



# Sadakathullah Appa College

\*An Autonomous Institution, Re-Accredited by NAAC at an 'A' Grade, \*ISO 9001 : 2018 Certified\*

## CRITERION III

### RESEARCH, INNOVATION AND EXTENSION

#### 3.7.1. Collaborative Activities

(2016 – 2017)

*Submitted to*

THE NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC)

August 2022





# Sadakathullah Appa College

\*An Autonomous Institution, Re-Accredited by NAAC at an 'A' Grade, \* ISO 9001: 2015 Certified \*

## CRITERION III

### RESEARCH, INNOVATION AND EXTENSION

#### 3.7.1. Collaborative Activities

3.7.1 Number of Collaborative Activities Per year for research/faculty exchange/student exchange/internship/on-the-job training/project work	
2016-17	42

**Principal**  
PRINCIPAL  
SADAKATHULLAH APPA COLLEGE  
Rahmath Nagar, TIRUNELVELI - 627 011.





**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr. K. Hema Assistant Prof. of English Staff ID: ATEN04
2	Name of the Collaborating Faculty with Designation	:	Dr. T. Ratha Jeyalakshmi Dean, Research & Development
3	Name of the Collaborating Organization	:	Sri Sarada College for Women Tirunelveli
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Member, Editorial Board for the College Journal, Pragnavani
6	Period of Collaboration	:	From: June 2016 To: till date
7	Financial Involvement (if any)	:	—
8	Proof Attached	:	Yes/No
Signature of Principal		Signature of the Collaborating Faculty	
Signature of the Faculty		Signature of the Faculty	

PRINCIPAL  
SRI SARADA COLLEGE FOR WOMEN  
(Autonomous)  
TIRUNELVELI - 627 011



## $\lambda$ - Bi Near Subtraction Semigroups

S.Firthous Fatima<sup>(1)</sup> and S. Jayalakshmi<sup>(2)</sup>

(1)Department of Mathematics, Sadakathullah Appa College (Autonomous), Thirunelveli, Tamil Nadu,India

(2) Department of Mathematics, Sri Parasakthi College (Autonomous ) for women, Courtallam , Tamil Nadu,India

### Abstract

*In this paper we introduce the notion of  $\lambda$ - bi-near subtraction semigroup. Also we give characterizations of  $\lambda$ - bi-near subtraction semigroup.*

**Mathematical subject classification:** 06F35

**Key words:**  $\lambda$ - bi-near subtraction semigroup,  $S_1$ - bi-near subtraction semigroup,  $S_2$ - bi-near subtraction semigroup, Nil near subtraction semigroup

### 1.Introduction

In 2007, Dheena[1] introduced Near Subtraction Algebra, Throughout his paper by a Near Subtraction Algebra, we mean a Right Near Subtraction Algebra. For basic definition one may refer to Pillz[4]. Zekiye Ciloglu, Yilmaz Ceven [5] gave the notation of Fuzzy Near Subtraction semigroups. In [2,3], seyadali fathima has defined a right near subtraction semigroup to be a  $S_1$ - near subtraction semigroup if for every  $a \in X$  there exists  $x \in X^*$  Such that  $axa = xa$ , and a near subtraction semigroup  $X$  is said to be a  $S_2$ - near subtraction semigroup if for every  $a \in X$  there exists  $x \in X^*$  Such that  $axa = ax$ . In generalization to this concept, After deriving basic properties of a  $\lambda$ -bi near subtraction semigroup We obtain some characterisation of  $\lambda$ -bi near subtraction semigroup

