

CAN

Cancrinite

Si(50), Al(50)

Contributed by J.-Ch. Buhl

Verified by C. Williams and M. Bottale

Type Material $\text{Na}_8[\text{AlSiO}_4]_6\text{CO}_3 \cdot 4\text{H}_2\text{O}$

Method J.-Ch. Buhl [1]

Batch Composition 93 Na_2O : Al_2O_3 : 2 SiO_2 : 10 NaHCO_3 : 1386 $\text{H}_2\text{O}^{\text{a}}$

Source Materials

distilled water

sodium hydroxide (Merck pellets, analytical grade)

kaolin (Fluka)

sodium bicarbonate (Merck, analytical grade, NaHCO_3)

Batch Preparation (for 0.6 g product)

(1) [45 mL water + 14.4 g sodium hydroxide], stir until dissolved

(2) [(1) + 0.5 g kaolin + 1.7 g sodium bicarbonate], mix until uniform slurry

Crystallization

Vessel: Teflon-lined steel autoclave

Temperature: 200 °C

Time: 48 hours

Agitation: none

Product Recovery

(1) Cool to ambient temperature. Filter

(2) Wash free of NaOH residuals (approximately 150 mL water)

(3) Dry at 80 °C

(4) Yield: close to 100%

Product Characterization

XRD: CAN; small amounts of a disordered phase between CAN and SOD and amorphous material could be detected in the polycrystalline sample [1,2]

Elemental Analysis: $\text{Na}_8[\text{AlSiO}_4]_6\text{CO}_3 \cdot 4\text{H}_2\text{O}^{\text{b}}$

Crystal Size and Habit: small elongated needles

References

[1] J.-Ch. Buhl, *Thermochimica Acta* 178 (1991) 19

[2] G. Hermeler, J.-Ch. Buhl, W. Hoffmann, *Catalysis Today* 8 (1991) 415

[3] C. Liu, S. Li, K. Tu, R Xu, *J. Chem. Soc., Chem. Commun.* (1993) 1645

Notes

a. CAN-formation in the water-free system is reported using butane-1,3-diol. [3]

- b. Analysis of the guest anions according to the combination of simultaneous thermal analysis (TG, DTG, DTA), IR-spectroscopy and MAS NMR (^{13}C).
- c. Single crystals can be prepared from a gel consisting of [50 mg kaolin (heated at 1400°C for two hours) + 168 mg NaHCO_3 + 320 mg NaOH + 1 mL distilled water] treated at 500°C for 48 hours in a silver-lined steel autoclave.