KINETIC PARAMETERS OF THERMAL DECOMPOSITION OF ANISALDEHYDE-GIRARD T COMPLEXES OF COBALT AND COPPER BROMIDES FROM TG AND DSC DATA

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The kinetic parameters relating to the thermal decompositions of the Co(II) and Cu(II) hydrazone complexes of general formula [ML₂Br₂]Cl₂, where L = anisaldehyde-Girard T cation: CH₃OC₆H₄CH = N–NHCOCH₂–N(CH₃)₂, and M = Co(II) or Cu(II), were evaluated from TG and DSC data. The thermal stabilities of the cobalt and copper complexes are discussed.

In a continuation of studies [1–3] on the hydrazone complexes of Girard T (carbohydrate methyl trimethyl-ammonium chloride), the present work is concerned with the anisaldehyde-Girard T complexes of cobalt and copper bromides. It has been shown that these hydrazone ligands undergo bidentate coordination, in keto or enol form, via azomethine and carbonyl groups. The structures of these complexes can be represented as follows:

\[
\begin{array}{c}
\text{HN} \quad \text{C} \quad \text{CH}_2 \quad \text{N(CH}_3)_3 \\
\text{CH}_3\text{O} \quad \text{C}_6\text{H}_4 \quad \text{CH} = \text{N} \\
\text{Br} \quad \text{M} \quad \text{Br} \\
\text{O} \quad \text{N} = \text{CH} \quad \text{C}_6\text{H}_4 \quad \text{OCH}_3 \\
(\text{CH}_3)_3 \quad \text{N} \quad \text{H} \quad \text{C} \quad \text{C} \quad \text{N} \quad \text{H}
\end{array}
\]

2 Cl⁻

The present paper describes the calculation of the kinetic parameters of thermal decomposition of these complexes: the order of the reaction (n), the preexponential factor (A) and the activation energy (Ea). Such values are determined from

\[2 \text{Cl}⁻\]
corresponding TG and DSC data by using the methods of Coats and Redfern [4], Chatterjee [5], Kissinger [6] and Ozawa [7]. The object of this work was to examine the effect of the central metal ion on the thermal stability of the complex.

**Experimental**

The anisaldehyde-Girard T ligand was prepared with the general method [8]. The complexes were prepared by addition of the metal bromide solution in absolute ethanol to twice its equivalent of the ligand (in the same solvent) and the mixture was refluxed on a water bath for half an hour. The complexes formed were filtered off, washed several times with ethanol and vacuum-dried over anhydrous calcium chloride. The solid complexes obtained gave satisfactory analytical results. The TG/DTG/DTA data were obtained with a Setaram (1600 °C) GDTA 16 system. Sample masses were in the range 16.5 ± 0.2 mg and the heating rate was 5.5 deg/min. Decompositions were carried out in a platinum crucible. Alumina was used as a reference standard under identical conditions. The DSC data were

![Graph](image)

**Fig. 1** Determination of the reaction order for the thermal decomposition of [CoL₂Br₂] by the Coats-Redfern method using TG data.

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