### 2. Preliminaries :

A non-empty subset  $X$  together with two binary operations “-“ and “.” is said to be subtraction semigroup If (i)  $(X, -)$  is a subtraction algebra (ii)  $(X, .)$  is a semi group (iii)  $x(y-z) = xy - xz$  and  $(x-y)z = xz - yz$  for every  $x, y, z \in X$ . A non-empty subset  $X$  together with two binary operations “-“ and “.” is said to be near subtraction semigroup if (i)  $(X, -)$  is a subtraction algebra (ii)  $(X, .)$  is a semi group and (iii)  $(x-y)z = xz - yz$  for every  $x, y, z \in X$ . A non-empty subset  $X$  is said to be  **$S_1$ -near subtraction semigroup** if for every  $a \in X$  there exists  $x \in X^*$  such that  $axa = xa$ . A non-empty subset  $X$  is said to be  **$S_2$ -near subtraction semigroup** if for every  $a \in X$  there exists  $x \in X^*$  such that  $axa = ax$ . A non-empty subset  $X$  is said to be **nil-near subtraction semigroup** if there exists a positive integer  $k > 1$  such that  $a^k = 0$  Which implies that  $xa = 0$  where  $x = a^{k-1}$ .

### 3. $\lambda$ -BI NEAR SUBTRACTION SEMIGROUP

#### Definition 3.1

A non-empty subset  $X$  together with two binary operations“-“ and “.” is said to be  **$\lambda$ - bi near subtraction semigroup**. Then  $X$  is the both  $S_1$  and  $S_2$ -near subtraction semigroup

#### Example 3.2

Let  $X = \{0, a, b, 1\}$  in which “-“ and “.” be defined by

-	0	a	b	1
0	0	0	0	0
a	a	0	a	0
b	b	b	0	0
1	1	b	a	0


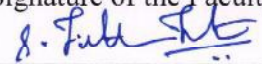
.	0	a	b	1
0	0	0	0	0
a	0	a	0	a
b	0	0	b	b
1	0	a	b	1

Then  $X$  is a  $\lambda$ - bi near-subtraction semi group



## SadakathullahAppa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	S. Firthous Fatima
			Assistant Professor of Mathematics
			ATMA02
2	Name of the Collaborating Faculty with Designation	:	Dr. S. Jaya Lakshmi
			Associate Professor of Mathematics
3	Name of the Collaborating Organization	:	Sri Parasakthi College for women (Autonomous)
			Courtallam
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publications (Strong $\lambda$ -- Bi NEAR SUBTRACTION SEMIGROUPS)
6	Period of Collaboration	:	From : 2016 To:2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
		S. Jayalakshmi	
		Signature of the Faculty	
			

International Journal of Mathematics Research.  
 ISSN 0976-5840 Volume 8, Number 3 (2016), pp. 207-212  
 © International Research Publication House  
 http://www.irphouse.com

---

## Strong $\lambda$ - Bi Near Subtraction Semigroups

**S.Firhous Fatima<sup>(1)</sup> and S. Jayalakshmi<sup>(2)</sup>**

<sup>1</sup>*Department of Mathematics, Sadakathullah Appa College (Autonomous),  
 Thirunelveli- 627 011, Tamil Nadu,India.*

*E-mail: kitherali@yahoo.co.in*

<sup>2</sup>*Department of Mathematics, Sri ParaSakathi College (Autonomous) for women,  
 Courtallam, Tamil Nadu, India.*

*E-mail: jayarajkutti@gmail.com*

### Abstract

*In this paper we introduce the notion of Strong  $\lambda$ - bi-near subtraction semigroup. Also we give characterizations of Strong  $\lambda$ - bi-near subtraction semigroup.*

**Mathematical subject classification:** 06F35

**Key words:** Strong  $\lambda$  bi-near subtraction semigroup,  $S_1$ - bi-near subtraction semigroup,  $S_2$ - bi-near subtraction semigroup, Nil near subtraction semigroup.

