

Complexation of Beryllium(II) by Maleic and Succinic Acid

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Dedicated to Professor H. Nöth on the occasion of his 70th birthday

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Beryllium(II), Maleic Acid, Succinic Acid, X-Ray Data

Beryllium succinate dihydrate $[\text{Be}(\text{C}_4\text{H}_4\text{O}_4)](\text{H}_2\text{O})_2$ is formed in the reaction of equimolar quantities of beryllium sulfate, succinic acid and barium hydroxide in aqueous solution at pH 3.2. Sodium, potassium, and ammonium bis(succinato)beryllates $\text{M}_2[\text{Be}(\text{C}_4\text{H}_4\text{O}_4)_2]$ are obtained using the same reagents in the molar ratio 1:2:1 and adjusting the pH to 6.3–6.5 with NaOH, KOH or concentrated aqueous ammonia, respectively. The corresponding potassium bis(maleato)beryllate is prepared similarly and obtained as a crystalline monohydrate, the structure of which has been determined by X-ray methods. The lattice contains spiro-bicyclic dianions with the Be atom chelated by two dicarboxylate ligands. The compounds undergo slow hydrolysis in water as shown by time- and pH-dependent ^9Be NMR spectroscopy. In the neutral region (pH 6.5–6.9) the maleinato complexes are in an equilibrium with trinuclear compounds $\text{M}_3\{[\text{Be}(\text{C}_4\text{H}_2\text{O}_4)\text{OH}]_3\}$ as the predominating species, while in acid solution (at pH 1.3) only the aquo complex $[\text{Be}(\text{H}_2\text{O})_4]^{2+}$ remains. In the intermediate pH region various complexes of the above types coexist, with only very slow ligand exchange (on the NMR time scale).

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