

Research Article

Synthesis, characterization, antimicrobial activity and transition metal complexes of 3-bromo-N'-(1-(5-chloro-2-hydroxyphenyl)ethylidene) benzohydrazide ligand.

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ABSTRACT

A series of Mn(II), Co(II), Ni(II), Cu(II) and Zn(II) transition metal complexes of 3-bromo-N'-(1-(5-chloro-2-hydroxyphenyl)ethylidene)-benzohydrazide (H₂L) were synthesized and characterized by IR, elemental analysis, UV-visible and thermal analysis. Spectral data suggests that the ligand acts as dibasic, tridentate coordinated through oxygen of phenolic OH, nitrogen of azomethine group and enolic oxygen of hydrazide. Antimicrobial activity of the metal complexes was found to be excellent against fungi than the parent ligand as compared to standard drug and moderate activity against bacterial stains.

KEYWORDS

Ligand, Metal complex, Antimicrobial



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Stability Constants of Transition Metal Complexes with Naratriptan Hydrochloride drug and Amino Acids

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Abstract

Stability constants of transition metal complexes with Naratriptan Hydrochloride medicinal drug, glycine and valine amino acids have been studied pH metrically in 20% v/v ethyl alcohol and water medium at 30°C temperature and 0.1 M ionic strength. The pK_a of ligands and logK of binary metal complexes were determined. It is correlated with basicity of ligands, atomic numbers and atomic radii of metal ions. The complexes of both ligands with metals follow the Irving-Williams natural order of stability.

Keywords: Stability constants, metal complexes, medicinal drug, amino acids.

1.0 Introduction

The complexes of metal ions with biomolecules play a vital role in biological systems. The knowledge of metal complexes with drugs is essential to understand proper dose of drug. In addition, it helps to know the complex physiological process and mode of action of drugs and their effect on various body systems. The formation of metal complexes depends on metal ligand selectivity in complex media. The stability constant of metal complexes with drugs are important to measure the metal ligand selectivity and strength of metal ligand bonds¹. The metal complexes of drug are found more potent than drugs². It plays a vital role in transportation, detoxification and catalytic process. The study of complexes of drugs attracts many researchers because of its tremendous application in medical field.

The literature survey reveals that there is still need to study the binary complexes of transition metal ions with drugs and amino acids to know the coordination behavior³⁻⁹.

1.1 Naratriptan Hydrochloride

Naratriptan Hydrochloride (Fig 1.0) is an important drug for the treatment of migraine headaches.¹⁰ Naratriptan is a serotonin receptor agonist and is known as 'triptan'. The triptan class of anti-migraine drugs bind to the 5-HT_{1D} and 5-HT_{1F} receptors with high affinities.¹¹ Although the exact pathophysiology of migraine is unclear: direct vasoconstrictor effect on the cranial blood vessels¹² and/or inhibition of neurogenic inflammation in the dura matter,¹³ it is generally accepted that one or more of the three receptors to which triptan binds is involved in migraine. While all three receptors (5-HT_{1D}, 5-HT_{1B}, 5-HT_{1F}) have been found in human trigeminal ganglia, only 5-HT_{1B} and 5-HT_{1F} receptors are

clearly present in the cerebral blood vessels.¹⁴



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POTENTIOMETRIC STUDIES ON CHROMIUM (III) METAL COMPLEXES WITH ANTIRETROVIRAL DRUG ZIDOVUDINE (AZT) AND BIOLOGICAL IMPORTANT LIGAND IN 80% ETHANOL-WATER MIXTURE

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ABSTRACT

The present study emphasizes on the characterization and Potentiometric evaluation of the Binary copper $[Cr^{3+}]$ - Zidovudine and Ternary complexes Chromium metal ion Zidovudine drug and Some Biological important amino acids as the secondary ligands. The properties of the complexes investigated for determination of the $\Delta \log K$ values in solution states with the help of Potentiometer in controlled experimental conditions. These metal complexes are evaluated for their formation on the basis of $\log k$ values. Metal complexes have shown their significant formation when compared to pure drug. The study of metal complexes is of special interest as per as their enhanced biological activities are concerned. This investigation thus aims at determining the stability constant of ternary metal complexes of chromium (III) ion with Antiretroviral Drug Zidovudine (AZT) and amino acids potentiometrically in 80% (v/v) ethanol-water mixture at 27°C and fixed ionic strength 0.1M NaClO₄.

KEYWORDS

Zidovudine, Binary Metal Complexes and Ternary complexes.