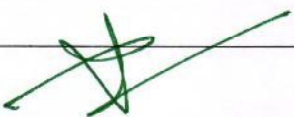
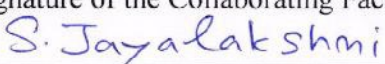
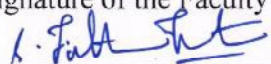
### 1. INTRODUCTION

In 2007, Dheena[1] introduced Near Subtraction Algebra, Throughout his paper by a Near Subtraction Algebra, we mean a Right Near Subtraction Algebra. For basic definition one may refer to Pillz[4]. Zekiye Ciloglu, Yilmaz Ceven [5] gave the notation of Fuzzy Near Subtraction semigroups. Seydali Fathima et.al[2,3] introduced the notation of  $S_1$ -near subtraction semigroup and  $S_2$ -near subtraction semigroup. In this



## SadakathullahAppa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	S. Firthous Fatima
			Assistant Professor of Mathematics
			ATMA02
2	Name of the Collaborating Faculty with Designation	:	Dr. S. Jaya Lakshmi
			Associate Professor of Mathematics
3	Name of the Collaborating Organization	:	Sri Parasakthi College (Autonomous) for women, Courtallam
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publications ( $\beta$ - BI NEAR SUBTRACTION SEMIGROUPS)
6	Period of Collaboration	:	From : 2016 To:2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
			
		Signature of the Faculty	
			



 $\beta$ - BI NEAR SUBTRACTION SEMIGROUPSS. FIRTHOUS FATIMA\*<sup>1</sup>, S. JAYALAKSHMI<sup>2</sup>

<sup>1</sup>Department of Mathematics,  
Sadakathullah Appa College (Autonomous), Thirunelveli- 627 011, Tamil Nadu, India.

<sup>2</sup>Department of Mathematics,  
Sri Para Sakathi College (Autonomous) for women, Courtallam, Tamil Nadu, India.

(Received On: 06-09-16; Revised &amp; Accepted On: 21-09-16)

## ABSTRACT

In this paper we introduce the notion of  $\beta$ - bi-near subtraction semigroup. Also we give characterizations of  $\beta$ - bi-near subtraction semigroup.

Mathematical subject classification: 06F35.

Key words:  $\beta$  bi-near subtraction semigroup, Boolean near subtraction semigroup, Weak commutative near subtraction semigroups, Nil near subtraction semigroup.

## 1. INTRODUCTION

In 2007, Dheena [1] introduced Near Subtraction Algebra, Throughout his paper by a Near Subtraction Algebra, we mean a Right Near Subtraction Algebra. For basic definition one may refer to Pillz [4]. In this paper we shall obtained equivalent conditions for regularity in terms of  $\beta$ - Bi near subtraction semigroup.

## 2. PRELIMINARIES

A non-empty subset  $X$  together with two binary operations “-“ and “.” is said to be subtraction semigroup If (i)  $(X, -)$  is a subtraction algebra (ii)  $(X, .)$  is a semi group (iii)  $x(y-z)=xy-xz$  and  $(x-y)z= xz-yz$  for every  $x, y, z \in X$ . A non-empty subset  $X$  together with two binary operations “-“ and “.” is said to be near subtraction semigroup if (i)  $(X, -)$  is a subtraction algebra (ii)  $(X, .)$  is a semi group and (iii)  $(x-y)z = xz-yz$  for every  $x, y, z \in X$ . A non-empty subset  $X$  is said to be **nil-near subtraction semigroup** if there exists a positive integer  $k > 1$  such that  $a^k = 0$  Which implies that  $xa = 0$  where  $x = a^{k-1}$ .

3.  $\beta$ -BI NEAR SUBTRACTION SEMIGROUP

**Definition 3.1:** A non-empty subset  $X$  together with two binary operations“-“and “.” Is said to be  $\beta$ - bi near subtraction semigroup. Then  $X$  is the both boolean and weak commutative near subtraction semigroup

**Example 3.2:** Let  $X = \{0, a, b, 1\}$  in which “-“ and “.” be defined by

-	0	a	b	c
0	0	0	0	0
a	a	0	c	b
b	b	0	0	0
c	c	0	c	0

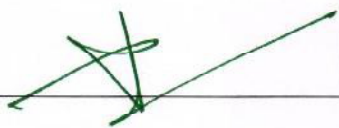

.	0	a	b	c
0	0	0	0	0
a	0	a	0	a
b	0	0	b	b
c	0	a	b	c

Then  $X$  is a  $\beta$ - bi near-subtraction semi group

**Corresponding Author: S. Firthous Fatima\*<sup>1</sup>, <sup>1</sup>Department of Mathematics,  
Sadakathullah Appa College (Autonomous), Thirunelveli- 627 011, Tamil Nadu, India.**



