Synthesis and Characterisation of Na₅[CoO₂]CO₃

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Dedicated to Professor Albrecht Mewis on the occasion of his 60th birthday

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Na₅[CoO₂]CO₃ was prepared via the azide/nitrate route. Stoichiometric mixtures of the precursors (Co₃O₄, NaN₃, NaNO₃ and Na₂CO₃) were heated in a special regime up to 500 °C and annealed at this temperature for 50 h in silver crucibles. Single crystals have been grown by subsequent annealing of the powder at 500 °C for 2000 h in silver crucibles, which were sealed in glass ampoules under dry Ar. According to the X-ray analysis of the crystal structure (P4/mmm, Z = 1, a = 4.6467(4), c = 8.2577(6) Å), Na₅[CoO₂]CO₃ is isomorphous with Na₅[NiO₂]CO₃ and contains Co¹⁺, which is coordinated by two oxygen atoms forming a dumb-bell. Na₅CoCO₅ decomposes at 600 °C to Na₃CoO₂ and Na₂CO₃.

Key words: Cobalt(I), Crystal Structure, Azide/Nitrate Route