Synthesis and Thermal Decomposition Studies of Some Isonaphthazarin Chelates of Transition Metals

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Isonaphthazarin is an important hydroxy derivative of 1,4-naphthoquinone which possesses powerful chelating ability, appreciable analytical utility and remarkable biological activity. Although it is an important isomer of naphthazarin, relatively much less work on its metal chelates has been reported as compared to naphthazarin.

As a part of some detail investigations of the coordination chemistry of isonaphthazarin, transition metal chelates of Mn(II), Fe(II), Co(II), Ni(II) and Cu(II) have been synthesized. These chelates have been characterized on the basis of elemental analysis and thermogravimetry. All the chelates are intense blue colored with different shades possessing molecular composition corresponding to (M (L) $(H_2O)_2$)n.

The thermogravimetric measurements have been carried out in the temperature range 0 to 900^0C. The thermograms (TG / DTA) are recorded in air on Metler Toledo 851 model USA using about 2.5 to 10 mg sample with heating rate of 10 ^{0}C per minute.

An examination of the thermogravimetric patterns of these chelates indicates that, they decompose in gradual manner in contrast to the sharp decomposition of the corresponding ligand molecule. For Mn (II) and Cu (II) chelates, three step degradation, while for Fe (II), Co(II) and Ni (II) chelates two step degradation is exhibited. The lower decomposition temperatures (325-480) ^{0}C indicate that the polymeric network in less stable. The procedural decomposition temperatures follow the sequence;

Ni > Co > Fe > Mn > Cu

The kinetic parameters are calculated from TG curves using Coats and Redfem's expression. Activation energy (Ea) for these chelates lies in the range (30-70) kJ /mol. The order of reaction (n) observed is almost same (0.905-0.995) for all the chelates.