**SadakathullahAppa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	S. Firthous Fatima
			Assistant Professor of Mathematics
			ATMA02
2	Name of the Collaborating Faculty with Designation	:	Dr. S. Jaya Lakshmi
			Associate Professor of Mathematics
3	Name of the Collaborating Organization	:	Sri Parasakthi College (Autonomous) for women, Courtallam
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publications (LEFT REGULAR BI NEAR SUBTRACTION SEMIGROUPS)
6	Period of Collaboration	:	From : 2016 To:2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
		S. Jayalakshmi	
		Signature of the Faculty	
			



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

# IJDR

---

**International Journal of  
DEVELOPMENT RESEARCH**


---

*International Journal of Development Research*  
Vol. 06, Issue, 11, pp.10331-10332, November, 2016

## Full Length Research Article

### LEFT REGULAR BI NEAR SUBTRACTION SEMIGROUPS

<sup>1</sup>Firthous Fatima, S. and <sup>2</sup>Jayalakshmi, S.

<sup>1</sup>Department of Mathematics, Sadakathullah Appa College (Autonomous),  
Thirunelveli- 627 011, Tamil Nadu, India,

<sup>2</sup>Department of Mathematics, Sri Parasakthi College (Autonomous) for women, Courtallam,  
Tamil Nadu, India

---

#### ARTICLE INFO

##### Article History:

Received 17<sup>th</sup> August, 2016  
Received in revised form  
03<sup>rd</sup> September, 2016  
Accepted 14<sup>th</sup> October, 2016  
Published online 30<sup>th</sup> November, 2016

##### Key Words:

Left Regular- bi near subtraction  
semigroups, Right Regular- bi near  
subtraction semigroups,  
Regular-near subtraction semigroups,  
Left Strongly Regular-near subtraction  
semigroups, Right Strongly Regular-near  
subtraction semigroups,  
Nil near subtraction semigroup.

---

#### ABSTRACT

In this paper we introduce the notion of Left Regular- bi-near subtraction semigroup. Also we give characterizations of Left Regular- bi-near subtraction semigroup.

Copyright©2016, Nguyen Xuan Huy et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### INTRODUCTION

In [3,4], Y. V. Reddy and C. V. L. N. Murty, has introduced, On Strongly Regular Near Rings A near subtraction semigroup  $X$  is regular if for all  $x \in X$ , there exists  $a \in X$  with  $x = xax$ . A near subtraction semigroup  $X$  is left strongly regular if for all  $x \in X$ , there exists  $a \in X$  with  $x = ax^2$ . A near subtraction semigroup  $X$  is right strongly regular if for all  $x \in X$ , there exists  $a \in X$  with  $x = x^2a$ . Motivated by these concepts we introduce left regular bi near subtraction We obtain some characterisation of Left Regular bi near subtraction semigroup

##### Preliminaries

A non-empty subset  $X$  together with two binary operations “-“ and “.” is said to be subtraction semigroup If (i)  $(X, -)$  is a subtraction algebra (ii)  $(X, .)$  is a semi group (iii)  $x(y-z) = xy -$

$xz$  and  $(x-y)z = xz - yz$  for every  $x, y, z \in X$ . A non-empty subset  $X$  together with two binary operations “-“ and “.” is said to be near subtraction semigroup if (i)  $(X, -)$  is a subtraction algebra (ii)  $(X, .)$  is a semi group and (iii)  $(x-y)z = xz - yz$  for every  $x, y, z \in X$ . A non-empty subset  $X$  is said to be  $S_1$ -near subtraction semigroup if for every  $a \in X$  there exists  $x \in X^*$  such that  $axa = xa$ . A non-empty subset  $X$  is said to be  $S_2$ -near subtraction semigroup if for every  $a \in X$  there exists  $x \in X^*$  such that  $axa = ax$ . A non-empty subset  $X$  is said to be nil-near subtraction semigroup if there exists a positive integer  $k \geq 1$  such that  $a^k = 0$  Which implies that  $xa = 0$  where  $x = a^{k-1}$ .

