



SYNTHESIS AND MAGNETIC PROPERTIES OF Co (II) α -(p-NITRO BENZYLIDINE) IMINO ACETO HYDROXAMIC ACID COMPLEXES

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ABSTRACT

The complexes of Co (II) cations with the ligand of α (p-nitro benzylidene) imino aceto hydroxamic acid have been prepared. The elemental analysis shows that the expected general formula is $[\text{Co}(\text{L})_2(\text{B})_2]$. The complexes has been found to be coloured, amorphous in nature and octahedral in geometry.

Key words: Cations, Schiff base, Complex, Octahedral geometry.

INTRODUCTION

The synthesis of complexes of Co (II) with the ligand α -(p-nitro benzylidene) imino aceto hydroxamic acid by the reaction of chloride of Co (II) with the ligand in the presence of bases like water, ammonia and pyridine.

EXPERIMENTAL

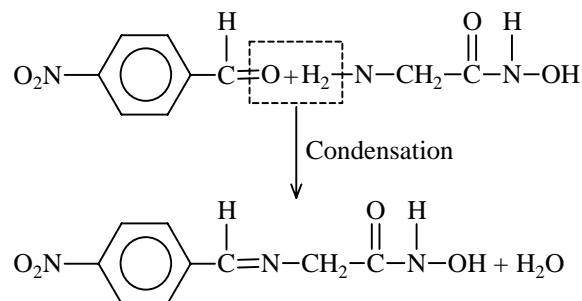
Materials and methods

α -(p-Nitro benzylidene) imino aceto hydroxamic acid was synthesised by the condensation of p-nitro benzylidene and α -amino aceto hydroxamic acid under reflux at room temperature.

These ligands were synthesized by taking a dry and cold solution of 15.1 g (0.1 mole) of p-nitrobenzylidene in ethanol and then it was allowed to reacts with the ethanolic solution of 9.00 g (0.1 mole) of α -amino aceto hydroxamic acid in equimolar proportion under reflux on a water bath for several hours at room temperature. During the course of reflux, the whole solution was shaken well more than three times. The resulting solution on cooling

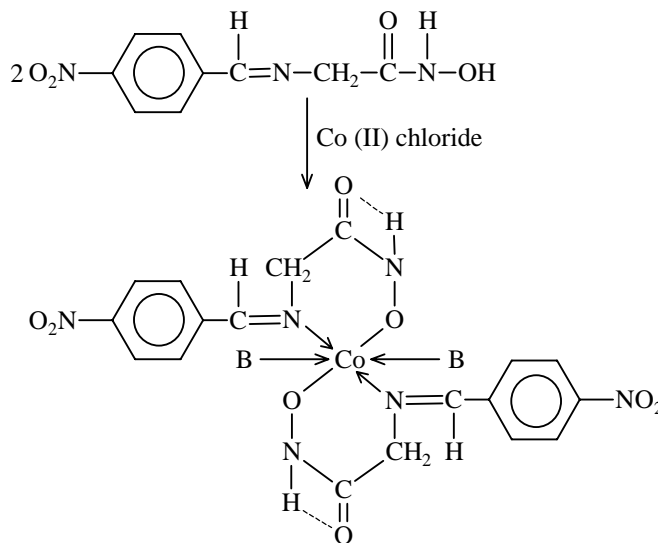
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under ice bath produced a light orange coloured solid which was separated by filtration, washed with absolute ethanol and dried in an electric oven at 100°C.



On the basis of elemental analysis, the compound was found to contain : C = 48.32%, H = 4.06% and N = 18.83%, which corresponds to the expected molecular formula : C₉H₉N₃O₄.

Then, the ethanolic solution of Co (II) chloride (0.01 mole) and the ligand (0.01 mole) in molar proportion of 1 : 2, respectively was allowed to react under reflux on a water bath for about two hours at room temperature. The resulting solution on crystallization produced the crystal of light green colour. The solid was then separated by filtration, washed with absolute ethanol and dried in an electric oven at 100°C. The complexes of Co (II) with the ligand were synthesised separately in the presence of bases like water, ammonia and pyridine.



