

Contributed by Hussein Awala

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Type Material: Na₈₈ [Al₈₈ Si₁₀₄O₃₈₄] w:H₂O (w ~220)

Method: H. Awala, J-P. Gilson, R. Retoux, P. Boullay, J-M. Goupil, V. Valtchev, S. Mintova [1]

Batch Composition: 9 Na₂O : 1.1 Al₂O₃ : 10 SiO₂ : 122 H₂O

Source Materials

aluminum powder (325 mesh, 99.5 %, Alfa Aesar)
sodium hydroxide (Sigma-Aldrich, 97 %)
silica sol (Ludox-HS 30, 30 wt. % SiO₂, pH=9.8, Aldrich)
distilled water

Batch Preparation

- (1) [2.5 g of NaOH, 3 g dd H₂O, 0.297 g aluminum powder]
- (2) [10 g colloidal silica, 1.1 g NaOH and 1 g dd H₂O]
- (3) [(1) drop wise added to (2); mixing of 1 and 2 in ice bath], stirring and aging for 24 h^a
- (4) Freeze dried, in order to adjust the water content

Crystallization

Vessel: polypropylene bottle
Temperature: 50 °C
Time: 24 h

Product Recovery

- (1) Centrifugation (25 000 rpm, 4h) and washing with dd water till pH=7
- (2) Freeze-dried the final products
- (3) Yield: about 80 %

Product Characterization

DLS: mono-dispersed particles, average particle size of 10 nm
XRD: FAU
TEM: octahedral morphology
Elemental analysis: ICP (Inductively Coupled Plasma) and (TEM-EDX): Si/Al ~ 1.1

References

- [1] H. Awala, J-P. Gilson, R. Retoux, P. Boullay, J-M. Goupil, V. Valtchev, S. Mintova, Nat Mater. 14 (2015) 447

Notes

- a. Clear solution is obtained