In this section, We establish new concept of left regular bi near subtraction semigroup and some properties of left regular bi near subtraction semigroup

##### Definition 3.1.1

A near subtraction semigroup  $X$  is regular if for all  $x \in X$ , there exists  $a \in X$  with  $x = xax$


---

\*Corresponding author: Firthous Fatima,  
Department of Mathematics, Sadakathullah Appa College  
(Autonomous), Thirunelveli- 627 011, Tamil Nadu, India




**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

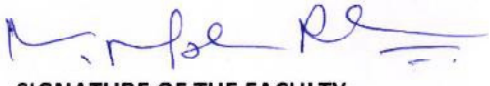
1	NAME OF THE FACULTY WITH DESIGNATION, STAFF ID	: <b>Dr. N. MOHAMED RILWAN</b> ASSISTANT PROFESSOR, DEPARTMENT OF MATHEMATICS (PG), SADAKATHULLAH APPA COLLEGE, TIIRUNELVELI – 627 011.
		ATMA05
2	NAME OF THE COLLABORATING FACULTY WITH DESIGNATION	: -
3	NAME OF THE COLLABORATING ORGANIZATION.	: DEPARTMENT OF MATHEMATICS, WAVOO WAJEEHA WOMEN'S COLLEGE OF ARTS AND SCIENCE , TIRUCHENDUR ROAD, KAYALPATNAM – 628 204
4	NATURE OF COLLABORATION (ACADEMIC / RESEARCH / FACULTY EXCHANGE / STUDENT EXCHANGE / PROJECT / INTERNSHIP / ON-THE JOB TRAINING)	: FACULTY EXCHANGE
5	NATURE / DETAILS OF OUTCOME (GUEST LECTURÉ / DC MEMBER / CO-GUIDE / PROJECT REPORTS / OTHER REPORTS/PUBLICATIONS)	: CHIEF GUEST & JUDGE
6	PERIOD OF COLLABORATION	: 18 – 01 – 2017
7	FINANCIAL INVOLVEMENT (IF ANY)	: -
8	PROOF ATTACHED	: YES



SIGNATURE OF PRINCIPAL



SIGNATURE OF THE COLLABORATING  
FACULTY



SIGNATURE OF THE FACULTY

**Dr. N. MOHAMED RILWAN, M.Sc., Ph.D.**  
Assistant Professor  
Department of Mathematics  
Sadakathullah Appa College (Autonomous)  
Tirunelveli - 627 011.



# WAVOO WAJEEHA WOMEN'S COLLEGE OF ARTS AND SCIENCE

(Run by : Wavoo SAR Educational Trust)

(Affiliated to Manonmaniam Sundaranar University)

Phone off : 04639-285900

Tiruchendur Road, Kayalpatnam-628 204, Thoothukudi Dist.

**Dr. Mrs. J. ELLORA, M.Com., M.Phil., Ph.D.**

Principal.

## ATTENDANCE CERTIFICATE

This is to certify that **Dr. N. Mohamed Rilwan, M.Sc., Ph.D.** Assistant Professor, Department of Mathematics, Sadakathullah Appa College, Palayamkottai, has been the Chief Guest of Mathematics Association Meeting conducted in Wavoo Wajeeha Women's College of Arts and Science, Kayalpatnam on 18.01.2017. He gave a lecture on "An Approach towards Competitive Examinations" and has been the judge for Power point presentation competition for PG students under the topic "Applications of Mathematics".

Date: 18.01.2017

Place: Kayalpatnam



*J. Ellora*  
18/1/17  
**PRINCIPAL**  
WAVOO WAJEEHA WOMEN'S COLLEGE  
OF ARTS & SCIENCE  
Tiruchendur Road, Kayalpatnam-628 204.




