Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2015, 7(1):833-836

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Study of Zn (II) complex of diacerein drug

Shruti S. Sarwade[1]*, [1]W. N. Jadhav, [1]B. C. Khade and [2]Deepak Tayde

[1]Department of Chemistry, Dnyanopasak Science College, Parbhani, Maharashtra, India
[2]Department of Chemistry, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

---

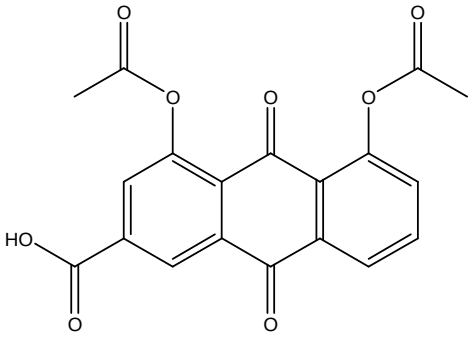
ABSTRACT

Diacerein complex of Zn (II) Chloride was synthesized and characterized by elemental analysis, molar conductivity, magnetic susceptibility measurement, I.R., U.V. spectroscopy and thermogravimetric analysis. Some physical parameters were obtained using molar conductance measurement and melting point determination.

Keywords: Diacerein, Metal Complex, Spectroscopic study, Thermal study.

INTRODUCTION

Diacerein also known as Diacetylrhein, is a slow acting medicine of class anthraquinone used to treat joint disease such as osteoarthritis, swelling in joints and pain in joints [1-2]. It works by inhibiting interleukin 1 beta; a protein involved in the inflammation and destruction of cartilage that play a role in the development of degenerative joint disease such as osteoarthritis.[3-6]. Due to its specific mode of action, this does not involve the inhibition of prostaglandin synthesis. Diacerein has been shown to have anti osteoarthritis and cartilage stimulating properties in vitro and animal models, together with the analgesic and anti -inflammatory properties. Due to its excellent gastro-intestinal tolerance, a combination therapy with an analgesic or NSAID may be recommended during the first 2-4 weeks of treatment [7].



4,5-diacetyloxy-9,10-dioxo-anthracene-2-carboxylic acid

Fig.1 Structure of Diacerein

EXPERIMENTAL SECTION

Synthesis of Diacerein Zinc chloride complex:

Complex was prepared by dissolving Diacerein (0.2 mol, 3.6gm) in ethanol and adding solution to ethanolic zinc chloride solution,(0.1 mol.). The reaction mixture was refluxed for 2hrs. The mixture was made alkaline by adding few drops of ammonia. Again the mixture was refluxed for 1hr.The solution was filtered. The complex was dried in oven.

Table1. Elemental analysis data of complex

Sr.No.	Compound	%C found(cal)	%H found(cal)	O%found(cal)	M%found(cal)
1.	$C_{19}H_{12}O_8$ (DCN)	61.80 (61.95)	3.20 (3.26)	34.20 (34.78)	-
2.	$[Zn(DCN)(Cl)_2]$	45.26 (45.02)	2.38 (2.22)	25.41(25.80)	12.98 (12.85)

Table2. Analytical Data of complex

Sr.no.	Compound	colour	Yield %	M.P(^{0}C)	Magnetic moment (B.M)	Molar conductance $\Omega^{-1}cm^2mol^{-1}$
1.	$C_{19}H_{12}O_8$ (DCN)	yellow	-	218	-	-
2.	$[Zn(DCN)(Cl)_2]2H_2O$	Yellowish white	72	328	diamagnetic	8.75

RESULT AND DISCUSSION

Table3. Electronic spectra studies of complexes

Sr.No.	Compound	Wavelength in nm	Wavelength in cm^{-1}	Assignment
1.	$C_{19}H_{12}O_8$ (DCN)	286	34965	∏-∏*
2.	Zn (DCN)$(Cl)_2$	526 440 260	19011 22727 38461	∏-∏* n-∏*

