

Studies on the Formation of Some Borocitrates

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The formation of borotartarates and boromalates has been studied in some details but no work on borocitrate has been reported in the literature.

Palme¹ prepared a complex compound by adding boric acid to tartaric acid and Herg² observed that one molecule of boric acid combines with two of tartaric acid. Shvares and Ivins³ obtained two complex ions $[\text{BO}_2\text{C}_4\text{H}_4\text{O}_6]^{3-}$ and $[\text{BO}_22\text{C}_4\text{H}_4\text{O}_6]^{2-}$ by the interaction of boric and tartaric acids. The formation of these complexes was also confirmed by studying transference number and by cryoscopic measurements. Darmois⁴ and Jones⁵ studied the formation of borotartarates and boromalates by physico-chemical methods. Kolthoff⁶ observed that boric acid forms complex compounds with organic hydroxy acids. Ploquin⁷ attributed the increase in antifungal action of boric acid in the presence of oxalates to the formation of borooxalic complex which is stable in alkaline media.

EXPERIMENTAL

Isolation of the compounds: Solutions of boric acid and citric acid were mixed together in the molar ratio of 1:1 and calculated amount of sodium hydroxide added to it. The mixture was heated to boiling and cooled. On adding alcohol a liquid product was obtained, which was separated with a separating funnel. On adding an excess of alcohol to this liquid a crystalline substance was obtained. Potassium salt was obtained by a similar procedure using potassium hydroxide instead of NaOH. Aqueous solution of sodium salt on treatment with $\text{Pb}(\text{NO}_3)_2$, AgNO_3 , $\text{Hg}(\text{NO}_3)_2$, $\text{Th}(\text{NO}_3)_4$, $\text{Ce}(\text{NO}_3)_3$ and $\text{Sm}(\text{NO}_3)_3$ gave corresponding borocitrates. Barium and strontium salts were obtained by adding BaCl_2 and SrCl_2 solution to sodium borocitrate and warming, calcium salt was prepared by boiling a mixture of CaCl_2 and sodium borocitrate solutions.

Analysis: Sodium and potassium were estimated using a flame photometer and other metals by standard methods, and alcohol and water by heating the compounds to constant weight at 80°C and 120°C respectively. In a few cases carbon and hydrogen were estimated by micro-combustion method.

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