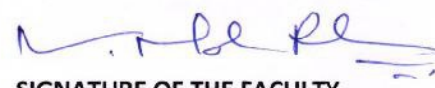
## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	NAME OF THE FACULTY WITH DESIGNATION, STAFF ID	:	<b>Dr. N. MOHAMED RILWAN</b> ASSISTANT PROFESSOR, DEPARTMENT OF MATHEMATICS (PG), SADAKATHULLAH APPA COLLEGE, TIIRUNELVELI – 627 011.
			ATMA05
2	NAME OF THE COLLABORATING FACULTY WITH DESIGNATION	:	-
3	NAME OF THE COLLABORATING ORGANIZATION	:	DEPARTMENT OF MATHEMATICS, SRI PARASAKTHI COLLEGE FOR WOMEN COURTALLAM – 627 802
4	NATURE OF COLLABORATION (ACADEMIC / RESEARCH / FACULTY EXCHANGE / STUDENT EXCHANGE / PROJECT / INTERNSHIP / ON-THE JOB TRAINING)	:	FACULTY EXCHANGE
5	NATURE / DETAILS OF OUTCOME (GUEST LECTURE / DC MEMBER / CO-GUIDE / PROJECT REPORTS / OTHER REPORTS/PUBLICATIONS)	:	RESOURCE PERSON
6	PERIOD OF COLLABORATION	:	23 – 02 – 2017 to 24 – 02 – 2017
7	FINANCIAL INVOLVEMENT (IF ANY)	:	-
8	PROOF ATTACHED	:	YES

  
SIGNATURE OF PRINCIPAL

  
SIGNATURE OF THE COLLABORATING  
FACULTY

  
SIGNATURE OF THE FACULTY

**Dr. N. MOHAMED RILWAN, M.Sc., Ph.D.,**  
**Assistant Professor**  
**Department of Mathematics**  
**Sadakathullah Appa College (Autonomous)**  
**Tirunelveli - 627 011.**

# SRI PARASAKTHI COLLEGE FOR WOMEN (Re - Accredited with A by NAAC)

(An Autonomous College of M.S. University, Tirunelveli)

(Under the Management of H.R. & C.E. Dept)

Courtallam - 627802, TAMILNADU.



## CERTIFICATE

It is to certify that *Dr/Mr/Ms/Mrs. N. MOHAMMED RIZWAN, M.Sc., Ph.D., Asst. Professor of Mathematics, Sadakathullah Appa College* Resource Person / Participated in the National Level Workshop on "MATLAB and LaTeX" organized by the Department of Mathematics, Sri Parasakthi College for Women, Courtallam on 23.02.2017 and 24.02.2017.

S. Jayalakshmi  
Convener


K. Thiripuran  
Principal




**Sadakathullah Appa College (Autonomous)**  
**Rahmath Nagar, Tirunelveli - 627011**

1	NAME OF THE FACULTY WITH DESIGNATION, STAFF ID	:	<b>Dr. N. MOHAMED RILWAN</b> ASSISTANT PROFESSOR, DEPARTMENT OF MATHEMATICS (PG), SADAKATHULLAH APPA COLLEGE, TIIRUNELVELI – 627 011.
			ATMA05
2	NAME OF THE COLLABORATING FACULTY WITH DESIGNATION	:	-
3	NAME OF THE COLLABORATING ORGANIZATION	:	DEPARTMENT OF MATHEMATICS, SRI PARASAKTHI COLLEGE FOR WOMEN COURTALLAM – 627 802
4	NATURE OF COLLABORATION (ACADEMIC / RESEARCH / FACULTY EXCHANGE / STUDENT EXCHANGE / PROJECT / INTERNSHIP / ON-THE JOB TRAINING)	:	FACULTY EXCHANGE
5	NATURE / DETAILS OF OUTCOME (GUEST LECTURE / DC MEMBER / CO-GUIDE / PROJECT REPORTS / OTHER REPORTS/PUBLICATIONS)	:	GUEST LECTURE
6	PERIOD OF COLLABORATION	:	04 – 03 – 2017
7	FINANCIAL INVOLVEMENT (IF ANY)	:	-
8	PROOF ATTACHED	:	YES

