

Lecture Notes on Data Engineering
and Communications Technologies 26

Jude Hemanth
Xavier Fernando
Pavel Lafata
Zubair Baig *Editors*



International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) 2018

Editors

Jude Hemanth
Department of ECE
Karunya University
Coimbatore, India

Xavier Fernando
Department of Electrical and Computer
Engineering, Ryerson Communications Lab
Ryerson University
Toronto, ON, Canada

Pavel Lafata
Faculty of Engineering, Department
of Telecommunication Engineering
Czech Technical University
Prague, Czech Republic

Zubair Baig
School of Science, Joondalup Campus
Edith Cowan University
Joondalup, WA, Australia

ISSN 2367-4512

ISSN 2367-4520 (electronic)

Lecture Notes on Data Engineering and Communications Technologies

ISBN 978-3-030-03145-9

ISBN 978-3-030-03146-6 (eBook)

<https://doi.org/10.1007/978-3-030-03146-6>

Library of Congress Control Number: 2018958966

© Springer Nature Switzerland AG 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland



Rescheduling Enhanced Min-Min (REMM) Algorithm for Meta-task Scheduling in Cloud Computing

D. I. George Amalarethinam¹ and S. Kavitha²(✉)

¹ Department of Computer Science, Jamal Mohamed College, Trichy, India
di_george@ymail.com

² Department of Computer Science, Saradha Gangadharan College,
Pondicherry, India
kavidharan2000@gmail.com

Abstract. Cloud computing is a service based and internet-oriented way of providing IT services on request. It contains all the computing resources from hardware infrastructure to software platform with software applications in distributed environment. To process a task with remote resources, Scheduling is a primary process. It comes under NP-Complete problem. A perfect task scheduling strategy handles the scheduling issues like makespan, cost, load balancing, resources utilization, fault tolerant and energy efficiency. This paper proposes a new REMM algorithm. This strategy decides the allocation of tasks in Meta task set based on speed of resources in cloud environment.

Keywords: Scheduling · Meta-task · Rescheduling · Min-Min
Makespan · Resource utilization

1 Introduction

Now a day's Cloud Computing takes important part in day to day life. Each one wishes to utilize resources instantly with lesser cost by using Cloud Computing. It is a kind of ubiquitous computing which provides almost all the IT services in virtualized way with the help of internet [1]. There are various issues exists in it like scalability of network of data centre, energy management, duplication strategies, scheduling methodology and security [2–4]. The principal intention of this article is optimizing the scheduling strategies. Task Scheduling is the process by which the specified task is allotted to the appropriate resource that finishes it in efficient manner to minimize the total response time [4]. Scheduling itself has several parameters like execution time, resource utilization, fault tolerant, cost, load balancing and energy efficiency. It is intricate to schedule a set of submitted tasks set called meta-task, from diverse consumers on a computing environment to satisfy scheduling parameters. There are different types of algorithms existing for scheduling; the core profit of scheduling algorithm is to get a high computing performance and the finest system throughput [5].

ISSN



ijs

ISSN: 2395-5929
UGC Jr. No.: 45308
Impact Factor: 1.14

EIJFMR

**Emperor International Journal of
Finance and Management Research**

Volume-IV Special Issue-01 January-2018

Editor-In-Chief

Dr. A. JAFAR AHAMED, Ph.D

Associate Professor

PG and Research Department of Chemistry

&

Coordinator, Department of Hotel Management and Catering Science

Jamal Mohamed College (Autonomous)

Tiruchirappalli-620 020, India.



**Published by
Mayas Publication®**

Tamilnadu | Kerala | Karnataka | New Delhi

maya1984kannan@gmail.com

editoreijfmr@gmail.com

customersupport@eijfmr.com

www.eijfmr.com



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years



ISSN: 0973-0303
Volume: SPL NSATP-19

**PROCEEDINGS OF
THE NATIONAL LEVEL SEMINAR
ON**

**ADVANCED TOPICS IN PHYSICS
(NSATP - 19)**
(Under UGC Autonomous Grant)

6th March 2019



Organised by

**POST GRADUATE AND RESEARCH DEPARTMENT OF PHYSICS
JAMAL MOHAMED COLLEGE (Autonomous)**



College with Potential for Excellence
Reaccredited (3rd Cycle) with 'A' Grade by NAAC
Affiliated to Bharathidasan University
Tiruchirappalli – 620 020



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

**PROCEEDINGS OF THE
NATIONAL LEVEL SEMINAR
ON**

**ADVANCED TOPICS IN PHYSICS
(NSATP - 19)**



ज्ञान-विज्ञान विमुक्तये

(UNDER UGC AUTONOMOUS GRANT)

6th March 2019

ORGANISED BY



Since 1951

**POST GRADUATE AND RESEARCH DEPARTMENT OF PHYSICS
JAMAL MOHAMED COLLEGE (Autonomous)**

College with Potential for Excellence

Re-accredited (3rd Cycle) with 'A' grade by NAAC

Affiliated to Bharathidasan University

Tiruchirappalli – 620 020.

TAMIL NADU



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

All Rights Reserved

No part of this publication may be reproduced, stored in retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of the publisher. All data, information, views, opinions, charts, tables, figures, graphs that are published are the sole responsibilities of the authors.

EDITORIAL COMMITTEE

Convener

Dr. M. Jamal Mohamed Jaffar

Associate Professor and Head, Department of Physics

Organizing Secretary and Editor - in - Chief

Dr. S. Abbas Manthiri

Assistant Professor, Department of Physics

Member

Dr. A. Ishaq Ahamed

Associate Professor, Department of Physics

ISSN:0973-0303

Volume:SPL NSATP-19



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

Editorial

Science and Engineering had its roots in Physics but has now grown into a vast scientific discipline encompassing polymers, ceramics, glass, composite materials and biomaterials. Virtually all sophisticated products – computers, aircraft, and biomedical devices – require materials manufactured to precise specifications. Increasingly, these specifications are determined at the molecular level. The phenomenal growth of Physics and its branches may well be attributed to the concomitant advances in Spectroscopy, Ultrasonics, Crystal Growth, Biophysics, Organic Crystals, Thin Films, Nanoscience and Nanotechnology. The overwhelming response that we have received from scientists and researchers to this National Level Seminar on Advanced Topics in Physics (NSATP- 19) is an ample evidence to this fact.

On behalf of the organizing committee of NSATP- 19 we cordially welcome our chief guests, resource persons and the participants to this seminar and feel honoured of their prominent presence. The technical sessions involve in four invited talks related to ongoing research in Physics such as in the field of medicine, nanotechnology, environment and industry as well as paper and poster presentation by young researchers and students. The response is overwhelming with over 55 research articles being submitted for presentation in various categories: Spectroscopy, Crystal Growth, Thin Film, Nanomaterials, Ultrasonics and Materials Processing.

The Organizing Committee of NSATP- 19 wishes to thank all the senior Scientists and Researchers for having accepted their invitation and enlightening them through their lectures and papers arising out of years of dedicated research. Their gracious presence has made this National Level Seminar a grand success. Organizing a National Seminar of this dimension calls for planning, consultations and coordinated teamwork and we have received all of these in an ample measure. As the Organizing Secretary, I feel humbled by the opportunity presented to me and would like to register at this juncture, my deep sense of gratitude to our benevolent Management, beloved Principal and my dear Head of Department for their help, guidance and support. I would also like to thank the learned faculty, non-teaching staff members, dedicated research scholars and committed students of our department for their collective teamwork. The grand success of NSATP- 19 is only due to their kind cooperation and hard work.

S. ABBAS MANTHIRI
Organizing Secretary, NSATP- 19



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

THE JAMAL

Jamal Mohamed College was established in 1951 as a religious minority institution with the primary objective of providing higher education to the down-trodden and socially backward sections of the society in general and Muslim minority in particular. Hajee Janab M. Jamal Mohamed Sahib and Janab N. M. KhajamianRowther were its founding fathers. During its inception it was affiliated to the University of Madras, Chennai and then to Bharathidasan University, Tiruchirappalli. When it was incorporated in 1982, the college had a humble beginning offering, two UG Programmes and Intermediate Courses with a student strength of 250 and 12 staff members. Over the years, the college has grown from strength to strength as a multidisciplinary institution, offering now 20 U.G., 19 P.G., 18 M.Phil. and 16 Ph.D. Programmes and a host of certificate, Diploma and Career Oriented Programmes with a student strength of about 12,000 and a total staff strength of 482 well qualified teachers. True to the goals envisaged by its founding fathers, the college offers a holistic education preparing the students to succeed not only in their careers, but also to grow up into responsible, law abiding citizens, conscious of their commitment to the society. Its performance finds reflection in the patronage received by the college not only from the society but also by the governmental authorities from time to time. In the year 2001-02 it was awarded FIVE STAR status by the NAAC. In the year 2003-04, it was granted autonomous status by the UGC on the recommendation of the Bharathidasan University. During 2009-10 it was awarded Grade A status during the second cycle of Accreditation. In the year 2011-12 it was awarded the prestigious "College with Potential for Excellence" status by the UGC. In the year 2015-16 the college was once again awarded Grade A during the third cycle of Accreditation by the NAAC

DEPARTMENT OF PHYSICS

Right from its inception in 1951, the Department has been doing yeoman service to the society in general and the student community in particular, imparting quality Physics education to the needy and down-trodden members of the society. The department has a band of highly qualified and dedicated faculty. The splendid efforts of the department found reflection in the award of financial assistance to the tune of Rs.28 lakhs under the DST-FIST Programme, by the Department of Science and Technology, Govt. of India for the improvement and strengthening of Post-Graduate programme.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

In addition the department has been receiving the substantial financial assistance from other central agencies like UGC, DST etc. The department has splendid infrastructural facilities, with well developed laboratories and advanced instruments such as ultrasonic liquid interferometer, spectrophotometer, thin film dip coating unit, computer facilities etc., added over the years. Taking advantage of the autonomy granted to the college, the department has been introducing innovative programs for the benefit of the students.

