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TRANSITION METAL POLYCHELATES WITH SALEN-TYPE SCHIFF BASE: SYNTHETIC, SPECTROSCOPIC, THERMAL, ELECTRICAL CONDUCTIVITY, BIOLOGICAL, AND COORDINATION ASPECTS

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ABSTRACT

Cr(III), Mn(III), Fe(III), Ti(III), Zr(IV), VO(IV), MoO_2(VI) and UO_2(VI) polychelates with salen type Schiff base 4,4*'-bis*[(*N*-butanessalicylaldimine-5)azo]biphenyl (BNBSAP) prepared from dye 4,4*'-bis*[(salicylaldimine-5)azo]biphenyl and 1,4-diaminobutanehave been characterized by elemental analyses, IR and electronic spectra, magnetic susceptibility measurements and thermogravimetric analysis.All the polychelatesare dark colouredsolid and sparinglysoluble in common organic solvents. ^{1}H-NMR spectrum ligand clearly indicates the presence of OH and azomethine groups. Thermogravimetric analysis confirms the coordination of H_2O in polychelates.The thermal data have also been analyzed for the kinetic parameters by using Horowitz-Metzger method. Solid state dc conductivity of ligand and its polychelates was measured in their compressed pellet form over 373-413K range of temperatures and all compounds show semiconducting behaviour. The Synthesise polychelateswere also screened for antimicrobial activity against various bacteria.

KEYWORDS: Polychelates, Thermal analysis, Electrical Conductivity, Biological Activity.

INTRODUCTION

Polymers have increasing interest over the last few decades in the fundamental research as well as in their potential applications in fields such as catalysis, ion exchange, photochemistry, selective separation, biological study, physical and materials chemistry [I-IV]. Chelate polymers are defined as materials in which metal ions are linked together with polyfunctional ligands and chelate polymers are also well known for their thermal stability [V]. The incorporation of transition metals into polymeric Schiff bases not only affects their physical characteristics, but also their chemical activity. Complexation of a metal ion to functional polymeric ligand changes its activity due to polymeric effect.Polymer–metal complexes are in general coordinating polymers containing one or more electron donor atoms such as N, S and O that can form coordination with most of the transition and toxic heavy metals.Among polymers those containing nitrogen as donor atoms have been synthesized and

Progress of Financial Inclusion in India – The Crisil Inclusix Analysis

Sanjay P. Dhanwate & Anumita Agarwal

INTRODUCTION

Financial Inclusion is gaining global priority as it is capable of bolstering sustainable, balanced inclusive economic growth at the macro level and promoting economic and social inclusion at the household and enterprise level especially among financially excluded and under-privileged populations. There are three elements of integral financial strategy i.e. financial education, financial inclusion and financial stability. Financial Inclusion works from the supply side by providing access to various financial services; financial education feeds the demand side by promoting awareness among the people regarding the needs and benefits of financial services offered by banks and other institutions. Further these two strategies promote the third element of financial stability.

DEFINITION OF FINANCIAL INCLUSION

Financial Inclusion may be broadly defined as universal access to a wide range of financial services at a reasonable cost. These not only include banking products but also other financial services such as insurance and equity products (The Committee on Financial Sector Reforms, Chairman: Dr. Raghuram G. Rajan). If the term 'Financial Inclusion' is elaborated it means that all working age adults (persons at the age 15+) have effective and quality access to and usage of - at a cost affordable to the customers and sustainable for the providers - financial services provided by formal institutions. "Effective access" involves convenient and responsible delivery of services that re responsive to the needs of financially excluded and underserved customers, at a cost affordable to the customers and sustainable for the providers. The demonstration of effective access is usage. The fact that a customer can access services offered by a formal financial service provider does not mean she or he is "financially included". For this, the condition of "effective access" must be met (GPFI White Paper, 2016).

Dilip Mookherjee emphasizes two other important aspects of financial inclusion in the context of India. The first is the necessity of wider financial inclusion to improve the efficiency and targeting of government welfare programs. For example, transfers that can be made directly to citizen bank accounts can help to eliminate corrupt and inefficient intermediaries.

