

ABSTRACT

The structure of the thiosulphatopentamminecobalt(III) complex ion and some aspects of redox processes in acidopentamminecobalt(III) complexes are discussed.

Some properties of the tetrathionate ion and of thiosulphatopentamminecobalt(III) nitrate were investigated. The data obtained showed that in acid media, $\text{Co}(\text{NH}_3)_5\text{S}_2\text{O}_3^+$ decomposes by a redox process. Kinetic studies showed that in acetic acid - sodium acetate buffer of pH 5.6, the decomposition is of first order, and similar to the intramolecular electron-transfer reactions which occur when $\text{Co}(\text{NH}_3)_5\text{NO}_2^{2+}$ and $\text{Co}(\text{H}_2\text{O})_6^{3+}$ decompose in acetic acid - sodium acetate buffer, and in perchloric acid respectively. The kinetic data also showed that the rate of decomposition decreases as the acid concentration is increased and that the reaction is autocatalysed at the higher acid concentrations.

The kinetics of the reaction between $\text{Co}(\text{NH}_3)_5\text{S}_2\text{O}_3^+$ and the hydroxide ion were studied and there was evidence that simultaneous base substitution and redox reactions occur. High values were obtained for the Arrhenius parameters of the base substitution reaction and the effect of the ionic strength of the medium was as expected on the basis of the Bronsted-Bjerrum theory

of the primary salt effect.