THEME OF THE CONFERENCE

The theme of the seminar is

1. To create awareness about the recent technical advancement in the field of physics.
2. To provide an opportunity for the young researchers to gain an insight into the frontier areas of research in Physics and also to provide an opportunity to interact with experts in the relevant field.
3. It will also provide enough guidance and expert knowledge relating to the development of Physics.
4. This Seminar will have lectures by an eminent scientist who will share their experiences in their respective fields and will provide guidance towards advances in Physics.

The topics covered in the seminar are

- Ultrasonics and applications
- Nanomaterials
- Non-Conventional Energy
- Nuclear Physics
- Potential Hi-Tech devices and Bio-Medical applications
- Spectroscopy
- Thin Films and applications
- Crystal Growth and applications
- Photonics crystals
- Nonlinear Dynamics



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

AIMS AND OBJECTIVES

- To explore the advancements made in the field Physics and allied disciplines in recent years.
- To familiarize the researchers and student community of the various techniques, processes and tools essential to have a meaningful insight of these developments.
- To bring in eminent experts in these fields to enrich the participants with their expertise and experiences in these areas. To provide a forum to young researchers and students to interact with their peers for equipping themselves for a prospective research career.



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

PATRONS - MANAGEMENT COMMITTEE

Janab. **M.J. JAMAL MOHAMED BILAL**- President

Janab. **Dr. A.K. KHAJA NAZEEMUDEEN**, D.Litt (USA)

Secretary and Correspondent

Hajee. **M.J. JAMAL MOHAMED**- Treasurer

Dr.K. **ABDUS SAMAD**, Assistant Secretary

DIRECTORS

Dr. **K.N.ABDUL KADER NIHAL**, Director & Bursar, Head - Department of IT

Dr. **K.N. MOHAMED FAZIL**

Director – Hostel Administration

Mr. **M.A.JAMAL MOHAMED YASEEN ZUBEIR** Director-Hostel Administration
and Registrar of Attendance (SF)

Ms.J. HAJIRA FATHIMA

Deputy Director - Hostel Administration(Women)



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ORGANISING COMMITTEE

CHAIRMAN

Dr.S. ISMAIL MOHIDEEN
Principal, Jamal Mohamed College

CONVENER

Dr. M. JAMAL MOHAMED JAFFAR
Associate Professor and Head, Department of Physics

ORGANIZING SECRETARY

Dr .S. ABBAS MANTHIRI
Assistant Professor, Department of Physics

NATIONAL ADVISORY COMMITTEE

Dr. U.Ponnambalam,

Professor (Rtd), Department of Physics, Presidency College, Chennai.

Dr.V.Kannappan, Professor (Rtd), Department of Chemistry, Presidency College, Chennai

Dr.S.GunaSekaran Dean (R&D) St.Peter's University of Higher Education and Research.
Avadi, Chennai.

Dr.K.Thamilmaran,

Professor and Head, Centre for Nonlinear Dynamics, Bharathidasan University, Trichy

Dr.V.Mani,

Head, Department of Electronics & Information Technology. Govt. of India. Hyderabad

Dr. V.Elangovan

Associate Professor & Head, Kanjima Munivar Centre for Post Graduate Studies.
Puducherry.

Dr.V.Sathyanarayanamoorthi,

Associate Professor of Physics, PSG College, Coimbatore.

Dr. D.Sastikumar

Professor, Department of Physics, NIT, Tiruchirappalli.

Dr.G.Manivannan

Associate Professor of Physics, NIT, Tiruchirappalli

Dr.R.K.Biju

Assistant Professor of Physics, PRNSS College, Kannur, Kerala.

Dr. Gene George

Associate Professor, Department of Physics, T.B.M.L.College, Porayar.

Dr.R. Ramesh Babu

Assistant Professor, School of Physics, Bharathidasan University, Trichy

Dr.S.Ramalingam

Assistant Professor of Physics, AVC College, Mayiladuthurai,



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

EXECUTIVE MEMBERS

Mr.A.Mohamed Saleem	Dr.S.Prabhakaran MID
Dr.A.Ishaq Ahamed	Mr. I. Mansur Basha
Dr.N.Peer Mohamed Sathik	Ms.R.Gowthar
Dr.R.Radha Krishnan	Mr. P.Mohamed Anwar
Capt.F.S.Muzammil	Mrs.J. Sabna Ahsmi
Dr.R.Raj Muhamed	Mrs.M.Ayesha Begum
Mr.J.Umar Malik	Mrs.S.Priya
Dr.J.Ebenezar	Mrs. M.Shobanambigai
Mr.A.Abbas Manthiri	Mrs.A.G.Mareyam Ayesha
Dr.A.S.Haja Hameed	Mrs.G.Pragadeeswari
Dr.S.Shek Dhavud	Ms.C.Marie Quintine Sherly
Mr.S.M.I. Sulaiman Sait	Mrs.P.Aiswarya Lakshmi
Dr. C.Hariharan.	

SUPPORTING STAFF

Mr. A. Rafiq Ahamed	Mr. K. B. Syed Ishaq	Mr. H.Ahamed Hussain
Mr. J.Kamaludeen	Mr. M.Mohamed Hassan	Mr. S.Mohamed Ibrahim

INVITED SPEAKERS

Dr. G.Gopinath

Registrar, Bharathidasan University, Tiruchirappalli - 620 024.

Dr. V. Kannappan

Professor, Dept. of Chemistry (Rtd), Presidency College, Chennai-600 005.

Dr. R.K.Biju

Assistant Professor, Dept. of Physics, PRNSS College, Mattannur, Kannur District, Kerala.

Dr.K.Thamilmaran

Professor and Head, Centre for Nonlinear Dynamics, Bharathidasan University, Trichy.



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

PROGRAMME

INAUGURATION

Venue	:	Hussainudeen Hall A/c
Registration	:	8:30 a.m. – 9.00 a.m.
Inauguration	:	9.00 a.m.
Welcome Address & Introduction of the Chief Guest	:	Dr. M. Jamal Mohamed Jaffar Convener and Head, Department of Physics
Presidential Address	:	Hajee. Dr. S. Ismail Mohideen Principal
Theme of the Seminar	:	Dr. S. Abbas Manthiri Organizing Secretary
Inaugural Address	:	Dr. G.Gopinath Registrar, Bharathidasan University, Tiruchirappalli.
Release of e-Souvenir	:	Janab. Dr. A. K. Khaja Nazeemudeen, D.Litt (USA) Secretary and Correspondent
Felicitations	:	Janab. Dr. A. K. Khaja Nazeemudeen, D.Litt (USA) Secretary and Correspondent Hajee. M.J. Jamal Mohamed Treasurer Dr. K. Abdus Samad Assistant Secretary Dr. A. Mohamed Ibraheem Vice Principal Hajee. Dr. M. Mohamed Sihabudeen Additional Vice Principal Dr. K. N. Abdul Kader Nihal Director and Bursar (SF) Head, Department of IT Dr. K. N. Mohamed Fazil Director – Hostel Administration Mr. M. A. Jamal Mohamed Yaseen Zubeir Director – Hostel Administration & Registrar of Attendance (SF) Ms. J. Hajira Fathima Deputy Director – Hostel Administration (Women)
Vote of Thanks	:	Dr. A. Ishaq Ahamed Associate Professor, Department of Physics
11.30 a.m. – 11.45 a.m.	:	Tea Break



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

11.45 a.m. – 1.00 p.m.	:	Technical Session – I
	:	Plenary Lecture-I: Applications of Ultrasound in assessing intermolecular non-covalent interactions in liquid mixtures Dr. V.Kannappan Professor of Chemistry (Rtd) Presidency College, Chennai.
1.00 p.m. – 2.30 p.m.	:	Lunch Break
2.30 p.m. – 4.00 p.m.	:	Technical Session – II
	:	Plenary Lecture-II : Nuclear decay properties and its analysis in the super Heavy region Dr.R.K. Biju Assistant Professor, Department of Physics, PRNSS College, Mattannur, Kannur District, Kerala.
2.30 p.m. – 3.30 p.m.	:	Technical Session – III : Oral Presentation (Parallel Session)
Venue	:	Physics Seminar Hall
2.30 P.M – 3.30 P.M	:	Technical Session – IV Poster Presentation (Parallel session)
Venue	:	Physics Department - PG Laboratory
4.00 p.m. – 4.30 p.m	:	Tea Break



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

VALEDICTION – 4.30 p.m.

