

SYNTHESIS AND CHARACTERISATION OF RU (II) COMPLEXES WITH MONODENTATE AND BIDENTATE SCHIFF BASE LIGANDS

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Abstract

Preparation of some ruthenium(II) complexes with Schiff base ligands such as bidentate ligands derived by Condensing of *P*-methylaniline and *O*- hydroxyacetophenone have been Carried out. These Compounds are Characterized by elemental analysis, IR, and ¹H-NMR, spectral analysis. These Octahedral geometry was established for these New Complexes.

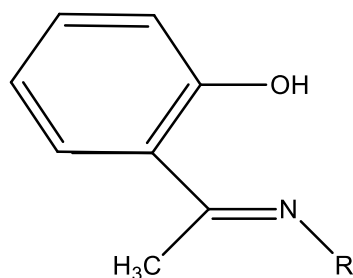
Keywords: Schiff base, Triphenyl phosphine, Ruthenium (II) Complexes

INTRODUCTION

Ruthenium element is one of the very rare elements belonging to the platinum-group metals and this element was isolated in the year 1844 (Kanaoujiya,2021 & Kanaoujiya, 2021, Kanaoujiya, 2020). Ruthenium is a hard metal of hcp structure. It does not tarnish at room temperature. The bulk of ruthenium metal oxidizes in the air at about 800°C work on lower price in comparison to the other platinum group metal such as Pd, Pt, Rh and Ir and make ruthenium compounds as first choice for various catalytic processes. Ruthenium macrocyclic complexes and the macrocyclic drugs show various biological activities(kanaoujiya,2021& Kanaoujiya,2020) There has been considerable current interest in the chemistry of ruthenium primarily because of the fascinating electron-transfer, photochemical and catalytic properties exhibited by the complexes of this metal. As the coordination environment around the central metal ion directs properties of the complexes, complexation of ruthenium by ligands of different types has been of significant importance(Kanaoujiya,2020). Ruthenium–Schiff base complexes, particularly those containing oxygen and nitrogen as donor atoms were found to be very efficient catalysts in the oxidation of alcohols using *N*-methylmorpholine-*N*-oxide as co-oxidant(Karvembu,2003,Seddon,2013& Stephenson,1966) .

EXPERIMENTAL

The RuCl₃.3H₂O, methanol, triphenyl phosphine was purchased from the Sigma – Aldrich and they are used for further purification. The elemental analysis for C, H, N, was determine on a Semi-micro Scale at Central Drug Research Institute Lucknow India. The Infrared spectra were recorded in the KBr pallets on perking Elmer 457 Spectrometer . Using Syntonic Spectrophoto meter, Electronic Spectra were recorded in some of CH₂Cl₂. ¹HNMR Spectra were recorded on a Bruker WM instrument Using TMA as internal Standard . Melting Point are observe in Icon Instrument Company are used.



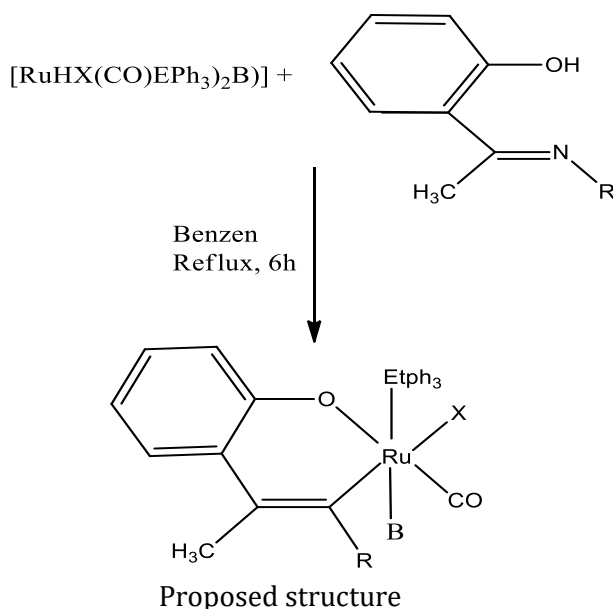
[R = Ph (Hohyac-an); 2-MeC₆H₄ (Hohyac-oman); 4-MeC₆H₄ (Hohyac-pman)](Ramesh,2018)
Schiff Base ligand

[RuHX(CO)(EPh₃)₂(B)] [X = H or Cl; B = EPh₃, pyridine (py) ; E = P. Hot Solution [RuHX(CO)(EPh₃)₂(B)] as As (1 mmol) and in Solvent benzene (20 ml) and the Schiff base (1 m mole)

The ruthenium and Schiff base molar ratio was (1:1)(Nirmala,2015, Viswanathamurthi,2011& Viswanathamurthi,1998). The solution was heated ratio was heated and reflux for 24h on Cooling at 0.C a solid Product [RuHX(CO)(EPh₃)₂(B)] was precipitated and. It was precipitated out. It was filtered and washed several time The result precipitate was filtered and recrystallised in the ethanol (9:1).

