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SYNTHESIS OF COBALT (II) COMPLEX WITH NEW LIGAND (1-AZO PHENYL, 4- AZOMETHINE VANILLIN) PHENYL

Annotation: *A new ligand (L) (1-azo phenyl ,4- azomethine vanillin) phenyl was synthesized by condensation of 4-Amino Azo benzene with O-Vanillin . Then the complex was synthesized by reacting the transition metal [Co+2] with the ligand [with a metal to ligand ratio of (1:1) respectively] and this led to forming the following complex : [Co(L)Cl2], The ligand and complex were characterized and studied on the basis of FT-IR , 1H NMR , 13C NMR , and the results were concordant compatible with the proposed structures .*

Keywords: *Ligand, metal complex, Schiff bases, Azo dyes .*

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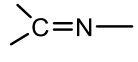
СИНТЕЗ КОМПЛЕКСА КОБАЛЬТА (II) С НОВЫМ ЛИГАНДОМ (1-АЗОФЕНИЛ, 4-АЗОМЕТИН ВАНИЛИН) ФЕНИЛ

Аннотация: *Новый лиганд (L) (1-азофенил, 4-азометин ванилин) фенил был синтезирован путем конденсации 4-аминоазобензола с О-Ванилин, Затем комплекс синтезировали путем взаимодействия переходных металл [Co+2] с лигандом [с отношением металла к лиганду (1: 1) соответственно], и это привело к образованию следующих комплекса. [Co(L)Cl2], Лиганд и комплекс были охарактеризованы и исследованы на основе FT-IR, 1H NMR, 13C NMR, и результаты совпали с предлагаемыми структурами.*

Ключевые слова: *лиганд, комплекс металлов, основания Шиффа, азокрасители.*

1. Introduction

Compounds with the structure of  (azomethine group) are known as Schiff bases, which are usually synthesized from the condensation of primary amines and active carbonyl groups. Schiff bases are important class of compounds in

medicinal and pharmaceutical field. They show biological applications including antibacterial , antifungal , and antitumor activity [1.c,1368] .

Schiff bases derived from aromatic amines and aromatic aldehydes have a wide variety of applications in many fields, *e.g.*, biological, inorganic and analytical chemistry [2.c,18] .

Schiff base ligands have significant importance in chemistry , especially in the development of Schiff base complexes , because Schiff base complexes are potentially capable of forming stable complexes with metal ions, Many Schiff base complexes show excellent catalytic activity in various reaction at high temperature and in the presence of moisture . Over the past few years, there have been many report on their applications in homogeneous and heterogeneous catalysis, hence the need for a review article highlighting the catalytic activity of Schiff base complexes. [3.c,36] . They are used in optical and electrochemical sensors, in various chromatographic methods and to enhance selectivity and sensitivity of the organic reagents. Schiff bases are easily characterized. They possess structural-similarities with natural biological substances. Their preparation procedures are relatively simple and have synthetic flexibility that enables tuning of suitable structural properties [4.c,68] .