Welcome Address	:	Mr. A. Mohamed Saleem Associate Professor, Department of Physics
Report of the Conference	:	Dr. S. Abbas Manthiri Organizing Secretary
Presidential Address	:	Hajee. Dr. S. Ismail Mohideen Principal
Introduction of the Chief Guest	:	Dr. M. Jamal Mohamed Jaffar Convener and Head
Valedictory Address	:	Janab. Dr. A. K. Khaja Nazeemudeen, Secretary and Correspondent, Jamal Mohamed College (Autonomous), Tiruchirappalli.
& Distribution of Certificates		
Felicitation	:	Hajee. M.J. Jamal Mohamed Treasurer Dr. K. Abdus Samad Assistant Secretary Hajee. Dr. S. Ismail Mohideen Principal Dr. A. Mohamed Ibraheem Vice Principal Hajee. Dr. M. Mohamed Sihabudeen Additional Vice Principal Dr. K. N. Abdul Kader Nihal Director and Bursar (SF) Head, Department of IT Dr. K. N. Mohamed Fazil Director – Hostel Administration Mr. M. A. Jamal Mohamed Yaseen Zubeir Director – Hostel Administration & Registrar of Attendance (SF) Ms. J. Hajira Fathima Deputy Director – Hostel Administration (Women)
Vote of Thanks	:	Dr. S. Abbas Manthiri Department of Physics
National Anthem		

**Criterion III Research, Innovations & Extension****3.4 Research Publications and Awards****3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years****CONTENTS****INVITED TALK**

Article No.	Title	Corresponding Author	Page No.
IT1	Applications of Ultrasound in Assessing Strength of Molecular Non-covalent Interactions in Liquid Mixtures	Dr. VenuKannappan	1
IT2	Chaos in Simple Nonlinear Oscillators	Dr. K. Thamilmaran	3
IT3	Nuclear Decay Properties and its analysis in the Super Heavy Region	Dr. R. K. Biju	4

SPECTROSCOPY

Article No.	Title	Corresponding Author	Page No.
SP-1	Synthesis, Spectroscopic, NBO, NLO, antimicrobial and Molecular docking study of 3 - (biphenyl-4-yl) -1- (2,4-dichlorophenyl) prop-2-en-1-one	A. Thamarai, R. Vadamar, S. Muthu, M. Raja, R. Raj Muhamed	5
SP-2	Synthesis, Spectroscopic Analysis And Pharmacodynamic Investigation Studies Of Novel Mannich Base	S. Mohamed rabeek and M. Seenimubarak	6
SP-3	Spectroscopic study, NLO, NBO analysis, HOMO and LUMO analysis of (1R,2S)-2-(aminomethyl)-N,N-diethyl-1-phenylcyclopropane-1-carboxamide by density functional methods	C.A, Harikrishnan, Johanan Christian Prasanna, S. Muthu,	7
SP-4	Molecular Structure, Spectroscopic (FT-IR, FT-Raman, NMR, UV), HOMO-LUMO Analysis of 1-Bromo-4-Nitrobenzene by Quantum Computational Methods	Rasheed .M.P, S.Seshadri R Sangeetha, M.Padmavathy	8
SP-5	Molecular Structure, Spectroscopic, Nonlinear Optical and Biological Evaluation Of 3-(Biphenyl-4-Yl)-1-(4-Chlorophenyl) Prop-2-En-1-One: Experimental and Computational Modeling Approach	A. Thamarai, R. Vadamar, M.Raja, S. Muthu, R. Raj Muhamed	9

**Criterion III Research, Innovations & Extension****3.4 Research Publications and Awards****3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years**

SP-6	Spectroscopic , DFT calculations and molecular docking analysis of (2s,2's)-2,2-(Ethane-1,2-diylidimino) dibutan-1-ol	S.Sakthivel, T. Alagesan, S. Muthu, G.Ramesh	10
SP-7	The spectroscopic, Quantum computational and Molecular docking study of N-(4-Chloro-3-methylphenyl)-2-phenylacetamide.	R. Shahidha, S. Muthu' M. Raja, R. Raj Muhamed, B.Narayana, Prakash S Nayak and B.K. Sarojini	11
SP-8	Spectroscopic, NLO, NBO analysis, HOMO and LUMO analysis of Methyl[(3R)-3-(2-methylphenoxy)-3-phenylpropyl]amine by density functional methods	Sheril Ann Mathew, Johanan Christian Prasanna ¹ , S. Muthu	12
SP-9	Studies on effects of novel safrole derivatives on apoptosis using polarizable continuum model	Krishnaveni. S, Mary Josephine. X , Sathynarayanamoorthi. V ^{a*}	13
SP-10	Synthesis, Characterisation and biological activity of some Organic Chalcones	M. Yaseen Mowlana and A. Jamal Abdul Nasser	14
SP-11	Synthesis, spectroscopic characterization of novel (Z)-3-(3-chloro-2, 6-difluorophenyl)-1-(1H-imidazol-1-yl) prop-2-en-1-one, its molecular structure, NBO analysis, intramolecular interactions studied by DFT approach	R.Raj Muhamed,.K.Kumanan,S.Abbas Manthiri, R.Rajesh	15
SP-12	Pharmacodynamic investigation and QSAR analysis on Molecular structure of 5-[(2E)-3-(furan-2-yl)prop-2-enoyl]-4-hydroxy-2H-pyran-2-one using spectroscopy tools supported by quantum calculations	A. Asrar Ahamed and M. Mohamed Sihabudeen	16
SP-13	Spectroscopic [FT-IR and FT-Raman] and theoretical [UV-Visible and NMR] analysis on some acrylamide derived mannich by DFT calculations	G. Hema Sindhuja and S.R. Bheeter	17
SP-14	Spectroscopic (FT-IR, FT-Raman), first order hyperpolarizability, nbo and homo-lumo analysis of (2e)-3-(2h-1,3-benzodioxol-5-yl)-n-phenylprop-2-enamide	Sudharsan, Gokula Krishana, R. Raj Muhamed, S.Abbas Manthiri	18



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

SP-15	Synthesis, spectroscopic, NLO, NBO, HOMO-LUMO, antimicrobial and molecular docking analysis of (2e)-3-(1h-indol-2-yl)-n-phenylprop-2-enamide	Gokula Krishana, Sudharsan, R. Raj Muhamed, S.Abbas Manthiri	19
SP-16	Molecular docking, spectroscopic, first order hyperpolarizability, nbo and homo-lumo analysis of (2e)-3-(2h-1,3-benzodioxol-5-yl)-n-(4-chlorophenyl)prop-2-enamide	S. Arulappan, V Sathyanarayanamoorthi, R. Raj Muhamed, S.Abbas Manthiri	20
SP-17	Spectroscopic and quantum mechanical investigations of (2E)-3-(2H-1,3-benzodioxol-5-yl)-N-phenylprop-2-enamide using density functional theory method	R Rajesh, V Sathyanarayanamoorthi, S Abbas Manthiri, R Raj Muhamed,	21

THIN FILMS

Article No.	Title	Corresponding author	Page No.
TF-1	Preparation and Characterization of Ag ₂ O:ZnO thin films on glass substrate by using Jet Nebuliser technique	V.Prabhu, A. Mohamed Saleem, S. Nivetha, R. Perumalsamy, A. Ayeshamariam, N. Punithavelan, M. Jayachandran	22
TF-2	Studies on synthesis and characterization of Cd ₃ xIn _{2-2x} S ₃ (0 ≤ x ≤ 1) alloy thin films by nebulized spray pyrolysis technique	J.Raj Mohamed, L. Amalraj	23
TF-3	An Interdependence Study of ZnO Thin Films	P.S. Vinod, V. Ponnuswamy, C. Sankar, K.Brinda.	24
TF-4	A Characteristic Study on Lead Sulphide Thin Film	W. Christopher Immanuel ¹ , S. Paul Mary Deborah ^{2,*} , S.S.R. Inbanathan ^{2,**} , D. NithyaaSree ²	25
TF-5	Enhanced of visible light driven photocatalytic dye degradation efficiency of ZnO thin films through Cu + N codoping	D. S. Vasanthia, K. Ravichandran	26
TF-6	Synthesis and characterization of Mg Doped ZnO Thin Films Prepared By Silar Method	P. Mohamed Anwar, S. Muruganantham	27
TF-7	Effect of F doping on physical properties of (211) oriented SnO ₂ thin films prepared by jet nebulizer spray pyrolysis technique	M.Thirumoorthi, J.Thomas Joseph Prakash	28



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

TF-8	Fabrication of $\text{ZnO}:\text{Cu}:\text{g-C}_3\text{N}_4$ thin films deposited on stainless steel meshes for enhanced photo catalytic activity	K. Shantha Seelan & K. Ravichandran	29
TF-9	Structural , Optical and Electrical properties of Ni-doped ZnO thin films by SILAR method for gas sensor applications	S. Syed Zahirullah	30

CRYSTAL GROWTH

Article No.	Title	Corresponding author	Page No.
CG-1	1,6 Hexane thiol as a Corrosion Inhibitor for Zinc Metal in Acidic Solutions	S.S Syed Abuthahir, M.Raja	31
CG-2	Structural, optical and thermal characterization of amino acid doped ADP single crystals for optoelectronic applications	S. Shek Dhavud J. Thomas Joseph Prakash	32
CG-3	Growth and HRXRD, Optical and Thermal studies of Pure and Rare-Earth metal doped Ammonium Penta Borate (APB) single crystals	K.Prabha, M. Rameshbabu and G. Bhagavannarayana	33
CG-4	Growth and characterisation of 2-Amino-4-Picolinium-Nitrophenolate-Nitrophenol: an organic NLO crystal	H.J. Trinity Rabecca, A. Santha, J. Roselin Jeyaseeli, S. Brahadeeswaran	34
CG-5	Synthesis, characterization and pharmacodynamic investigation studies of novel heterocyclic compound	M. Sathyanarayanan and M. Seenii mubarak	35
CG-6	Design, characterization and Investigation of structural diversity In Aminoguanidium salts of Isoelectronic 2-Picolinic Acid N-Oxide And 3-Hydroxypicolinic Acid	N. Angamuthu ^a and Jamaludeen ahamed sulthan	36
CG-7	Growth and characterization of Urea ammonium chloride (UAC)	Rafeeqe Ahmed K, Dr. Ramdas balan	37