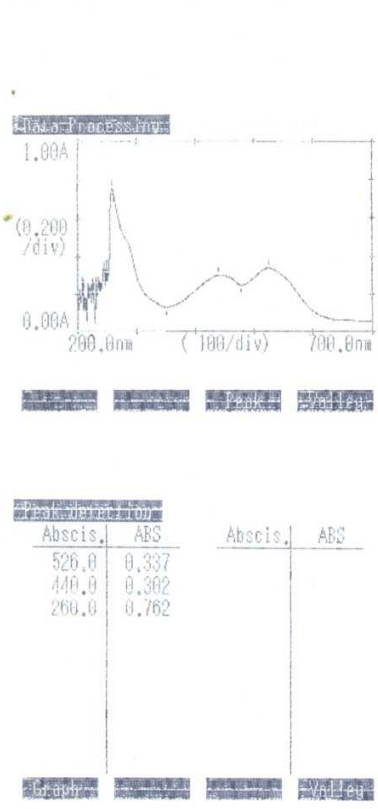


Fig. 3 U.V spectra of Zn (DCN)$(Cl)_2$

UV Spectra Analysis:
The formation of the complex was confirmed by electronic spectra. In the electronic spectra of the ligand and its mononuclear metal complex, the wide range bands were observed due to either the ∏-∏* and n-∏* arising from ∏ electron interactions between the metal and ligand, which involves either a metal- to -ligand or ligand- to - metal electron transfer.

The electronic absorption spectra of Zn $(DCN)(Cl)_2$ showed absorption bands at 526nm, 440nm and 260nm corresponding to a charge transfer band suggesting an octahedral environment. It is evident that, structural configuration has a close relation with magnetic susceptibility of the complexes. Magnetic susceptibility for metal complexes can be measured by Gouy Balance method at room temperature.

In the present investigation it was observed that at room temperature magnetic moment of Zn (II) complex is zero B.M. It shows that all the electrons are paired and complex is diamagnetic in nature [8-11].

Infrared spectra studies of complexes:
FTIR band assignments of the synthesized complex were done by comparing the spectra of the complex with that of the free ligand. The FTIR pattern of pure Diacerein(DCN) are already studied by Poonam S Karekar et al .The principal absorption peaks of DCN were observed at 3300cm^{-1} (O-H, stretch, broad, COOH), 3069 cm^{-1} (C-H, stretch, aromatic), 2935 cm^{-1} (C-H, stretch, aliphatic, *sym*), 1770 cm^{-1} (C=O, stretch, ester), 1679 cm^{-1} (C=O, stretch, COOH), 1693 cm^{-1} (C=O, stretch, ketone), 1593 cm^{-1} (C=C, stretch aromatic), 1450 cm^{-1} (C-O, stretch, COOH), 1029 cm^{-1} (C-O, stretch, ester), 760 cm^{-1} (*m* substituted benzene), 704 cm^{-1} (benzene).

It has been proposed that the ligand DCN interacted with the metal ion through bidentate chelating from each ester group. This was consistent with decrease in frequency of ester group in free ligand after forming complex. The ester group stretch seen at 1770 cm^{-1} decreased to 1670 – 1685 cm^{-1} in the complex. DCN binds to the metal ion with its two ester groups forming tetradentate ligand. New vibrating absorptions were observed in the range of 550-620 cm^{-1} which was characterized as the absorption of M-O bonds also bands in the range 430-450 cm^{-1} were characterized as the bands of M-Cl absorption.

Table 4: IR spectra data analysis of complexes

Sr.No.	Compound	*v* COO^- cm^{-1}(ester)	*v* M-O cm^{-1}	*v*M-Cl cm^{-1}
1.	$C_{19}H_{12}O_8$ (DCN)	1770	-	-
2.	Zn $(DCN)(Cl)_2$	1690	567	456

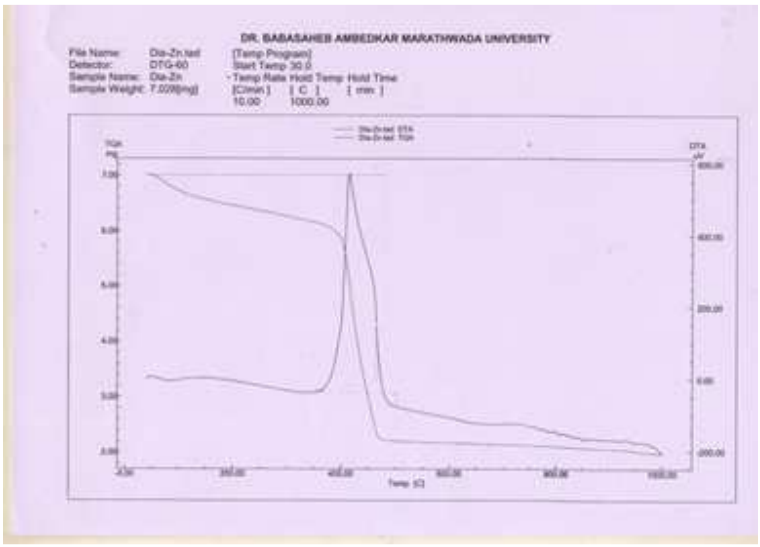


Fig. 4 TG/DTA Spectra of Diacerein complex

Thermogravimetric TG/DTA analysis of the complexes:
The first decomposition step of Zn (DCN)$(Cl)_2$ complex stretches beyond 150^0C and exhibits weight loss of 75.2 %. This corresponds to decomposition of the organic moiety leaving behind metal oxide as the end product.

