METAL (II) OF (5Z) -5-((3,4,5-TRIMETHOXYPHENYLMETHYLENE] -4H- PYRIMIDINE -2,4 -DIAMINE MIXED WITH 1,10 –PHENANTHROLINE

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ABSTRACT

Transition metal complexes of Zn(II) and Co(II) with (5Z) -5- [(3,4,5 – trimethoxyl-phenylmethylene]-4H- pyrimidine -2,4-diamine mixed with 1,10 - phenanthroline have been synthesized and characterized by Uv-Visible, FT-IR spectroscopy, elemental analysis and molar conductance. The analytical data of the stoichiometry of the complexes has been found to be 1:1:1.The ligands acted as bidentate donor coordinating to the metal ions through the pyrimidine N- atom and the N- atom of the NH_2/group. The complexes are non- electrolyte and the proposed structure indicate on octahedral geometry.

INTRODUCTION

Malaria has been found to cause cognitive impairment especially in children; it causes widespread anaemia during a period of rapid brain development and also direct brain damage. This neurologic damage results from cerebral malaria to which children are more vulnerable (Boivin, 2002). The continuing vehement search for new drug delivery systems is most commonly due to impotency, poor drug delivery and drug resistance (Enemose, *et, al* 2014; Enemose, *et al* 2018). Effective drugs are urgently needed to replace present drugs where resistance makes them unsuitable.

EXPERIMENTAL METHODS

IR spectra of the samples in KBr pellets SP3-30 Infrared Spectrometer FT_IR -8400S were obtained in the ranges of 4000-500cm^{-1}. The Uv-Visible Spectra measurement was obtained from Shimadzu 10UV scanning UV-vis spectrometer. Melting points were determined using Optimelt Automated Melting Point System while hand–held conductivity TDS meter was used for conductivity measurement. Elemental analysis (CHN) was carried using elemental analyzer, Thermo Flash 1112 CHNSO.

Synthesis:

The zinc complex [Zn (TRM)(PHEN)Cl_2]was obtained from trimethoprim in 20 mL methanol and dropwise addition of ZnCl, followed by introduction of 1,10-phenanthroline. White precipitate obtained.

The complex $Co(TRM)(PHEN)(SCN)_2$ was obtained by dissolving a known concentration of trimethoprim in 20 mL ethanol, followed by addition of $Co(SCN)_2$and 1,10-phenanthrolineas reported by Agarwal et al 2005.A peach coloured precipitate was obtained. The complex $[Co(TRM)(PHEN)]Cl_2$]was obtained by following the procedure used in obtaining compound 1 and 2.

RESULTS AND DISCUSSION

The first complex was formulated as $[Zn(TRM)(PHEN)Cl_2]$. Yield 51%,mol.wt 642.87, M.Pt = 266 ^{0}C, anal calcd.C,48.58, H. 4.70, N.13.07; found , C, 47.77, H.4.63, N. 13.26. FTIR (KBr.cm^{-1}) 3423(asy), 3336, 2360,1552,1421,779,682,530,497; UV – Vis ƛ nm (cm^{-1})216 (46296), 321 (31152).

Second complex formulated as $[Co(TRM)(PHEN)(SCN)_2]$ Yield 47%,mol.wt 645.62, M.Pt =257 DT, anal. calcd C,52.09, H.4.06, N, 17.36;found 52.53, H. 4.15, N. 17.44.FTIR (KBr.cm^{-1}) 3443 (asy) 3390 (sym) 2071, 1624, 1514, 1423, 763, 640, 511, 424.UV – Vis ƛ nm (cm^{-1}) 226 (44247), 357(28011).

Third complex formulated as $[Co(TRM)(PHEN)]Cl_2$ Yield 72%, mol.wt 672.42, M.Pt =234 DT, anal.calcd.C.46.44, H. 5.10 , N. 12.50; found C,46.95, H.5.00, N. 12.62.FTIR (KBr.cm^{-1}) 3466 (asy), 3335 (sym), 1635, 1550, 1421, 783, 520, 420,UV – Vis ƛ nm (cm^{-1})348 (28735), 641 (15600), 663 (15082).

The results of elemental analysis of the complexes are in good agreement with the formula proposed $[Zn(TRM)(phen)Cl_2]$, $[Co(TRM)(phen)Cl_2]$ and $[Co(TRM)(phen)(SCN)_2]$. This was further confirmed by the infrared spectra. The UV-spectrum of free Trimethoprim and 1,10-phenanthroline showed that the bands underwent bathochromic shift due to complexation in the metal complexes. The Zn(II) complex of (TRM)(phen) gave absorption bands at 216 nm and 321 nm. The bands observed have been interpreted as charge transfer transitions while the Co(II) complexes of (TRM)(phen) gave three absorptions, these are assigned to n – π*, π – π* and charge transfer transitions. Bands at 530 cm^{-1} – 511 cm^{-1} assigned to M – O and 497 cm^{-1} - 424 cm^{-1} is assigned to M – N.

The shifts observed in the ligands and synthesized complex in the ^{1}H NMR spectra and ^{13}C NMR signals of the selected carbon confirmed the infrared results that the methoxyl group in the ligand did not participate in bonding with the metal ions.

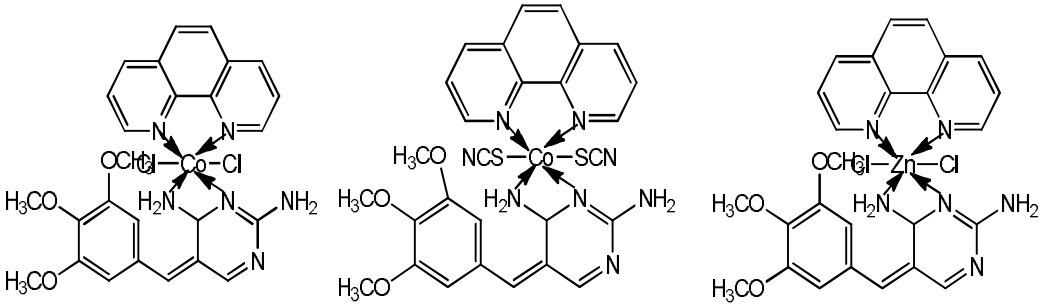


Figure 1: Proposed structures of $[Co(TRM)(phen)(Cl)_2]$, $[Co(TRM)(phen)(SCN)_2]$ and

[Zn(TRM)(phen)Cl_2] respectively.

CONCLUSION

All the novel complexes reported have been synthesized and characterized by elemental analysis, electronic and FT-IR spectroscopy. In addition NMR (proton and carbon) spectroscopy was used to analyze the Zinc complex. The metal complexes are air stable and insoluble in most common solvent. The proposed structures for the metal- drug complexes are octahedral in shape. The metal ions are bonded to the ligands that are bidentate in nature through the pyrimidine N-atoms.

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