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Transition Metal Complexes Incorporating with Unsymmetrical N_2O_2-Donor Schiff Base Ligand: Microwave-Assisted Synthesis, Spectroscopic, Thermal, and Biological Aspects

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Complexes of Ti(III), Cr(III), Mn(III), Fe(III), VO(IV), MoO_2(VI), WO_2(VI), and UO_2(VI) with 3-(1-(2-(1-(2,4-dihydroxyphenyl)ethylideneamino)-cyclohexylimino)-ethyl)-4-hydroxy-6-methyl-2*H*-pyran-2-one (H_2L) are reported and have been characterized by various spectroscopic techniques like IR, UV–visible, ^1H & ^{13}C NMR, Mass, XRD, and ESR as well as elemental analyses, magnetic, and thermal measurements and also by the aid of molar conductivity measurements. It is found that the ligand behaves as a dianionic tetradentate coordinating to the metal ion with 1:1 metal to ligand stoichiometry. An octahedral geometry is proposed for all the complexes except Mn(III) and VO(IV) complexes, which possess square pyramidal geometry. The thermal studies show the type of water molecules involved in metal complexes as well as the thermal decomposition of the metal complexes. The compounds are subjected to antimicrobial activity screening and minimum inhibitory concentration is determined. Microbial assay of the above compounds against *Escherichia coli* MTCC 443, *Pseudomonas aeruginosa* MTCC 424, and *Staphylococcus aureus* MTCC 96 and fungal strains *Candida albicans* MTCC 227 and *Aspergillus niger* MTCC 282 shows that complexes exhibit higher activity than the ligand.

1. Introduction

The chemistry of metal complexes with dicompartmental ligands has become a rapidly growing area of research[1] because of their importance in biomimetic studies of binuclear metalloproteins,[2] their interesting catalytic processes,[3] and their ability to stabilize unusual oxidation states and mixed-valence compounds. They are also useful as starting materials for the synthesis of important drugs like antibiotics, antiallergic, antiphologistic, and antitumor agents.[4] The antibacterial and antifungal activities of complexes appear to be due to the chelating behavior of the ligand, with most of the metal ions coordinated through *N* and *S* donor atoms. The influence of the donor atoms and their relative position, the number and size of the chelate ring formed, and shape of the coordination moiety play important role in the biological and catalytic activity of the complexes formed.[5] The poisoning role of central metal ions in living organisms is ascertained using these complexes by determining the action of drugs. It is well documented that coordination of a ligand to the transition metal ions increase the biological activity of the ligand and reduce the cytotoxic effects of metal ion and ligand.[6] Schiff bases derived from substituted aldehydes or ketones and diammines constitute one of the most relevant synthetic ligand systems with importance in asymmetric catalysis and microbial activity. In this paper, our efforts have focused on the synthesis and characterization of Ti(III), Cr(III), Mn(III), Fe(III), VO(IV), MoO_2(VI), WO_2(VI), and UO_2(VI) metal complexes with ligand 3-(1-(2-(1-(2,4-dihydroxyphenyl)ethylideneamino)cyclohexylimino)-ethyl)-4-hydroxy-6-methyl-2*H*-pyran-2-one (H_2L) by microwave technique, as microwave-assisted synthesis of organic compounds is an efficient and eco-friendly synthetic strategy and has now become a powerful tool in green chemistry.

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2. Experimental Section

2.1. Materials and Physical Measurements

All chemicals used were of either AR or chemically pure grade. The solvents obtained from commercial sources were dried

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Carcinogenic Cr(VI) Abetment Applicability of 8-HQPHF-II Terpolymer

