



>>Entry Name: Sodium carbonate (Na₂CO₃)

ENTRY UNDER REVIEW

Synonym(s): Carbonic acid disodium salt, 8Cl. Soda ash

CAS Registry Number: 533-96-0

Extra CAS Registry Numbers(s): 497-19-8 7542-12-3

Na₂CO₃

Molecular Formula: CNa₂O₃

Molecular Weight: 105.989

Accurate Mass: 105.964279

Percentage Composition: C 11.33%; Na 43.38%; O 45.29%

Source/Synthesis: Manuf. by the Solvay process in which aq. NaCl is converted by reaction with CO₂ and NH₃, into NaHCO₃ which is calcined to give Na₂CO₃. Alternatively produced by thermal dec. of the mineral trona, Na₂CO₃·NaHCO₃·2H₂O

Use/Importance: Commercially available. Used in the paper pulp, soap and detergent industries; its principal application is as raw material for the production of glass.

Important industrial chemical, 11th in order of volume for USA in 1994 (production 10.28 million tons/year)

Physical Description: White monoclinic powder, hygroscopic. Dec. on heating by CO₂ loss. Undergoes monoclinic (β) to monoclinic (α) transition at 361° and monoclinic (β) to hexagonal (α) transition at 489°

Melting Point: Mp 850°

Solubility: V. sol. H₂O (7.1 g per 100 cm³ at 0°; 46 g per 100 cm³ at 100°); spar. sol. EtOH; insol. Me₂CO

Other Data: ΔH_f^o -1130.8 kJ mol⁻¹; ΔG_f^o -1048.0 kJ mol⁻¹; S^o 138.8 JK⁻¹ mol⁻¹

Hazard & Toxicity: Irritant

>>Derivative: Monohydrate

>>Derivative: Heptahydrate

>>Derivative: Decahydrate

References:

Aldrich Library of FT-IR Spectra, 1st edn., 1985, **1**, 545A; **2**, 1272C, (*ir*)

Vratny, F. *et al.*, *Appl. Spectrosc.*, 1960, **14**, 76, (*Raman*)

Jardetzky, O. *et al.*, *J.A.C.S.*, 1960, **82**, 318, (*Na-23 nmr*)

Buijs, K. *et al.*, *Spectrochim. Acta*, 1961, **17**, 927, (*ir*)

Kirk-Othmer Encycl. Chem. Technol., 2nd edn., Wiley, 1963, **18**, 458, (*rev, uses*)

Brouns, E. *et al.*, *Acta Cryst.*, 1964, **17**, 614, (*cryst struct*)

Gmelin Handbook Inorg. Chem., Syst. No. 21, 1964, **1**, 267; 1966, **3**, 1317, (*rev, bibl*)

Clough, R.W., *Handb. Ind. Chem.*, 7th. Ed., 1974, 123, (*rev, uses*)

Chase, M.W. *et al.*, *J. Phys. Chem. Ref. Data*, 1985, **14**, 623, (*thermochem data*)

Sigma-Aldrich Library of Chemical Safety Data, 1988, **2**, 3134D, (*haz*)

Encyclopedia of Food and Color Additives, (ed. Burdock, G.A.), CRC Press, 1997, 2535-2536

Lewis, R.J., *Sax's Dangerous Properties of Industrial Materials*, 8th edn., Van Nostrand Reinhold, 1992, SFO000