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Type Material: \( \text{K}_{24}\text{Al}_{24}\text{Si}_{8}\text{O}_{216} \cdot x\text{H}_2\text{O} \cdot y\text{R}^{[1]} \)
\( \text{SDA} = 1,4\text{-dimethyl-1,4-diazabicyclo[2.2.2]octane dihydroxide} \)

Method: J.B. Higgins and K.D. Schmitt [1]

Batch Composition: 1 SiO₂ : 0.068 Al₂O₃ : 29.5 H₂O : 0.06 \( \text{SDA}^{2+} \)O : 0.365 K₂O

Source Materials
- deionized water (MilliQ quality from Millipore)
- fumed silica (Aldrich)
- aluminum hydroxide (Reheis F2000, 5.20 mmol Al₂O₃/g or from Aldrich, 57% Al₂O₃)
- potassium hydroxide (Aldrich, 90 wt.% diluted with water to 20 wt%)
- 1,4-dimethyl-1,4-diazabicyclo[2.2.2]octane dihydroxide (made in-house; 10 wt% or 1.135 N; purity confirmed by NMR and CHN)

Batch Preparation (for 1.351 g dry product)
1. Combine 10.535 g MilliQ water, 8.176 g potassium hydroxide (20 wt.%), and 0.487 g aluminum hydroxide in a 50 ml polypropylene closed vial. The mixture was stirred using a magnetic bar for 15 min.
2. Add 2.402 g fumed silica; magnetically mixed to homogenize.
3. Add 4.227 g SDA solution; magnetically mixed to homogenize.
4. Cover and magnetically stir for 3 days at room temperature.\(^a\)

Crystallization
- Vessel: Teflon-lined stainless steel autoclave
- Temperature: 100° C
- Time: 15 days
- Agitation: 60 rpm (tumbling oven)

Product Recovery
1. Remove reactor from oven and quench
2. Filter (with glass-frit funnel) to recover solids
3. Wash product with ~300 mL DI water
4. Dry in an oven at 100° C
5. Yield: 1.351 g

Product Characterization
XRD: MOZ
Elemental analysis: 7.5 SiO₂ : 1 Al₂O₃ \(^c\)
Crystal size and habit: Aggregates of poorly faceted nano-sized crystallites
Micropore volume of calcined potassium-form is 0.12 cc/g by nitrogen adsorption
Reference

Notes
a. pH of the initial gel is 13.1 and the pH of the final gel after crystallization is 12.7.
b. as-synthesized; organic content not specified.