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Abstract

Recently surface water and groundwater gets commonly contaminated with toxic heavy metals. Amongst these heavy metals hexavalent chromium Cr(VI) is more toxic because it is carcinogenic and mutagenic. For this reason, the removal of Cr(IV) from polluted water has received an extensive concern and has become a hot topic in environmental research. The aim of the present investigation is to synthesize an efficient adsorptive material (8-HQPHF-II terpolymer) and to evaluate its practical efficacy towards removal of hexavalent chromium. Its synthesis was done by polycondensation of 8-HydroxyQuinoline, Phenylhadrazine and Formaldehyde in 2:1:3 molar ratio followed by its applicability studies in environmental pollution control with respect to Cr(VI) removal. The characterization and the structural elucidation of the newly prepared terpolymer was carried out using the modern techniques such as elemental analysis, TGA, FTIR, XRD and ^{1}H-NMR spectral studies. The Cr(VI) removal property of the terpolymer was determined by batch equilibrium method. The effects of various parameters like pH, contact time and adoption doses have also been studied and their optimum values are found to be pH 4, 110 min and 5 gm respectively. The adsorption data were found to fit well with the Langmuir and Freundlich isotherm models. At optimum condition nearly 90% abatement of Cr(VI) has been noted using 8-HQPHF-II.Thus the 8-HQPHF-II under study has been proved be as an efficient/successful adsorbent material for removal of Cr(VI) from contaminated water.

Keywords: *Hexavalent chromium, Carcinogenic, Batch method, environmental applications.*

Introduction

The compounds containing chromium(Cr) are among the most common toxic pollutants in water [1]. Chromium concentration increase in surface water/ground water is a

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Sustainable development and COVID-19 Pandemic

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ABSTRACT

Development means making lifebetter, to have a better standard of living and an improved quality of life.In this system of development man ,trees,environment,society,wealth are important factors i.e.,economic,social environmental development is essential. There are various goals of sustainable development which was in progress but due to COVID-19pandemic effect it totally change the situation. The major crises found in global economy. so How to control this situation is a major problems. All the countries given priorities of pandemic infection control. The infection and mortality rate increases at higher level in some countries.The most important thing to return and achieve our suistainable development we must focus on how we save our life during COVID-19 Pandemic.

KEY WORDS:-Sustainable development,Goals, COVID-19.

INTRODUCTION

The term 'sustainable development'first come to prominence in the world conservation strategy (WCS) in 1980.Development is a describing of human potentials for meaningful participation in economic,social,political and cultural process and institutions,so that people can improve their conditions.The aims of this to maximizing the probability of achieving sustainable development and minimizing the chances of environmental degradation. "Sustainable development is development that encounters the needs of the present without compromising the ability of future generations to meet their own needs."(Unite Nations General Assembly, 1987).The goals and targets are universals, meaning they apply to all countries around the world, not just poor countries. Reaching the goals requires action on all fronts-governments, businesses, civil society and people everywhere all have a role to play .Sustainable development is in the news every day as the world handles with climate change, biodiversity loss, conflict and resource scarcity.In the present situation we struggle with Corona virus COVID-19 Pandemic problem which is highly infectious,spreading all over the world.Government declared lockdown for the safety purpose.This infection is out of control in some countries ,death rate increases.WHO declared it as a Pandemic in all over the world.

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Harvesting amino acid doped KDP crystal by temperature and time control using AVR microcontroller

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ABSTRACT

The significant advances in the fascinating field of solid state physics which is largely concerned with crystal world. The growth of crystal was reported along growth zone plane ⟨011⟩ and ⟨101⟩ by seed rotating crystal method under specially made constant temperature bath which was observed by Temperature and time control using AVR microcontroller software simulation. The AVR Microcontroller Based Temperature Control System with Real Time Data Logger is designed and developed in our laboratory. The doping concentrations in mother solution were 1.0 mol% and 2.0 mol% and corresponding seed rotation rate 30 rpm and 60 rpm for 15 days to 20 days. A transparent clear crystals has been harvested of size 10 × 12 × 24 mm, 10^2 × 35 mm. the crystal structure and perfection were determine using powder XRD. The Vickers micro hardness (H_v) for LV doped KDP crystals at constant load at 50 g, was found 120.4 H_v and 122.0 H_v. This shows that the concentration of dopant increases the hardness property of crystals. The Vickers hardness value increases as dopant concentration increases due to stiffness of grown crystal which has low porosity. The dielectric constant decreases for increasing frequencies and remains constant at higher frequencies. The valine doped KDP crystal shows the property of SHG.

