THERMAL DECOMPOSITION OF Cu(II) COMPLEXES WITH SALICYLALDEHYDE S-METHYL THIOSEMICARBAZONE

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Abstract

The thermal decomposition of copper(II) complexes with salicylaldehyde S-methylthiosemicarbazone of general formula Cu(HL)X.nH₂O (X = Py + NO₃, NCS, 0.5SO₄) and [Cu(L)NH₃]·H₂O was investigated in air atmosphere in the interval from room temperature to 1000°C. Decomposition of the complexes occurred in several successive endothermic and exothermic processes, and the residue was in all cases CuO.

Introduction

Copper(II) complexes with salicylaldehyde S-methylthiosemicarbazone, H₂L, the subject of the present study, were synthesized earlier [1, 2]. They can be represented as Cu(HL)X·nH₂O, where X = Py + NO₃, NCS, 0.5SO₄ and [Cu(L)NH₃]·H₂O.

All complexes are paramagnetic, and possess a square-planar configuration. In the cases when the synthesized complexes formed satisfactory monocrystals, their X-ray analysis was carried out [2, 3]. In this way, the postulated coordination was confirmed, and interatomic distances and angles were explicitly determined.

The results of studies of the complexes by electron spectroscopy have been presented in [4]. The obtained diffusion - reflection spectra were interpreted in accordance with the D₄h point group, which can be ascribed to the central ion surroundings. Spectral maxima were related to d–d and intraligand transitions, and also to charge-transfer transitions.

We have now undertaken a study of the thermal decomposition of these complexes, and the results are presented in this article.
Experimental

Thermogravimetric measurements were carried out on a Paulik-Paulik-Erdey derivatograph in air atmosphere, employing $\alpha$-$\text{Al}_2\text{O}_3$ as a standard. The mass of the samples was 100 mg and the heating rate was 10 deg-min$^{-1}$.

Analysis of the final product was carried out with an automatic PW 1373 (Philips) powder diffractometer and by means of ASTM data.

Results and discussion

Figures 1–4 present thermal decomposition curves for the investigated compounds.

It can be seen that the decomposition processes of the investigated complexes proceed with several analogous endothermic and exothermic effects. For the water-containing complexes, the first endothermic effect corresponds to water elimination. The endothermic effect observed for Cu(L)NH$_3$ at 403 K is

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