**Criterion III Research, Innovations & Extension****3.4 Research Publications and Awards****3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years****NANO MATERIALS**

Article No.	Title	Corresponding author	Page No.
NM-1	ZrO ₂ /CeO ₂ nanocomposite oxide via hydrothermal method for Photocatalytic applications	A. Mohamed Saleem, S.A Fowziya, A.Ayeshamariam, C.M. Magdalane, A.M. Uduman Mohideen, M. Jayachandran	38
NM-2	Molecular Structure and Reactivity of nano-Punicalagins – A computational Study	G. SampathKumar,V. Brindha and B. S. Krishnamoorthy	39
NM-3	External pressure effect on novel iron based superconductors	N. R. Tamilselvan	40
NM-4	Biological applications of silver nanoparticles impregnated chitosan Schiff base	Thandapani Gomathi ^{1*} and J. Rakshavi ²	41
NM-5	Green synthesis of silver nanoparticles with anticandidal activity using Lichen <i>Heterodermia leucomela</i> from high altitudes of Kodaikanal	Sitrarasi.R and Razia.M	42
NM-6	Structural, Optical and Antibacterial Activity of Unalloyed and Pb(NO ₃) ₂ alloyed with Zinc Oxide nanoparticles synthesized by simple precipitation method	S.R.M.Jony S.Muruganatham	43
NM-7	Role of Mg doping on structure, energy gap and photoluminescence properties of <i>Centella asiatica</i> extract mediated Mn/Mg doped ZnO nanostructure	R. Subbiah, S. Muthukumaran, V. Raja	44
NM-8	Green Synthesis: Characterization and Antibacterial potential of Silver Nanoparticles by using Bark of <i>Terminalia Arjuna</i>	D. Devi Priya, J. Thomas Joseph Prakash, M. Thamizh Ilakkiya	45
NM-9	Potential application of technetium-99m in the separation of conjoined twins	V.Priyadharshini, V.Bhuvaneshwari and S.Vijikumar	46
NM-10	Synthesis, structural, optical and antibacterial properties of pure and MgCa co-doped ZnO nanoparticles by co-precipitation method	M. Karthikeyan, P. Vijaya Kumarand A. Jafar Ahamed	47
NM-11	Green-Synthesis of Silver Nanoparticles Using Abies Webbiana leaves and Evaluation of its Antibacterial Activity	K. Sowmiya, J. Thomas Joseph Prakash*, M. Tamil ilakkiya	48
NM-12	Structural and photoluminescence properties of Sn/Mn-Doped ZnO Nanoparticles	R.K. Rajakarathikeyan, S. Muthukumaran	49



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI – 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

NM-13	Green-Synthesis of Copper Nanoparticles Using Galinsoga parviflora leaves and Evaluation of its Antibacterial Activity	K. Sowmiya, J. Thomas Joseph Prakash, M. Tamil ilakkiya	50
NM-14	Hot-injection Synthesis and Characterization of CesiumLead Bromide (CsPbBr ₃) All-inorganic Perovskite Nanomaterials for Solar Cell Applications	G. Sahaya Dennish Babu, Shivani Dhall, Felipe Cabellaro, Mengistie L. Debasu	51

OTHER TOPICS

Article No.	Title	Corresponding author	Page No.
OT-1	characterstics of zinc selenide mirror in laser cutting machine.	Gangadhareswaran . H	52
OT-2	Study of molecular interactions in binary mixtures of Benzyl alcohol and cyclohexane system	Saruhasan C & R. Raj Muhamed	53
OT-3	Study of molecular interactions in Binary mixtures of Benzyl alcohol and Chlorobenzene	J. Mohamed Yasar Arafath & R. Raj Muhamed	53
OT-4	Ultrasonic studies on charge transfer complexes of Diphenyl ether with certain amine compounds in N-hexane medium at various temperatures	F.S. Muzammil, R. Raj Muhammed, V. Kannappan	54
OT-5	Ultrasonic and Viscometric Studies of Insulin with Human Blood Serum Interactions of Different Blood Groups both Nondiabetic and Diabetic	R. Rajesh, R. Raj Muhamed, V. Kannappan	55



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

Invited Talk-1

Applications of Ultrasound in Assessing Strength of Molecular Non-covalent Interactions in Liquid Mixtures

Dr. Venu Kannappan

The human ear cannot detect sound above 20kHz, which is the ultrasonic range (1MHz-20MHz). Many animals, such as bats and dolphins, use ultrasonic frequencies for communication and echolocation, as very high-frequency sounds have a short wavelength and can be used to develop a high-resolution picture of the surrounding world. This presentation will cover applications of ultrasound velocity measurement in three different fields, although there are numerous applications.

Amino acids are building blocks of proteins and they exhibit both acidic and basic properties. Investigations on acoustic and thermodynamic properties of amino acids and peptides in aqueous and mixed aqueous solvents have been the area of interest of researchers. Isoelectric point is an important property which characterizes an amino acid and it can be used to separate amino acids in a mixture. There are several methods to determine the isoelectric pH of amino acids and ultrasound technique is a simple and non-destructive tool.

The significance of charge transfer (CT) complexes in various fields including biochemical reactions has been reported in the literature. The formation of 1:1 complexes in binary and ternary liquid mixtures was observed and reported. Recently, we used ultrasonic method to identify CT complexes in different media and their stability constants and thermodynamic parameters were determined for some CT complexes formed between benzene derivatives (donors) and iodine (acceptor). The data obtained by ultrasonic method were supported by the K and thermodynamic parameters determined by UV spectral method.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

The interaction of drug with enzymes and hormones and understanding the mechanisms of drug action would help to design new and more effective antibiotics against resistant bacteria and also to discover new drug targets. These findings clearly establish the need to assess the molecular interaction between antibiotics and insulin. The better efficacy and longer duration of

retention of Cefpodoxime acid (CA) interact significantly with peptide hormone molecules like insulin. Such interaction of CA with human insulin may lead to drug induced hypoglycemia and which leads to the dosage alteration of oral hypoglycemic agent for diabetic patients prescribed with CA. the present investigation is carried out. The third application is the investigation of molecular interaction between CA and human mixtardinsulin at different blend compositions through ultrasonic, dilute solution viscosity(DSV) and UV spectral methods.



ISSN:0973-0303
Volume:SPL NSATP-19

Invited Talk-2

Chaos in Simple Nonlinear Oscillators

Dr. K. Thamilmaran

Professor and Head, Centre for Nonlinear Dynamics, Bharathidasan University,
Tiruchirappalli – 620 020

Abstract

Nonlinear Dynamics and Chaos have been developed in the past two decades as new emergent fields in Physics with an interdisciplinary character. Introductory course on these fields are quite usual for graduate courses in sciences. However many of us are not familiar with or feel uncomfortable with this subject. Hence the main aim of this lecture is two fold, namely to present an overview of the relevance of nonlinearity in describing the evolution of dynamical systems and to experimentally demonstrate the bifurcations undergone by nonlinear systems and the related phenomena such as quasiperiodicity, period doublings and chaos in simple nonlinear electronic circuits. Through these experiments that can be performed in any undergraduate laboratory, we try to show a general overview of nonlinear dynamical systems and to briefly point out their implications.



ISSN:0973-0303
Volume:SPL NSATP-19

Invited Talk-3

Nuclear Decay Properties and its analysis in the Super Heavy Region

Dr. R. K. Biju*

Department of Physics, Pazhassi Raja NSS College, Mattannur, Kerala, India-670702

Email: bijurkn@gmail.com

The fundamental factor in the study of super heavy element is the prediction of doubly magic nuclei next to ^{208}Pb . Many studies predict that the next island of stability located around the spherical doubly magic nuclei in the super heavy region would be $^{298}_{184}114$, $^{292}_{172}120$ and $^{310}_{184}126$. The existence of long lived super heavy nuclei is mainly controlled by spontaneous fission and alpha decay process. But many of the elements in super heavy region can be identified via the alpha decay chain. Alpha decay in super heavy nuclei is possible if the shell effects supply the extra binding energy and increases the barrier height of fission. So the study of the alpha and cluster decay from various super heavy elements helps to identify the stability of the parent nuclei.

In the present work we investigated whether the island of stability could really exist around the above mentioned magic numbers, by studying the half- lives of alpha decay, cluster decay, beta decay and spontaneous fission. Alpha decay and cluster decay half- lives are computed using Coulomb and Proximity potential model and spontaneous fission half - life are calculated by phenomenological formula. We have also developed an empirical model for computing alpha and cluster radioactivity and an empirical formula for computing the spontaneous fission half lives. The competition between the alpha decay and spontaneous fission half -lives of super heavy nuclei is also investigated, and identified that some isotopes of these elements have the alpha decay channel as the dominant mode of decay and they are possible to synthesis. Through alpha decay process these isotopes can be identified in laboratory. Beta decay is another decay mode for the nuclei lie beyond the beta stability line. Beta decay process is slow and less favored because it proceeds via weak interaction. For beta decay process the energy released is less compared to alpha decay and spontaneous fission. We have also analysed the beta and double beta decay process in this region.