2. Experimental:

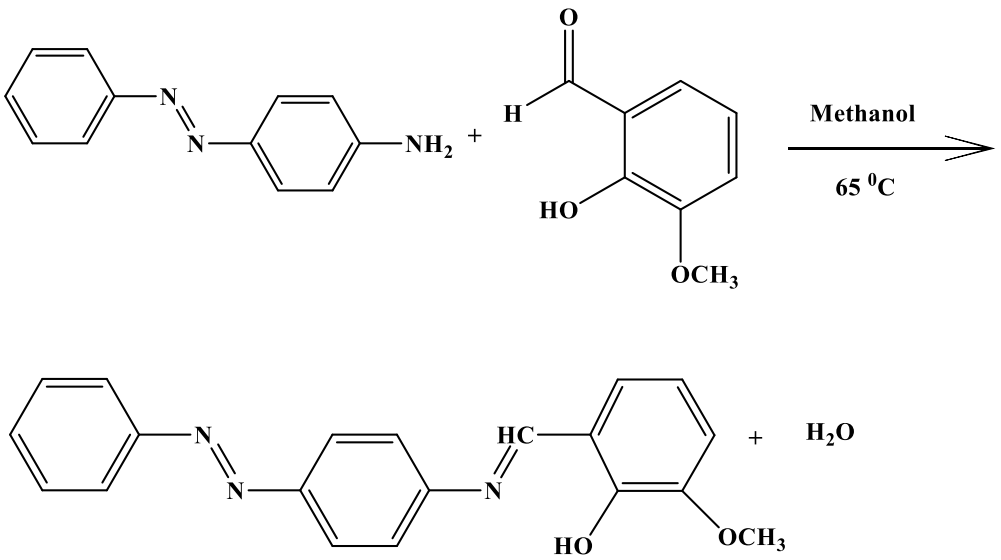
2.1. Materials

All the chemicals used were purchased from both Merck and Sigma Aldrich companies and used without further purification. FT-IR spectra was recorded using Jasco Japanese taype (A) Infrared Spectrophotometer Fourier Transform FT-IR-4100 (KBr).

2.2. Synthesis of a Schiff base ligand

The Schiff base (L) was prepared by adding (0.002 mol,0.304g) from O-Vanillin Dissolved in 20 ml methanol to a solution of 4-Amino Azo Benzene (0.002mol,0.394g) in methanol(50)ml.

The mixture was refluxed with stirring for 16 h . The precipitated L (1-azo phenyl ,4- azomethine vanillin) phenyl was filtered and recrystallized from methanol and washed with diethyl ether (5 ml) .



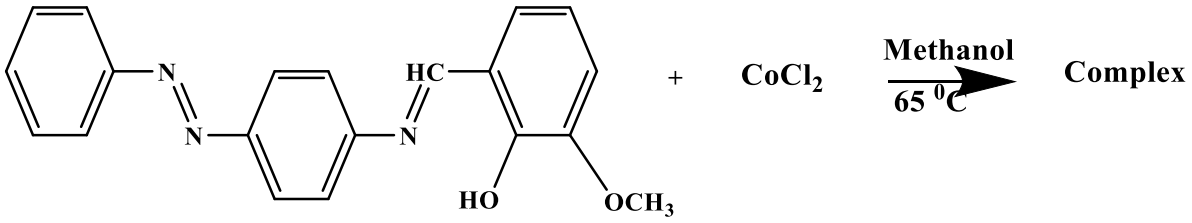
Scheme 1. Synthesis route of the main reaction.

2.3. Syntheses of metal complex :

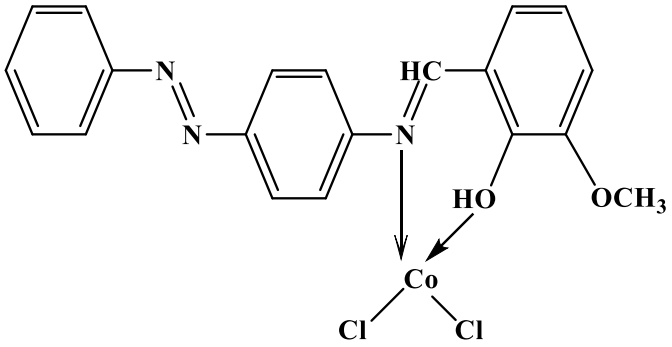
the complex was prepared following in a similar method of reacting solution with the metal salt [with a metal to ligand ratio of (1:1) respectively] . Preparation of one the complex is described below.

To a 50 ml Methanol solution the ligand (1mmol) was added with stirring. When the dissolution is completed. Addition of $CoCL_2$ anhydrous (1 mmol).

After (17 h) of stirring the volume of the solution reduced to 20 ml and filtered. The solid resultant was obtained and washed with ethanol (5ml) , followed by diethyl ether (5ml) .



Scheme 2. The main Synthesis of complex.



3.Results and Discussion:

3.1.1H-spectroscopic measurements:

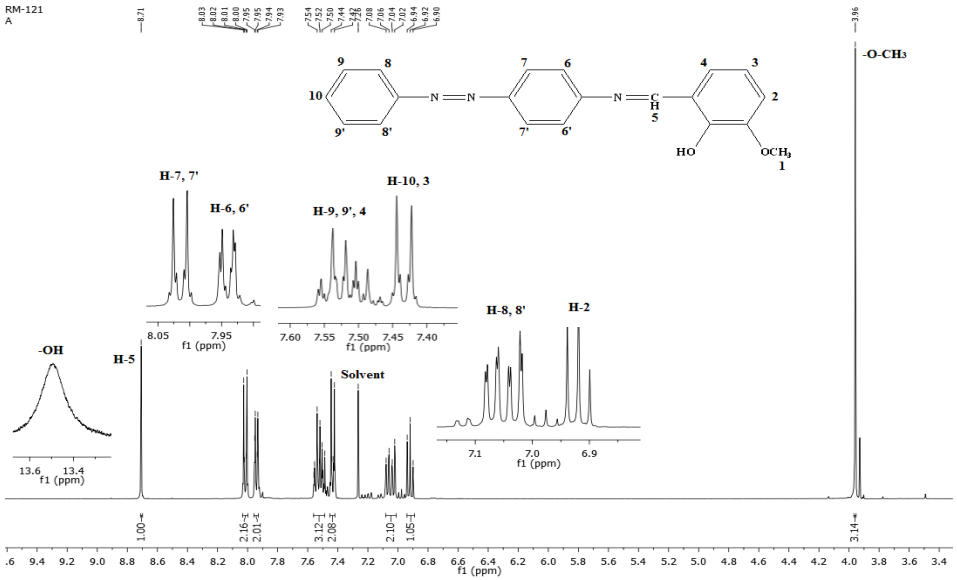


Figure 1. [1]H-NMR spectrum of the (L).

Table 1.

Explanation of 1H-NMR (ppm) of (L)

Chemical Shift ppmδ	Number of H
δH=3.96ppm,s,3H	1
δH=8.71ppm,s,1H	8
δH=13.50ppm,s,1H	7
δH=8.03ppm,d,2H	11,11'
δH=7.95ppm,d,2H	14,14'

δH=7.54ppm,d,2H	15,15'
δH=7.52ppm,t,1H	4
δH=7.44ppm,dd,1H	16
δH=7.08ppm, d,1H	3
δH=7.02ppm,d,1H	5
δH=6.92ppm,dd,2H	6, 6'

3.2. ^{13}C-spectroscopic measurements:

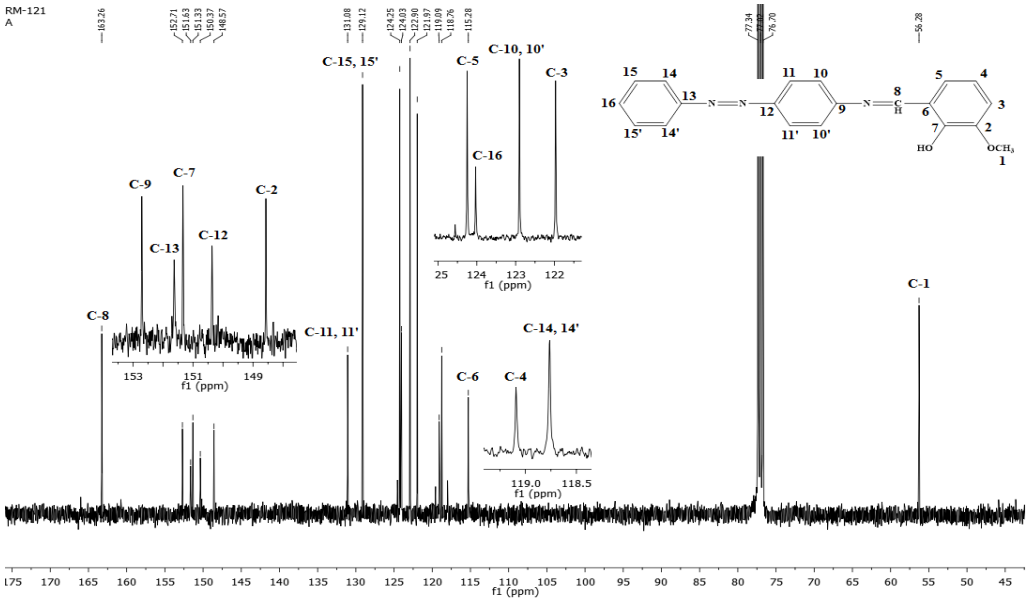


Figure 2. ^{13}C-NMR spectrum of (L)

Table 2.
Explanation of 13C-NMR (ppm) of (L)

Chemical Shift δ ppm	Number of Carbon
56.28	1
150.57	2
115.28	3
118.76	4
124.03	5
129.12	6
150.73	7

163.26	8
151.33	9
122.90	10,10'
119.07	11,11'
148.57	12
152.57	13
124.25	14,14'
129.12	15,15'
131.08	16

3.3. Infrared Spectra:

The infrared spectra for the present compounds taken in the range 400-4000 cm-1 help to indicate regions of absorption vibrations. The main stretching modes are for ν(C=N) , ν(C-O) , ν(C=C) , ν(C-O-C) , and ν(N=N).