Here, B = Water, ammonia or Pyridine.

RESULTS AND DISCUSSION

The elemental analysis show that the complexes correspond to the general formula $[\text{Co}(\text{L})_2(\text{B})_2]$. The analytical data of $[\text{Co}(\text{L})_2(\text{B})_2]$ complexes (found and calculated percentage) are given in Table 1.

Table 1: Elemental analysis

Complexes	Metal	C	H	N
$[\text{Co}(\text{C}_9\text{H}_8\text{N}_3\text{O}_4)_2(\text{H}_2\text{O})_2]$	10.80 (10.92)	39.96 (40.08)	3.75 (3.71)	15.68 (15.58)
$[\text{Co}(\text{C}_9\text{H}_8\text{N}_3\text{O}_4)_2(\text{NH}_3)_2]$	10.86 (10.97)	40.12 (40.23)	4.13 (4.09)	20.94 (20.86)
$[\text{Co}(\text{C}_9\text{H}_8\text{N}_3\text{O}_4)_2(\text{C}_9\text{H}_5\text{N})_2]$	8.86 (8.97)	50.72 (50.83)	3.97 (3.93)	16.98 (16.94)

Magnetic properties of Co (II) complexes

Co (II) is a $3d^7$ system. The free ion ground term is $4F$. In weak octahedral field, Co (II) has ${}^4T_{1g}$ as the ground term and in tetrahedral field, the ground term is 4A_2 .

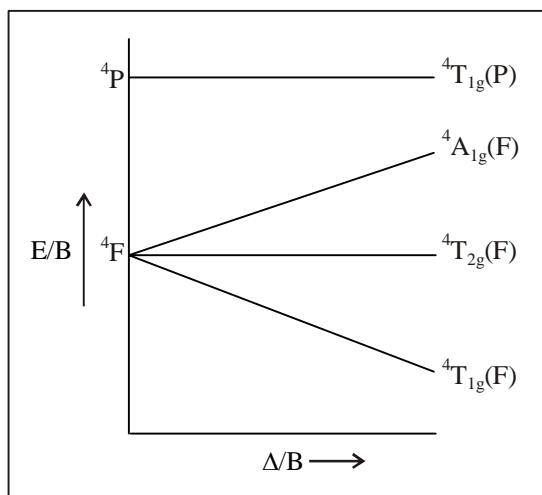


Fig. 1: Octahedral field

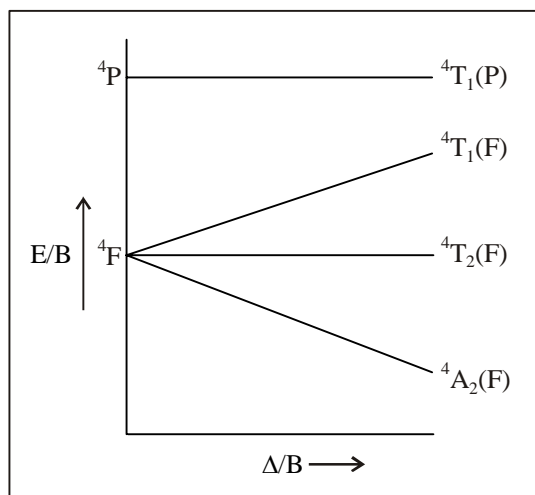


Fig. 2: Tetrahedral field

Table 2: The magnetic moment of [Co(L)₂(B)₂] complexes

Complexes	Colour	μ_{eff}	Magnetic nature
[Co (C ₉ H ₈ N ₃ O ₄) ₂ (H ₂ O) ₂]	Chocolate	4.98	Paramagnetic
[Co (C ₉ H ₈ N ₃ O ₄) ₂ (NH ₃) ₂]	Light brown	4.90	Paramagnetic
[Co (C ₉ H ₈ N ₃ O ₄) ₂ (C ₉ H ₅ N) ₂]	Pinkish brown	4.80	Paramagnetic

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