Key Words: *Alpha Decay, Cluster Decay, Spontaneous Fission, Beta Decay, Double Beta decay*



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

SPECTROSCOPY : SP-1

Synthesis, Spectroscopic, NBO, NLO, antimicrobial and Molecular docking study of 3-(biphenyl-4-yl)-1-(2,4-dichlorophenyl) prop-2-en-1-one

A. Thamarai^{1,2}, R. Vadamar², S. Muthu^{3*}, M. Raja¹, R. Raj Muhamed⁴

^{1,4}Department of Physics, Govt Thirumagal Mills College, Gudiyattam, 632602, Vellore, Tamilnadu, India.

²Department of Physics, Muthurangam Govt Arts College, Vellore, 632002, Tamilnadu, India.

³Department of Physics, Arignar Anna Govt. Arts College, Cheyyar, 604 407, Tamilnadu, India.

⁴Department of Physics, Jamal Mohamed College, Tiruchirappalli 620020, Tamilnadu, India

Abstract

In the present work, the characterization of 3-(biphenyl-4-yl)-1-(2,4-dichlorophenyl) prop-2-en-1-one (3BDO) molecule was carried out by quantum chemical method and vibrational spectral techniques. The FT-IR (4000-450 cm⁻¹) and FT-Raman (4000-100 cm⁻¹) spectra of 3BDO were recorded in solid phase. From the recorded UV-Visible spectrum, the electronic properties such as excitation energies, wavelength, band gap and oscillator strength are evaluated by TD-DFT in DMSO solution and gas phase methods using 6-311++G(d,p) basis set. The polarizability, first hyperpolarizability and dipole moment are determined. The hyperconjugative interaction energy E(2) and electron densities of donor (i) and acceptor (j) bonds were calculated using NBO analysis. The biological applications of 3BDO have been screened for its antimicrobial activity and found to exhibit antifungal and antibacterial effects. To study the biological activity of the investigation molecule, molecular docking was done to identify the hydrogen bond lengths and binding energy with different antimicrobial protein. Thermodynamic properties of the title compound at different temperatures have been calculated, revealing the correlations the heat capacity (C), entropy (S) and enthalpy changes (H) and temperatures.

Keywords: FT-IR; FT-Raman; NLO; NBO; Antimicrobial; Molecular docking;

* Corresponding author: S. Muthu, Email: mutgee@gmail.com , Contact number: 9443690138

Reference:

[1]N. Sundaraganesan, S.Illakiamani, C. Meganathan, B.D. Joshua, Spectrochim. Acta A 67 p.214-224 (2007).



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

[2] S. Muthu, G. Ramachandran, E. Isac Paulraj, T. Swaminathan, *Spectrochimica Acta A* 128 p 603- 613 (2014).

ISSN:0973-0303

Volume:SPL NSATP-19

SP-2

SYNTHESIS, SPECTROSCOPIC ANALYSIS AND PHARMACODYNAMIC INVESTIGATION STUDIES OF NOVEL MANNICH BASE

S. MOHAMED RABEEK¹ AND M. SEENI MUBARAK²

¹Assistant Professor, ²Associate Professor, PG and Research Department of Chemistry, Jamal Mohamed College (Autonomous),

Affiliated to Bharathidasan University, Tiruchirappalli – 620 020, Tamil Nadu, India.

E-mail: rafeeqchem@yahoo.com

ABSTRACT:

Mannich bases of piperidinone have been synthesized by using 4-chloroacetoacetanilide and 4-methoxybenzaldehyde with ammonium formate. Structures of the compounds were confirmed by IR, ¹H, ¹³C-NMR, mass spectra and elemental analysis. They were also screened for antimicrobial activity of gram positive (*Staphylococcus aureus*) Gram negative (*Escherichia coli* and *Pseudomonas aeruginosa*) and Fungus (*Aspergillus niger* and *Mucor*) against various bacterial and fungal strains employing Ciprofloxacin as standard drug for antibacterial and Nystatin as standard drug for anti fungal.

KEYWORDS:

4-chloroacetoacetanilide, 4-methoxybenzaldehyde, Spectral studies and Antimicrobial activities.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

SP-5

MOLECULAR STRUCTURE, SPECTROSCOPIC, NONLINEAR OPTICAL AND BIOLOGICAL EVALUATION OF 3-(BIPHENYL-4-YL)-1-(4-CHLOROPHENYL) PROP-2-EN-1-ONE: EXPERIMENTAL AND COMPUTATIONAL MODELING APPROACH

A. Thamarai ^{1,2}, R. Vadamar², M.Raja¹, S. Muthu ^{3*}, R. Raj Muhamed⁴

¹Department of Physics, Govt. Thirumagal Mills College, Gudiyatham, 632602, Tamilnadu, India.

²Department of Physics, Muthurangam Govt Arts College, Vellore, 632002, Tamilnadu, India

³Department of Physics, Arignar Anna Govt. Arts College, Cheyyar, 604407, Tamilnadu, India.

⁴Department of Physics, Jamal Mohamed College, Tiruchirappalli 620020, Tamilnadu, India

E-mail: * Corresponding author: mutgee@gmail.com

Abstract

The 3-(biphenyl-4-yl)-1-(4-chlorophenyl) prop-2-en-1-one (3BCO) compound was synthesized and evaluated. The 3BCO compound was analyzed by FT-IR, FT-Raman and UV-Vis spectral technique. The density functional theory (DFT) is currently most successful approach to calculate the molecular structural activity using time-independent Schrodinger equation. The present study, the compute theoretical calculations in ground state using (DFT/B3LYP) 6-311++G(d,p) basis set. Geometrical parameters (bond length and bond angle), vibrational frequencies calculated theoretically and compare to experimental data. The vibrational wavenumbers and corresponding potential energy distribution were performed by Veda program. The molecular electrostatic potential (MEP), natural bond orbital (NBO) and non-linear optical (NLO) properties of the title molecule were investigated by B3LYP method. Molecular docking studies reveal that title compound play a vital role in bonding and results draw us to the concluded that title compound inhibit different antimicrobial proteins.

Keywords: FT-IR; FT-Raman; NLO; NBO; Molecular docking;

References

- [1] M.H. Jamroz, Vibrational Energy Distribution Analysis VEDA 4, Warsaw-2004.
- [2] S. Muthu, G. Ramachandran, Spectrochim. Acta part A **121** p 394-403(2014).
- [3] D. Sajan, H. Joe, V.S. Jajakumar, J. Zaleski, J. Mol. Struct. **785** p 43-53(2006).



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

SP-7

The Spectroscopic, Quantum computational and Molecular docking study of N-(4-Chloro-3-methylphenyl)-2-phenylacetamide.

R. Shahidha^a, S. Muthu^{b,*} M. Raja^c, R. Raj Muhamed^c, B.Narayana^d, Prakash S Nayak^d and B.K. Sarojini^e

^aResearch and Development centre, Bharathiar University, Coimbatore 641 046, India.

^bDepartment of Physics, Arignar Anna Govt. Arts College, Cheyyar, Tamilnadu, India

^cDepartment of Physics, Jamal Mohamed College, Tiruchirappalli 620020, Tamil Nadu, India

^dDepartment of Studies in Chemistry, Mangalore University, Mangalagangothri-574 199, Karnataka, India

^eDepartment of Studies in Industrial Chemistry, Mangalore University, , Karnataka, India

Abstract

The Fourier transform infrared (FT-IR) and Fourier transform Raman (FT-Raman) of N-(4-Chloro-3-methylphenyl)-2-phenylacetamide (**N4C3M2P**) were recorded in the regions 4000 - 400 cm⁻¹ and 4000 - 100 cm⁻¹ respectively, in the solid phase. The molecular structures, vibrational wave numbers, infrared intensities, Raman scattering activities were calculated using DFT method with B3LYP/6-311++G(d,p) basis set. Detailed interpretations of the vibrational spectra have been carried out with the aid of normal co-ordinate analysis (NCA) following the scaled quantum mechanical force field methodology. Molecular electrostatic potential (MEP) and HOMO-LUMO energy levels are also constructed. The stability of molecule has been analyzed by NBO analysis. The molecule orbital contributions were studied by using the total density of states (TDOS), the sum of α and β electron density of states ($\alpha\beta$ DOS). Fukui functions, local softness and eletrophilicity indices for selected atomic sites of the title compound are determined. To study the biological activity of the investigation molecule, molecular docking (ligand-protein) stimulations are performed by using autoDock 4.2.6. The hydrogen bond lengths and binding energy values are determined. Finally, the thermal behaviors of the **N4C3M2P** compound have been calculated by different temperature.

Key words: FTIR, FT-Raman, NCA, NBO, NLO

* Corresponding author: S. Muthu, Email: mutgee@gmail.com , Contact number:

9443690138



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

SP-11

Synthesis, spectroscopic characterization of novel (Z)-3-(3-chloro-2, 6-difluorophenyl)-1-(1H-imidazol-1-yl) prop-2-en-1-one, its molecular structure, NBO analysis, intramolecular interactions studied by DFT approach.

R.Raj Muhamed¹, K.Kumanan², S.Abbas Manthiri¹, R.Rajesh³

¹, Dept of Physics, Jamal Mohamed College, Tiruchirappalli 620020.

². Dept of Physics, Bharathidasan University College, Perambalur 621217.

³. Dept of Physics, Govt Arts and Science College, Dharmapuri.