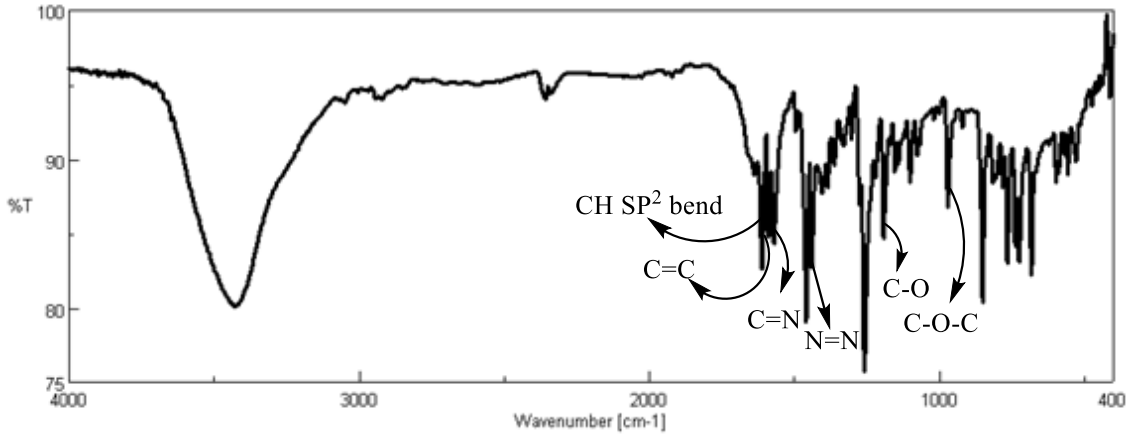


Figure 3. IR absorption spectra of ligand (L)

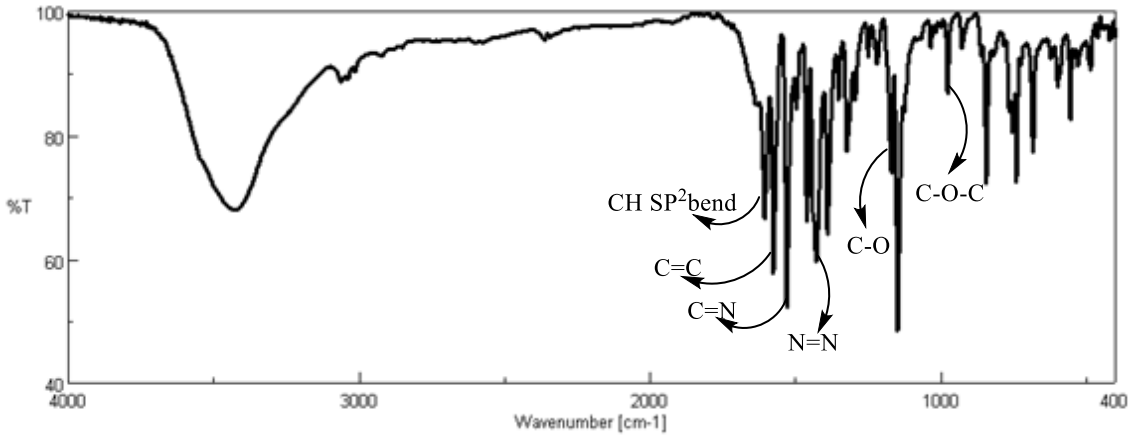


Figure 4. IR absorption spectra of [LCoCl2]

Table 3.

Characteristic infrared absorption frequencies (cm^{-1}) of the ligand and complex.

Compounds	ν(C=N)	ν(N=N)	ν(C-O)	V(C=C)	V(CH SP^2 bend)	V(C-O-C)
L	1570	1440	1192	1589	1611	970
$[CoLCl_2]$	1530	1427	1169	1575	1606	976

Conclusion:

A new ligand (L) (1-azo phenyl ,4- azomethine vanillin) phenyl was synthesized by condensation of 4-Amino Azo benzene with O-Vanillin . Then the complex was synthesized by reacting the transition metal [Co+2] with the ligand, and complex : [Co(L)Cl2].

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