1. Introduction

The nonlinearity property is very important in material for its opto-electronics, laser action, storage devices and telecommunication application. KDP is that it's best known, transparent dielectric material for NLO and has best electro optical properties [1]. KDP family crystal such as its isomorphs ADP, DKDP which has been used for nonlinear optical and electro-optic application for X-ray fluorescence analysis, single crystal of ADP are used for frequency doubling, frequency tripling of laser systems, optical switching in inertial confinements fusion and acousto-optical devices [2,3]. Kumaresan et al. [22] have improved the mechanical and electrical properties of KDP crystal by doping amino acids such as L-glutamic acid, L-histidine and L-valine. Non-Linear optical (NLO) crystals are a key material for the development of laser science and technology because there is almost only this kind of materials that have functions to change frequency of laser beam and modulate it in amplitude and phase. The study reveals that the efficiency of SHG enhance by doping organic molecule, e.g. amino acid in the host crystal of KDP due its high nonlinear coefficients [4]. The presence of amino acid impurity in KDP solution was found to increase the hardness value of the material, optical transmission, electrical conductivity with temperature [5,6]. Researchers grown large number of crystals in order to modify electrical, SHG, mechanical properties of KDP crystal [7–9].

A good transparent crystal were grown by Seed Rotating Crystal Method (SRCM). The excellent defect free seed were chosen for crystal preparation. The doping concentration in mother solution was 1.0 mol % and 2.0 mol % with corresponding seed rotation rate was 30 rpm and 60 rpm for 15 to 20 days. The growth of crystal have been observed was about 0.5 mm to 1 mm per day. A transparent clear crystals has been harvested of size 10 × 12 × 24 mm, 10^2 × 35 mm. The growth of crystal was reported along growth zone plane ⟨011⟩ and ⟨101⟩, C-axis at constant temperature bath which was observed by Temperature and time control using AVR microcontroller software simulation. The AVR Microcontroller Based Temperature Control System with Real Time Data Logger is designed and developed in our laboratory. All records of temperature and controlling system are maintained with the help of data logger. Data is logging & the data is transmitted to computer by serial port. Output is displayed on LCD display including heating status.

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"AN APPLICATION OF CAPITAL ASSET PRICING MODE (CAPM) ON VALUATION OF EQUITY LINKED SAVING SCHEMES"

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ABSTRACT

Money lying at leisure in our bank account is a chance lost. We must always invest that capital smartly to induce excellent returns out of it. For a greenhorn Investors, it's being advised to adopt a meticulous investment strategy and diversify their portfolio, as through diversification overall investment risk can be reduced. Many AMC's Floated plenty of schemes for the investors to invest their surplus savings. Within this context, close evaluation of mutual funds has become essential. Hence, picking out profitable mutual funds for investment could be an important issue. The foremost intention of this research work is to investigate financial performance of selected Equity Linked Saving Schemes through the employment of Financial & statistical parameters like (Average annualised return, beta, Capital Asset Pricing Model). The findings of this research study are help full to investors for their future investment decisions.

Keywords: Mutual funds, Equity Linked Saving Schemes, investors.

1. Introduction :

Ample Mutual Funds are available where the investors can Park their wealth. But, before investing they want to be aware with the fact that which fund gives more return, which fund is more risky etc. All these can be found out using certain key ratios & statistics. With the assistance of those key ratios & statistics an investor can analyze different mutual funds and put his/her money during a fund which suits his/ her risk perception. Mutual fund returns can be evaluated using Arithmetic mean, Compounded Annual Growth Rate; etc, Whereas risk will be analyzed by checking out standard deviation, Beta.

Taking this under consideration an approach to evaluate the performance of mutual fund schemes is Capital Asset Pricing Model (CAPM).

2. Equity Linked Saving Schemes :

With the objective to grant the double advantage of Capital Appreciation and Tax write-offs to Investors, Equity Linked Saving Scheme has been designed with their maximum exposure in equity and equity-oriented securities, a part of the quantity is additionally parked in debt

3. Literature Review :

Ashraf & Sharma (2014) analyzed mutual fund performance of 10 growth oriented- open ended- equity mutual fund schemes. on the premise of Coefficient of Variation, Treynor's ratio, Sharpe's ratio, Jensen's measure, Fama's measure and Regression analysis. They use monthly NAVs and benchmark market index for the period of April 2007 to March 2012.