Abstract:

Theoretical and experimental FT-IR and FT-Raman spectra characterization of (Z)-3-(3-chloro-2, 6-difluorophenyl)-1-(1H-imidazol-1-yl) prop-2-en-1-one were recorded and calculated. The vibrational wave numbers were computed using DFT quantum chemical calculations. The molecular geometry (bond length, bond angle) and vibrational frequencies of the title compounds have been calculated by using DFT/B3LYP method with 6-311++G (d,p) basis set. The title compounds were screened in vitro for antimicrobial activity against three bacterial and fungal strains. Molecular docking studies reveal that title compound play a vital role in bonding and results draw us to the concluded that title compound inhibit different antimicrobial proteins and that have good biological activities.

Keywords: DFT; FTIR; FT-Raman; Antimicrobial; Molecular docking



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

SP-12

Pharmacodynamic investigation and QSAR analysis on Molecular structure of 5-[(2E)-3-(furan-2-yl)prop-2-enyl]-4-hydroxy-2H-pyran-2-one using spectroscopy tools supported by quantum calculations

Dr. A. Asrar Ahamed and Dr. M. Mohamed Sihabudeen
PG & Research Department of Chemistry,
Jamal Mohamed College (Autonomous),
Tiruchirappalli, Tamil Nadu, India.

A novel bio-organic molecule, 5-[(2E)-3-(furan-2-yl)prop-2-enyl]-4-hydroxy-2H-pyran-2-one (I), has been synthesized and characterized by spectroscopy tools (FT-IR, FT-Raman, UV-Visible, ^1H and ^{13}C NMR). The stability of the structure and entire calculations have been performed on B3LYP methods with 6-311++G(d,p) level of basis set. HOMO-LUMO energies which confirm the occurring of charge transformation within the molecule. The molecular electrostatic potential MEP showed the electrophilic and nucleophilic region of the molecule. While analyzing the molecular structure useful results regarding unknown properties and applications were obtained. The calculated values; heats of formation, QSAR properties, Lipinski's parameters, Ligand efficiency (LE), Lipophilic Efficiency (LipE), were reported and discussed, to understand the biological activity of the synthesized chalcones. The biological activity of the present compound was studied and the capability of drug action has been interpreted.

Key Words: Vibrational study, HOMO-LUMO, QSAR and Chalcones



Spectroscopic [FT-IR and FT-Raman] and theoretical [UV-Visible and NMR] analysis on some acrylamide derived mannich by DFT calculations

G. Hema Sindhuja¹ and S.R. Bheeter²

¹ PG & Research Department of Chemistry, Jamal Mohamed College, Trichy.

² PG & Research Department of Chemistry, St. Joseph's College, Trichy

Abstract

The present work focuses to synthesize a novel mannich base using different substituted (OCH_3 , $\text{N}(\text{CH}_3)_2$) aromatic aldehyde via N-linkage Mannich reaction. The newly synthesized mannich bases are characterized using various spectral studies. Infra-red (IR), ^1H and ^{13}C Nuclear Magnetic resonance (NMR) spectroscopy confirmed the structure of the synthesized mannich bases. The observed fundamental frequencies in finger print and functional group regions were assigned according to their uniqueness region. The Gaussian computational calculations are carried out by DFT (B3LYP) methods with 6-31++G(d,p) basis sets and the corresponding results were tabulated. The impact of the presence of vinyl group in the compound is investigated. The modified vibrational pattern of the molecule associated vinyl group was analyzed. Moreover, ^{13}C NMR and ^1H NMR were calculated by using the gauge independent atomic orbital (GIAO) method with B3LYP methods and the 6-311++G(d,p) basis set and their spectra were simulated and the chemical shifts linked to TMS were compared. The gap of the present compound was calculated related to HOMO and LUMO energies which confirm the occurring of charge transformation between the base and ligand. Besides frontier molecular orbitals (FMO), molecular electrostatic potential (MEP) was performed.

Keywords: Mannich base, aromatic aldehydes, acrylamide, MEP and DFT



ISSN:0973-0303
Volume:SPL NSATP-19

SP-14

**SPECTROSCOPIC (FT-IR, FT-RAMAN), FIRST ORDER
HYPERPOLARIZABILITY, NBO AND HOMO-LUMO ANALYSIS OF (2E)-3-(2H-
1,3-BENZODIOXOL-5-YL)-N-PHENYLPROP-2-ENAMIDE**

Sudharsan, Gokula Krishana, R. Raj Muhamed, S.Abbas Manthiri

Department of Physics, Jamal Mohamed College

Abstract

The Fourier transform infrared (FT-IR) and FT-Raman of (2E)-3-(2H-1,3-benzodioxol-5-yl)-N-phenylprop-2-enamide (2BNP2E) have been recorded in the regions 4000-100 and 4000-450cm⁻¹, respectively. A complete assignment and analysis of the fundamental vibrational modes of the molecule were carried out. The observed fundamental modes have been compared with the harmonic vibrational frequencies computed using DFT (B3LYP) method by employing 6-311++G(d,p) basis sets. The vibrational studies were interpreted in terms of potential energy distribution. The first order hyperpolarizability (β_0) and related properties (α , μ and $\Delta\alpha$) of this molecular system are calculated using B3LYP/6-311++G(d,p) method based on the finite-field approach. Stability of the molecule arising from hyper conjugative interactions and charge delocalization has been analyzed using natural bond orbital (NBO) analysis. The results show that electron density (ED) in the σ^* and π^* antibonding orbitals and second-order delocalization energies (E(2)) confirm the occurrence of intramolecular charge transfer (ICT) within the molecule. Molecular electrostatic potential (MEP) and HOMO-LUMO energy levels are also constructed. The results reveal that the standard heat capacities ($C_{p,m}^0$), standard entropies (S_m^0) and standard enthalpy changes (H_m^0) increase with rise in temperature.



ISSN:0973-0303
Volume:SPL NSATP-19

SP-15

SYNTHESIS, SPECTROSCOPIC, NLO, NBO, HOMO-LUMO, ANTIMICROBIAL
AND MOLECULAR DOCKING ANALYSIS OF (2E)-3-(1H-INDOL-2-YL)-N-
PHENYLPROP-2-ENAMIDE

Gokula Krishana, Sudharsan, R. Raj Muhamed, S.Abbas Manthiri

Department of Physics, Jamal Mohamed College

Abstract

The title compound, (2E)-3-(1H-indol-2-yl)-N-phenylprop-2-enamide (2INP) has been synthesized and characterized by FT-IR and FT-Raman spectral analysis. The molecular structure, fundamental vibrational frequencies and intensity of the vibrational bands are interpreted with the aid of the structure optimizations and normal coordinate force field calculations based on density functional theory (DFT) method using 6-311++G(d,p) basis set. A complete assignment and analysis of the fundamental vibrational modes of the molecule were carried out. The vibrational studies were interpreted in terms of potential energy distribution. The hyperconjugative interaction energy $E(2)$ and electron densities of donor (i) and acceptor (j) bonds were calculated using NBO analysis. Besides NLO and MEP were also calculated and interpreted. To study the biological activity of the investigation molecule, molecular docking was done to identify the hydrogen bond lengths and binding energy with different antimicrobial protein. Thermodynamic properties of the title compound at different temperatures have been calculated, revealing the correlations the heat capacity (C), entropy (S) and enthalpy changes (H) and temperatures.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

SP-16

MOLECULAR DOCKING, SPECTROSCOPIC, FIRST ORDER HYPERPOLARIZABILITY, NBO AND HOMO-LUMO ANALYSIS OF (2E)-3-(2H- 1,3-BENZODIOXOL-5-YL)-N-(4-CHLOROPHENYL)PROP-2-ENAMIDE

S. Arulappan, V Sathyanarayanamoorthi ,R. Raj Muhamed, S.Abbas Manthiri

Department of Physics, Jamal Mohamed Colleg

Abstract

The title compound, (2E)-3-(2H-1,3-benzodioxol-5-yl)-N-(4-chlorophenyl)prop-2-enamide (**3B5NCE**) was synthesized and characterized by FT-IR and FT-Raman spectral analysis. The optimized molecular geometry, the vibrational wavenumbers, the infrared intensities and the Raman scattering activities were calculated by using density functional theory(DFT) B3LYP method with 6-311++G(d,p) basis set. The detailed interpretation of the vibrational spectra has been carried out by VEDA program. The calculated HOMO and LUMO energies show that charge transfer within the molecule. Stability of the molecule arising from hyperconjugative interactions, charge delocalization have been analyzed using natural bond orbital analysis (NBO). The first order hyperpolarizability and Molecular electrostatic potential (MEP) were also performed. To study the biological activity of the investigation molecule, molecular docking was done to identify the hydrogen bond lengths and binding energy with different antifungal proteins. The thermodynamic properties (heat capacity, entropy, and enthalpy) of the **3B5NCE** at different temperatures have been calculated.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

SP-17

Spectroscopic and quantum mechanical investigations of (2E)-3-(2H-1,3-benzodioxol-5-yl)-N-phenylprop-2-enamide using density functional theory method

V Sathyanarayanamoorthi^b, S Abbas Manthri^a, R Raj Muhamed^a, R Rajesh^a &

^a Department of Physics, Jamal Mohamed College, Tiruchirappalli 620 020, India

^b Department of Physics, PSG College of Arts and Science,
Coimbatore 641 014, India