RESULT AND DISCUSSION

[RuHX(CO)(EPh₃)₂(B)] are the following Ruthenium Complexes are Hexa- Coordinated geometry are established (Daniel Thangadurai, 2006, Subbaiyan,2019). The Reaction between [RuHX(CO)(EPh₃)₂(B)] and the Schiff base (1:1) and dry benzene are used as Solvent.(Ajibade,2021).



All the prepared ruthenium Schiff base Complexes(Manikandan,2015,Oliveira,2017& Viswanathamurthi,2005) were observed to Catalyse the oxidation of alcohol to aldehyde group, Turn over were observed with different type of Catalysed being Used.

IR SPECTRA- The Schiff base Cantaining Phenolic C-O Stretching the Sharp band are observed

around the range -1268 to 1260cm^{-1} On the process of Complexation(Ramaswamy,2021). The metal in Coordination through the phenolic Oxygen atom , the band has been shifted to the higher frequency such as 1318 to 1300cm^{-1} . The Carbonyl group Coordinate with a new ruthenium Complexes(González-Fernández,2021) the observed band are observed at 1950 to 1935cm^{-1} . In the following Complexes Coordinated pyridine a weak band is reported at about 1022cm^{-1} .The U (Ru-Cl) and (U-Ru-H) band are observed at 330cm^{-1} and 2010cm^{-1} (Kanaoujiya,2021).

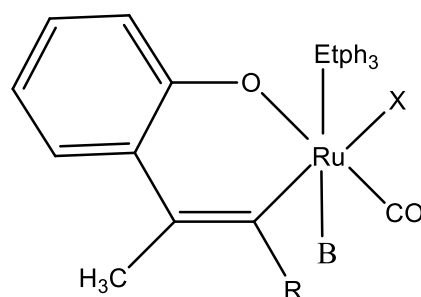
Table Shows Element analysis of ruthenium (II) Complexes

S.N	Complexes	Colour	m.p /Decomp* (°C)	Found (Calculated) (%)		
				C	H	N
1	[RuCl(CO)(PPh ₃) ₂ (ohyac-an)]	Dark Green	152	68.10 (68.08)	4.70 (4.80)	1.56 (1.44)
2	[RuCl(CO)(PPh ₃) ₂ (ohyac-pman)]	Pale Green	165	68.08 (68.22)	4.62 (4.78)	1.44 (1.51)
3	[RuH(CO)(PPh ₃) ₂ (ohyac-oman)]	Dark Brown	172	70.73 (71.06)	4.72 (4.80)	1.29 (1.62)
4	[RuCl(CO)(AsPh ₃) ₂ (ohyac-an)]	Pale Green	156	62.00 (62.08)	4.06 (4.16)	1.35 (1.39)
5	[RuCl(CO)(AsPh ₃) ₂ (ohyac-pman)]	Green	178	62.22 (62.35)	4.31 (4.41)	1.22 (1.38)
6	[RuCl(CO)(PPh ₃)(py)(ohyac-oman)]	Dark Brown	142	64.12 (64.15)	4.61 (4.68)	3.68 (3.78)
7	[RuCl(CO)(PPh ₃)(py)(ohyac-pman)]	Pale Green	179	64.08 (64.11)	4.31 (4.52)	3.58 (3.79)

The above ruthenium (II) Complexes Schiff base (Dharmaraj,2006,Jayabalakrishnan,2002& Natarajan,1977) are diamagnetic, Clearly indicate the ruthenium are present in the +2 oxidation state . The electronic spectra of all the following Complexes in CH₂Cl₂ Show a band in the 262-278 nm region. In Accordance with assignments made the octahedral geometry are established in ruthenium (II) Complexes.

¹HNMR

Schiff bases containing the CH₃ – group the peak are reported at 1-60 PPM. In All the Complexes signals for aromatic protons multiple are observed in the range of 8.40 to 6.00 PPM are proton signal has been reported as singlet in the very high region in the range of (approx~ 1200PM).



Proposed Structure

(R = Ph, 2-MeC₆H₄ or 4-MeC₆H₄; B = Eph₃, py; E = As or P; X = Cl or H)

CONCLUSION

The ruthenium (II) Complexes Containing and Bidentate Schiff base were characterized.On the

basis of elemental analysis, IR, ¹H-NMR spectra data proposed the Octahedral geometry was established for all these Complexes.

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