Shukla (2015) studied the 5 categories of mutual fund i.e. mid & small cap, large-cap, multi cap, infrastructure and hybrid. This study analysed the financial performance in terms of risk return relationship of selected mutual fund schemes through the statistical parameters such as alpha, beta, standard deviation, r-squared, Sharpe ratio. Infrastructure and Mid & Small Cap funds have performed better than the benchmark, Equity Linked Saving Schemes and hybrid funds on return parameters.

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E– Tourism–A Key Element for the Growth of Maharashtra Tourism Development Corporation.

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Abstract

The Internet is rapidly using for the distribution of tourism information and sales. This paper deals with e-tourism in Maharashtra. The Web sites can now have equal Internet access to international tourism markets. Research examines problems and solutions concerned to electronic tourism in the tourism industry and guides for successful e-tourism in tourism to be applied by the sector and the government of Maharashtra. The corporate world has taken over the majority of skilled man power providing them with the maximum salaries, hence leaving another challenge in the travel industry of rather small number of skilled manpowers interested to seek employment in the field. The research paper tries to examine the following factors.

- Role of e – tourism in promoting tourist destination in Maharashtra.
- The benefits of e – tourism on the number of incoming tourists and on the life of local service providers.

Keywords: e - Tourism, e – Business.

Introduction

As per WTO, the Internet is rapidly using for the distribution of tourism information. An increasing proportion of Internet by the people for buying online and tourism would gain a larger share of the online

RESEARCH ARTICLE

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Study of Acoustical Properties of Lead Oxide Nanoparticle in Different Solvent Mixtures at 305 K by Using Nanofluid Interferometer

Avinash A. Ramteke, Pradnya K. Chougule, Neeraj Prasad, Yogesh K. Vyawahare, Shivaji R. Kulal, and Amit R. Yaul*

In the present paper, study the acoustical properties of lead oxide nanoparticles through the measurement of ultrasonic velocity and density of lead oxide nanoparticles as a ligand in 70% dioxane + water, 70% methanol + water, and 70% ethanol + water mixtures-based solutions has been carried out, this measurement is important for understanding the particle–particle, particle–solvent, and molecular interaction. The reported nanoparticles of lead oxide by using biological method such as using plant extract, but their acoustical properties of lead oxide nanoparticles are attracted the attentions of many researchers. Hence, the present investigation is focused on the study of acoustical parameters of lead oxide nanoparticles like adiabatic compressibility (β), acoustic impedance (Z), free length, and relative association by using the nanofluid interferometer. These measurements are carried out at frequency 2 MHz and temperature 305 K (at room temperature). The obtained results are helped to observe the behavior of ultrasonic velocity and acoustic properties at different concentrations range of ligand (i.e., lead oxide nanoparticle) such as 0.01, 0.05, 0.10, and 0.15 mol dm^{-3} reveal the presence of interaction between particle–particle, particle and solvent.

1. Introduction

Nanomaterials are in performance and important role in the developing science and technology. Hence, their unique structural features, morphology, and size make them interesting ligands. They have wide application in the fields of medical science, physical science, chemical science, and biological science.[1–4] The lead oxide nanoparticle is having extensive uses in the field of medical, chemical, and physical science due to these interesting uses, which has been attracted the attention of researchers toward the simple and more efficient synthetic methodology. Out of all the synthetic methods, biological method is so simple and efficient. Hence, the prepared the metal oxide nanoparticle by biological method but still acoustic properties is lacking behind; therefore, many researchers are interested to know the physical and acoustical properties of metal nanoparticles. In recent years, ultrasonic waves have acquired the status of an important probe for the study of structure and properties of matter in basic science. Acoustic means sound wave propagation arising from the high frequency acoustic irradiation of a fluid can generate considerable stresses at the free surface of the fluid leading toward its destabilization and subsequent breakup. Acoustic technique is best suited for physicochemical studies of various systems.[5–7] Molecular interaction studies on *n*-alkanols in cyclohexane with DMF at 303 K by Thirumaran and Jayalakshmi.[8] The study of acoustical properties of silver nanoparticles[9] and cupric oxide nanoparticles[10] in aqueous solutions of various glycols.

An exhaustive literature review tells that the study of acoustical properties of nanomaterials still lacking behind. Hence, we have undertaken this study and focused on acoustical properties of

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