Abstract

The Fourier transform infrared (FT-IR) and FT-Raman of (2E)-3-(2H-1,3-benzodioxol-5-yl)-N-phenylprop-2-enamide (2BNP2E) have been recorded in the regions 4000-100 and 4000-450 cm⁻¹, respectively. A complete assignment and analysis of the fundamental vibrational modes of the molecule were carried out. The observed fundamental modes have been compared with the harmonic vibrational frequencies computed using DFT (B3LYP) method by employing 6-311++G(d,p) basis sets. The vibrational studies were interpreted in terms of potential energy distribution. The first order hyperpolarizability (β_0) and related properties (α , μ and $\Delta\alpha$) of this molecular system are calculated using B3LYP/6-311++G(d,p) method based on the finite-field approach. Stability of the molecule arising from hyper conjugative interactions and charge delocalization has been analyzed using natural bond orbital (NBO) analysis. The results show that electron density (ED) in the σ^* and π^* antibonding orbitals and second-order delocalization energies (E(2)) confirm the occurrence of intramolecular charge transfer (ICT) within the molecule. Molecular electrostatic potential (MEP) and HOMO-LUMO energy levels are also constructed. To study the biological activity of the investigation molecule, molecular docking was done to identify the hydrogen bond lengths and binding energy with different antimicrobial proteins. The thermodynamic properties of the title compound have been calculated at different temperatures. **Keywords:** DFT, FTIR, FT-Raman, HOMO-LUMO, MEP, NLO



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

THIN FILMS: TF-1

Preparation and Characterization of $\text{Ag}_2\text{O}:\text{ZnO}$ thin films on glass substrate by using Jet Nebuliser technique

V.Prabhu^{1,4}, A. Mohamed Saleem^{1,4}, S. Nivetha^{1,2}, R. Perumalsamy^{1,2}, A. Ayeshamariam^{1,2*}, N. Punithavelan³, M. Jayachandran⁵

¹Research and Development Centre, Bharathidasan University, Tiruchirappalli – 620 024, India.

²Department of Physics, Khadir Mohideen College, Adirampattinam - 614701, India.

³School of Advanced Sciences in Physics, Vellore Institute of Technology, Chennai Campus, Tamil Nadu, India.

⁴Department of Physics, Jamal Mohamed College (Auto), Tiruchirappalli – 620 020, India.

⁵Department of Physics, Sethu Institute of Technology, Pullor, Kariyapatti, Tamil Nadu.

*Corresponding author: - aamariam786@gmail.com

Abstract

In this work, the nano silver oxide ($\text{Ag}_2\text{O}:\text{ZnO}$) thin film is deposited on microscopic glass plates by Jet Nebuliser technique. The coated thin film was annealed at 100°, 150° and 200° C temperatures respectively. The XRD investigation on the thin film at three different temperatures have been carried out and their results showed that, the maximum peak intensity of (200) plane was observed at 200° C than rest of two samples. In addition to that, it was also found that, the annealing process has certainly improved the crystallization of the film particularly at 200°C. The SEM and TEM results confirmed that the particle size in the range of 30-50 nm. The peaks corresponding to the Ag, Zn and O in EDAX spectrum ensure the film is purely made up of nano $\text{Ag}_2\text{O}:\text{ZnO}$. The UV-Visible spectrograph explores the optical activity of the nano $\text{Ag}_2\text{O}:\text{ZnO}$. The Photoluminescence analysis revealed that, the optical transparency of the films and it was found that, the main cause of radiative centre was oxygen vacancies by making the common defects.

Key words: $\text{Ag}_2\text{O}:\text{ZnO}$, UV-Visible spectrograph, Photoluminescence, Optical transparency.

References

- [1]. Gaus, E. and Torrent-Burgués, J., 2003. Tin–zinc electrodeposition from sulphate–gluconate baths. *Journal of Electro analytical Chemistry*, 549, pp.25-36.
- [2]. Osaka, N. and Yamamoto, M., 1978. VEP latency and RT as power functions of luminance in the peripheral visual field. *Electroencephalography and clinical neurophysiology*, 44(6), pp.785-788.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

TF-6

SYNTHESIS AND CHARACTERIZATION OF Mg DOPED ZnO THIN FILMS PREPARED BY SILAR METHOD

P. Mohamed Anwar, PG & Research Department of Physics, Jamal Mohamed College
(Autonomous), Tiruchirappalli-620 020, Tamilnadu.

S. Muruganantham, PG & Research Department of Physics, National College (Autonomous),
Tiruchirappalli-620 001, Tamil Nadu.

Mg doped Zinc Oxide (ZnO) thin films have been successfully coated onto glass substrates by Low cost SILAR coating technique by varying dipping cycle such as 30, 60 and 90. The film thickness was estimated using weight gain method and it revealed that the film thickness increased with solution concentration values. The prepared film structural, morphological, optical and electrical properties were studied using X-ray diffraction (XRD), Scanning Electron Microscope (SEM) and UV-Vis-NIR spectrophotometer respectively. The structure of the films were found to be hexagonal with orientation along (002) plane. X-ray line profile analysis was used to evaluate the micro structural parameters such as crystallite size, micro strain, dislocation density and stacking fault probability. The crystallite size values are increased with increase of dipping cycle. The optical studies revealed that the band gap can be tailored between 3.25 eV to 3.70 eV by altering dipping.

Keywords: Zinc Oxide, Thin Films, Structural Studies, Optical Properties



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

CRYSTAL GROWTH:

CG-1

1,6 Hexane thiol as a Corrosion Inhibitor for Zinc Metal in Acidic Solutions

S.S Syed Abuthahir*, M.Raja¹

¹PG and Research Department of Chemistry, Jamal Mohamed College (Autonomous),

Tiruchirappalli, Tamilnadu, India.

E-mail address: syedchemjmc@gmail.com, rajaudc88@gmail.com

ABSTRACT

The inhibitive action of 1, 6 Hexane thiol on zinc metal has been evaluated in 0.5N HCl as corrosion medium using weight loss and gasometric. Parameters such as inhibition efficiency and corrosion rates were evaluated to assess the performance of the inhibitor. The results revealed that the inhibitor shows good corrosion inhibiting properties. The inhibition efficiency was found to increase with increase in the inhibitor concentration. This is due to at the higher concentration of inhibitor solution which blocks the active site of a zinc metal and a protective film is formed over the zinc metal surface. The Temkin adsorption isotherm gave the best fit for the inhibitors. The surface morphology of the zinc metal was characterized by Scanning electron microscopy (SEM) and atomic force microscopy (AFM) in the absence and presence of the inhibitors.

keywords- Acidic solutions, Atomic force microscopy, Gasometry, 1,6 Hexane thiol, Scanning electron microscopy, Weight loss, Zinc corrosion.



ISSN:0973-0303

Volume:SPL NSATP-19

CG-2

STRUCTURAL, OPTICAL AND THERMAL CHARACTERIZATION OF AMINO ACID DOPED ADP SINGLE CRYSTALS FOR OPTOELECTRONIC APPLICATIONS

^aS. Shek Dhavud

^bJ. Thomas Joseph Prakash

^aPG and Research Department of Physics, Jamal Mohammed College, Trichy

^bPG and Research Department of Physics, Government Arts College, Trichy



Abstract

The nonlinear optical single crystals of undoped and L-Proline doped Ammonium dihydrogen Phosphate (ADP) were effectively grown by a conventional slow evaporation solution growth technique at room temperature. FT-IR spectrum shows various functional groups that are due to fundamental overtones of L-Proline and ADP entities. The crystallinity of the materials is confirmed by powder XRD investigation. Single crystal XRD demonstrates that undoped and doped crystals have a tetragonal crystal system with space group I42d. The optical property of the material was examined by UV-Visible-NIR spectral analysis. The color centered emissions in the grown crystals have been tested by the photoluminescence study. Surface morphological changes because of doping are observed by SEM analysis. TG/DTA investigations were performed to study the thermal behaviour of the samples. The notable enhancement in mechanical strength was remarked due to doping. The SHG measurements also carried out on undoped and doped samples, which reveal the relative SHG efficiency has been enhanced due to doping. Antibacterial activities of the grown crystals were studied by the well diffusion method.

Key words: Solution Growth, FT-IR, UV-Visible-NIR, SEM, Vicker's Microhardness



ISSN:0973-0303
Volume:SPL NSATP-19

CG-5

SYNTHESIS, CHARACTERIZATION AND PHARMACODYNAMIC INVESTIGATION STUDIES OF NOVEL HETEROCYCLIC COMPOUND

M. SATHYANARAYANAN AND M. SEENI MUBARAK

PG and Research Department of Chemistry, Jamal Mohamed College (Autonomous),
Affiliated to Bharathidasan University, Tiruchirappalli – 620 020, Tamil Nadu, India.
E-mail: sathyachem07@gmail.com

ABSTRACT:

Mannich bases of piperidinone have been synthesized by using 4-phenyl-2-butanone and 4-chlorobenzaldehyde with ammonium acetate. The spectroscopic tools (FT-IR, ^1H , ^{13}C - NMR and Mass) have been used to elucidate the molecular structure and study the pharmaceutical properties instantly. While analyzing the molecular structure useful results regarding unknown properties and applications were obtained. The biological activity of the present compound was studied against various bacterial and fungal strains employing Ciprofloxacin as standard drug for antibacterial and Nystatin as standard drug for anti fungal.

KEYWORDS:

4-phenyl-2-butanone, 4-chlorobenzaldehyde, Spectral studies and biological activities.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

NM-10

Synthesis, structural, optical and antibacterial properties of pure and MgCa co-doped ZnO nanoparticles by co-precipitation method

M. Karthikeyan, P. Vijaya Kumar and A. Jafar Ahamed*

Post Graduate and Research Department of Chemistry,

Jamal Mohamed College (Autonomous),

Affiliated to Bharathidasan university, Tiruchirappalli – 620 020, Tamil Nadu, India.

