O}_{72}]:40\ \text{H}_2\text{O}$

Method M. Bourgogne, J.-L Guth, R Wey [1]

Batch Composition $0.17\ \text{Na}_2\text{O}: 2.0\ \text{K}_2\text{O}: \text{Al}_2\text{O}_3: 5.18\ \text{SiO}_2: 224\ \text{H}_2\text{O}$

Source Materials
demineralized water
potassium hydroxide (J. T. Baker reagent grade, 45% KOH solution)
(Na,H) Zeolite Y (UOP LZY-64)$^a$

Batch Preparation (for 25 g dry product)
(1) $[198.2\ \text{mL water} + 26.8\ \text{mL KOH (45% solution)}, \text{mix}$
(2) $[(1) + 25.0\ \text{g Zeolite Y}], \text{seal in a polypropylene bottle and shake for 30 s}$

Crystallization
Vessel: polypropylene bottle with a screw-top lid
Temperature: 95$^\circ\text{C}$ (steam chamber)
Tune: 96 hours
Agitation: none

Product Recovery
(1) Remove bottle from the steam chamber and filter to recover solids while still hot $^b$
(2) Wash two times with 500 mL water per wash
(3) Dry at ambient temperature $^c$
(4) Yield: 99% based on alumina, 83% based on silica

Product Characterization
XRD: CHA with no reflections from FAU. Competing phases; FAU when insufficient crystallization times are used $^d$
Elemental Analysis: 0.02 Na$_2$O : 0.98 K$_2$O : Al$_2$O$_3$ : 4.32 SiO$_2$ (dry basis)$^e,f$
Crystal Size and Habit: Sub-micron crystallites, 0.1 um on average, multifaceted
(some can be seen to be hexagonal platelets)

Reference

Notes
a. The Na/Al ratio of the NaHY starting materials should be less than 0.17. LZY-64 was prepared by heating NH$_4^+$ exchanged type Y to 550°C (at 20°C/minute) and calcining at 550°C for 2 hours. Caution: ammonia is liberated during the calcination. Use adequate ventilation and safety precautions.
b. pH = 13.5 after crystallization treatment.
c. The product is stable to drying in an oven at 110°C.
d. Converting samples of Zeolite Y which contain large crystals or are formed (pelleted, beaded) to chabazite requires longer reaction times.
e. The framework SiO₂/Al₂O₃ is 4.32 by ²⁹Si NMR.
f. For preparing more siliceous product, Nalco 2326 silica (14.5% SiO₂) was used as the silica source. Synthetic chabazite with SiO₂/Al₂O₃ = 5.3 forms from a reaction mixture of composition: 0.17 Na₂O : 4.31 K₂O : Al₂O₃ : 8 SiO₂ : 500 H₂O. Addition of more silica to the reaction mixture (batch SiO₂: Al₂O₃> 8) leads to incomplete conversion of Zeolite Y, and the product is a mixture of CHA and FAU.