The slight weight loss of 5.69% before this around 50^0C-150^0C could be ascribed to the presence of entrapped water or solvent. The absence of any thermal change before this temperature is reached indicates that sample restructuring did not take place before the degradation process started.

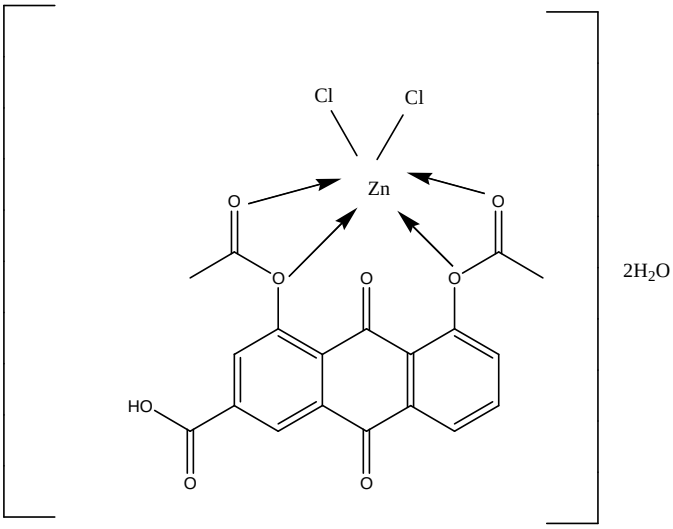


Fig.2 Proposed structure of the Diacerein complex

CONCLUSION

The present study illustrates a new preparative strategy for the synthesis of Diacerein Zn(II) metal complex. The DCN ligand behaves as a tetradentate ligand through two ester groups. Tentatively proposed structure for complex is given in fig. 2 Decomposition of complex at higher temperature suggests thermal stability. IR and UV spectra and thermal study suggest octahedral geometry of the complex. Electrolytic conductance shows non electrolytic nature.

REFRENCES

[1] B. Parashar, S. Bharadwaj, *Int.J.ChemTech. Res*; **2010**, 2 (3), 1454.
[2] Snehal B. Patil, Dhanashri K. Shete, Sarika B. Narade, Sharda S. Surve, Ziya K. Khan, Satish B. Bhise, Yogesh V. Pore,*Drug Discoveries & Therapeutics*. **2010**; 4(6):435-441.
[3] Oneil M, Heckelman PE, Koch C, In: The Merck Index. An Encyclopedia of Chemicals: Drugs and Biologicals 14th ed., Merck, Whitehouse Station, NJ, USA, **2006**; p.503.
[4] B.M. Gurupadayya et al, /*J. Pharm. Sci. & Res.* Vol.2 (10), **2010,**638-643.
[5] T.SFedilix, B.G.Soares, V.F.Trevisani, *Cochrane database Syst Rev*, 1 **2006**, CD005117.
[6] M. Solignac, *Press Med,* 33,**2004**,10-12.
[7] M. Yaron, I.Shirazi, I. Yaron, *OsteoarthritisCartilage*, **1999**,7 272-280.
[8] DhanashriSubhash Yadav, AshwiniAdhikrao Yadav, PoonamSubhashKarekar, Yogesh Vilas Pore and PankajSadashivGajare,*Der Pharmacia Lettre*, **2012**, 4 (2):428-435.
[9] S. S. Sarwade, W. N. Jadhav, B. C. Khade, *J. Chem. Bio.Phy.Sci.A.***2014**, *4(2)*, 978-982.
[10] S. S. Sarwade, W. N. Jadhav, B. C. Khade and B. R. Arbad, *Int. J. Chem. Tech. Res.***2014**, *6(4)*, 2291-2294.
[11] AradhanaVerma*, S. A. Iqbal, Arun Singh AndLiviuMitu, *E-Journal of Chemistry* **2010**, 7(S1),S520-S526.