*E-mail: agjafar@yahoo.co.in & karthichemist10@gmail.com

Abstract:

In this present work, Pure and MgCa co-doped ZnO nanoparticles were effectively prepared by simple precipitation method. The applications of metal oxide nanoparticles contain become gradually more relevant ranging from semiconductor to medical health industries. The synthesized pure and MgCa co-doped ZnO NPs was calcined at 700°C. The structural properties were confirmed by X-Ray diffraction (XRD), Fourier transform infra-red (FT-IR) spectroscopy, Field emission scanning electron microscopy (FESEM), Elemental analysis (EDAX) and optical properties were studied by UV-vis spectroscopy and Photoluminescence (PL). The antibacterial activity of pure and MgCa co-doped ZnO nanoparticles have been investigated against *Escherichia coli* and *Staphylococcus aureus* bacterial strains. It has been interestingly observed that MgCa co-doping has enhanced the inhibitory activity of ZnO against *S. aureus* more efficiently than the *E. coli* bacterial strain.

Key words: Zinc Oxide, Nanoparticles, *S. aureus*, antibacterial activity.

*Address for communication:

Dr. A. Jafar Ahamed

Associate Professor

PG and Research Department of Chemistry

Jamal Mohamed College (Autonomous), Trichy-20

E-mail: agjafar@yahoo.co.in /HP - 90035 76896

karthichemist10@gmail.com - 9790280194



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

OT-2

Study of molecular interactions in binary mixtures of

Benzyl alcohol and cyclohexane system

Saruhasan C & R. Raj Muhamed

Department of Physics, Jamal Mohamed College, Trichy, Tamil Nadu.

Measurement of viscosity and density along with ultrasonic velocity have been used for evaluating derived parameters for the binary system of benzyl alcohol and cyclohexane at different temperature. From these, excess parameters have been calculated. The variation of derived parameters as well as the sign and magnitude of corresponding excess functions have been used to investigate the type and extent of interactions between the component molecules of the binary liquid mixtures.

OT-3

Study of molecular interactions in Binary mixtures of Benzyl alcohol and
Chlorobenzene

J.Mohamed Yasar Arafath & R.Raj Muhamed

Department of Physics, Jamal Mohamed College, Trichy, Tamil Nadu

Ultrasonic velocity, density and viscosity are experimentally determined in the mixtures of benzyl alcohol with Chlorobenzene at different temperature. Several acoustic and thermodynamic parameters such as excess viscosity, excess adiabatic compressibility, excess free volume, excess molar volume, excess enthalpy, excess free length, viscous relaxation time have been calculated to study nature and extent of molecular interactions in these mixture.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303
Volume:SPL NSATP-19

OT- 4

Ultrasonic studies on charge transfer complexes of Diphenyl ether with certain amine compounds in N-hexane medium at various temperatures

F.S.MUZAMMIL¹, R.RAJ MUHAMED¹, V.KANNAPPAN²

1. Department of physics, Jamal Mohamed college, Trichy, Tamilnadu, India.

2. Department of chemistry, Presidency college, Chennai, Tamilnadu, India.

ABSTRACT

Ultrasonic velocities, densities, and coefficient of viscosities have been measured for ternary mixtures of Diethylamine and Cyclohexylamine with Diphenylether in equal molar concentration in the range of 0.1M to 1M at temperatures from 298K to 313K in N-Hexane medium. In this study, different acoustical parameters such as Adiabatic compressibility(β), Intermolecular free length(L_f), Free volume(V_f), Acoustic impedance(Z), Internal pressure(π_i), Molar volume (V_m), Molar cohesive energy (MCE), Relaxation time (τ) and their excess parameters were studied. The stability constants(K) are also calculated using Kannappan's formula for these complexes. This study is made mainly to investigate the effect of structure of donor molecules and polarity of medium in the stability of this type of complexes. These investigations reveals that the stability of the charge transfer complex depends on the structure of these amine compounds.



Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years

ISSN:0973-0303

Volume:SPL NSATP-19

OT- 5

Ultrasonic and Viscometric Studies of Insulin with Human Blood Serum Interactions of Different Blood Groups both Nondiabetic and Diabetic

R. Rajesh¹, R. Raj Muhamed^{2*}, V. Kannappan³

¹Sri Vijay Vidyalaya College of Arts and Science, Dharmapuri-636 807

²Department of Physics, Jamal Mohamed College, Tiruchirappalli-620 020

³Department of Chemistry, Presidency College, Chennai – 600 014

Abstract

The interaction between insulin-human blood serum both diabetic and nondiabetic at room temperature, human body temperature (303.15K, 310.15K) through ultrasonic velocity (u), density (ρ) and viscosity (η) measurement. The acoustical properties are calculated for the commercially available and pharmaceutically pure insulin solutions at different temperatures and also for the bloods of different group containing insulin at different dosages. Acoustical properties of insulin at different temperatures are determined with a view to assess the stability of insulin due to temperature changes and the acoustical properties of blood solution of different group in the presence of different doses of insulin can be used to choose dosage of insulin in the treatment of diabetes and hence the use of excess dosage can be avoided.

Key words: Insulin, Human blood serum, acoustical parameters, different blood groups

*Author for correspondence

Email: ponnu_65@yahoo.co.in



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University)

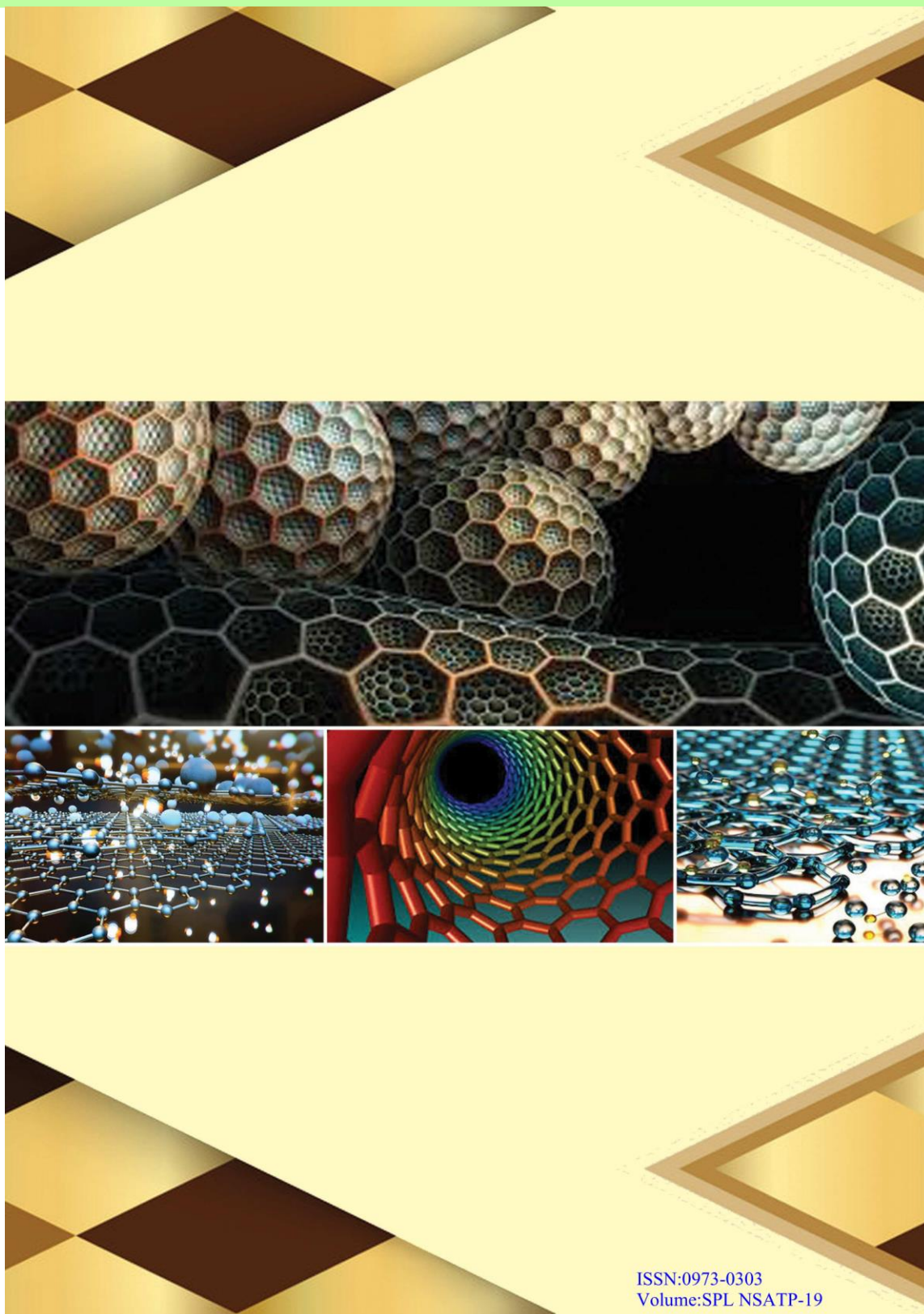
TIRUCHIRAPPALLI - 620 020

NAAC - SSR IV CYCLE

Criterion III Research, Innovations & Extension

3.4 Research Publications and Awards

3.4.4. Total number of books and chapters in edited volumes published year wise during the last five years



ISSN:0973-0303
Volume:SPL NSATP-19