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INTRODUCTION

The solution study of the metal complexes particularly the stability constant provides the good deal of the ideas about the coordination chemistry of the metal ion and the important organic molecules like the Drugs along with some another ligand such as amino acids which makes our understanding regarding the competition of the ligand for the formation of the coordinated complexes which are the important part of the bioinorganic chemistry and made this research area important in drug designing and the development in

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Studies of Ultrasonic Velocities, Densities, Viscosities & Refractive Indices of Naratriptan Hydrochloride at Different Temperatures

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Abstract: Densities, viscosities, refractive indices and ultrasonic velocities of Naratriptan hydrochloride were measured over the entire mole fractions at different temperatures (K). From these experimental results, excess molar volumes V_E , viscosity deviation $\Delta\eta$, refractive index deviation Δn_D deviations are calculated. It was found that in all cases, the data obtained fitted with the values correlated by the corresponding models very well. The results are interpreted in terms of molecular interactions occurring in the solution.

Keywords: Viscosity; Density; Refractive Index; Ultrasonic Velocity; Molecular interactions.

Introduction: In the recent years, mixed solvents rather than pure solvents find practical application in most chemical processes as their properties are less known Gracia, et al., (1997); Pitzer, (1995). Ultrasonic technique has become a powerful tool for studying the molecular behavior of liquid mixtures Ali et al., (1996). This is because of its ability of characterizing physico - chemical behavior of liquid medium Manisha and Shukla, (1996); Velmurugan et al., (1987). Binary liquid mixtures due to their unusual behaviour have attracted considerable attention Ewing et al., (1970). Data on some of the properties associated with the liquids and liquid mixtures like density, viscosity and ultrasonic velocity find extensive applications in chemical engineering process simulation, textile industries solution theory and molecular dynamics Mchaweh et al., (2004). These measurements are used to study the molecular interactions. In pure liquids, liquid mixtures and ionic interactions in solution comprising either single or mixed solute.

Ultrasonic study is the important research topic and as its usefulness in the fields of biology, biochemistry, engineering, geography, geology, medicine and polymer industry is found very interesting Nain et al., (2012); Jahagirdar et al., (1998). Ultrasonic velocity (U) together with density (ρ) and viscosity (η) data furnishes a wealth of information about bulk properties and intermolecular forces Nozdrev, (1963); Pierce, D. C. (1981), which find applications in several industries and technological processes. A literature survey reveals that

Formation Constant of Transition Metal Complexes with Adenosine Biomolecule and Glutamic Acid and Isoleucine Amino Acids

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Abstract

Formation constants of transition metal complexes with Adenosine biomolecule, Glutamic acid, and isoleucine amino acids have been studied pH metrically in 20% v/v ethyl alcohol and water medium at 30°C temperature and 0.1 M ionic strength. The proton ligand stability constant (pKa) of ligands and metal ligand stability constant (logK) of binary metal complexes were determined. It is correlated with atomic numbers, basicity of ligands, and atomic radii of metal ions. The transition metal complexes of ligands follow the Irving William natural order of stability.

Keywords: Formation Constants, Metal Complexes, Adenosine, Amino Acids.

Introduction

The formation of metal complexes depends on metal ligand selectivity in complex media. The formation constant of metal complexes with biomolecule and amino acids are important to measure the metal ligand selectivity and strength of metal ligand bonds (Thomas,2002). The metal complexes of drug are found more potent than drugs (Sarkar,1999). It plays a vital role in metabolism, transportation, detoxification and catalytic process. The knowledge of metal complexes with drugs is essential to understand proper dose of drug. In addition, it helps to know the complex physiological process and mode of action of drugs and their effect on various body systems. The literature survey reveals that there is still need to study the binary complexes of transition metal ions with drugs and amino acids to know the coordination behavior (Deore et al, 2011; Sandhi and Sekhon., 2006;Magare and Ubale,2011;Magare and Ubale,2018;Magare,2019;Phase et al 2013;Sakhare et al,2019)

Adenosine (Fig.1.0) being a purine nucleoside performs many important functions in human body and biological processes (Cummings,1994). It modulates physiological function in heart and brain, regulates oxygen supply during cell stress and play an important role in the regulation of renal function (Lior,2000;Zhang,1997). It is a potent anti-inflammatory and anti-arrhythmic agent which is important for the control of coronary and cerebral blood flow (Phillis,2004; Tesch,2004). It is an inhibitory neurotransmitter (Ruber,1991; Nishiyama et al,2004) and play a role in promoting sleep and suppressing arousal (Bashir et 2000). Adenosine is an endogenous vasodilation agent (Martin et al,2000) and also administered for the treatment of gastrointestinal diseases in many cases (Ye and Rajendran,2009). The amounts of Adenosine in the urine and plasma samples are considered be marker of some diseases such as carcinoma or liver diseases (Ang et al,2002).

Glutamic acid (Meister,1965) (Fig. 2.0) is acidic non-essential glycogenic amino acid with one amino group and two carboxylic groups. It takes part in transamination, transamidation and inter conversion of amino acids and also participate in ammonia transport and urea formation. Glutamic acid involve in