KFI ZK-5 Si(75), Al(25)

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Type Material: $Cs_{16}K_{10}[Si_{70}Al_{26}O_{192}]$

Method Citation Harry E. Robson [1]

Batch Composition Al_2O_3 : 10 SiO_2 : 2.4 K_2O : 0.6 Cs_2O : 80 H_2O

Source Materials
deionized water
potassium hydroxide (KOH, Sigma-Aldrich, 90%)
cesium hydroxide solution (CsOH 50% wt, Sigma-Aldrich, 99%)
aluminum hydroxide ($Al(OH)_3$, 99%)
silica (SiO_2 Ludox ® HS-40, Sigma-Aldrich, 40% wt)

Batch Preparation (for 3.0 g product)
(1) [2.24 g water + 1.5 g KOH], stir until dissolved
(2) [(1) + 0.78 g $Al(OH)_3$], stir under heating (90 °C) until dissolved
(3) [(2) + 1.8 g CsOH solution], stir until dissolved
(4) [(3) + 7.5 g silica], mix thoroughly for 10 min then transferred to a Teflon-lined autoclave

Crystallization
Vessel: Teflon-lined autoclave
Time: 6 days
Temperature: 100°C
Agitation: none

Product Recovery
(1) Centrifuge at 20,000 rpm for 20 minutes and remove the decanting water
(2) Add deionized water and sonicate to redisperse the solid material
(3) Repeat (1) and (2) until the decanting water's pH is below 8–9
(4) Dry at 90°C
(5) Yield: 2.85 g, close to 95%

Product Characterization
XRD: KFI
Competing phases: no
Elemental Analysis: $Cs_{16}K_{10}[Si_{70}Al_{26}O_{192}]$. Si/Al = 2.70
Crystal Size and Habit: spherical with a particle size of 500 nm, composed of nanoparticles ranging from 20 to 50 nm.

References
Robson, H. Method for Preparing a Small Pore Synthetic Zeolite. US3720753A, March 13, 1973.

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