  
SIGNATURE OF PRINCIPAL

  
SIGNATURE OF THE COLLABORATING  
FACULTY

  
SIGNATURE OF THE FACULTY

**Dr. N. MOHAMED RILWAN, M.Sc., Ph.D.,**  
**Assistant Professor**  
**Department of Mathematics**  
**Sadakathullah Appa College (Autonomous)**  
**Tirunelveli - 627 011.**



SRI PARASAKTHI COLLEGE FOR WOMEN, COURTALLAM

DEPARTMENT OF MATHEMATICS

Dr. N. Mohamed Rilwan delivered guest lecture on the topic

“LaTeX” (Tables, Mathematical Formulas, Drawing pictures) on 4.3.2017

*S. Jayalakshmi*  
Signature of the HOD


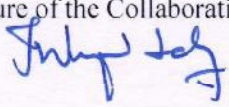

Head of the Department,  
Department of mathematics,  
Sri Parasakthi College For Women,  
Courtallam

*N. Mohamed Rilwan* 3.3.17  
Signature of the Principal

PRINCIPAL  
Sri Parasakthi College for Women  
Courtallam-627802



**Sadakathullah Appa College**  
**(Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. I. ANTONY DANISH</b> Assistant Professor, Department of Chemistry ATCH05
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. J. WINFRED JEBARAJ</b> Assistant Professor, Department of Chemistry, St. Johns 'College, Palayamkottai, Tirunelveli
3	Name of the Collaborating Organization	:	Department of Chemistry, St. Johns 'College, Palayamkottai, Tirunelveli
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publication
6	Period of Collaboration	:	From: 2016 To 2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
			
		Signature of the Faculty	
			

**PRINCIPAL**  
**SADAKATHULLAH APPA COLLEGE**  
**(AUTONOMOUS)**  
Rahmath Nagar, Tirunelveli - 627 011.

**Dr. J. WINFRED JEBARAJ**  
M.Sc., M.Phil., Ph.D.,  
Assistant Professor  
Research Department of Chemistry  
St. John's College,  
Palayamkottai - 627 002.

**Dr. I. ANTONY DANISH, M.Sc., Ph.D.**  
Assistant Professor,  
Department of Chemistry  
Sadakathullah Appa College (Autonomous)  
Rahmath Nagar, Tirunelveli - 627 011.

## Theoretical Study on Indacaterol by DFT Study

J. Winfred Jebaraj<sup>1</sup>, P. Muthuselvan<sup>1</sup>, D. Jim Livingston<sup>1</sup>, I. Antony Danish<sup>2</sup>

<sup>1</sup>Department of Chemistry, St. John's College, Palayamkottai, India – 627002

<sup>2</sup>Department of Chemistry, Sadakathullah Appa College, Palayamkottai, India – 627011

**Abstract:** Quantum chemical calculations were carried out to study the molecular structure for indacaterol. To investigate the optimized molecular structure, bond length, bond angle and tetrahedral angles. Mullikan atomic charges, HOMO, LUMO energy levels, energy gap, dipole moment, total energy and some other physical parameters. DFT calculations were carried out using 6-31G basis set with B3LYP.

**Keywords:** Dipole moment, HOMO-LUMO energy gap, Indacaterol, Mullikan charges.

### I. Introduction

Indacaterol is a drug used for the treatment of chronic obstructive pulmonary disease (COPD). Its chemical name is 5-((1R)-2-[(5,6-diethyl-2,3-dihydro-1H-inden-2-yl)amino]-1-hydroxyethyl)-8-hydroxy-2(1H)-quinolinone maleate. It is an ultra long acting beta adrenoceptor agonist. According to WHO, there are more than two hundred million people have moderate to severe COPD worldwide. It is in essential need of the theoretical properties. B3LYP/DFT/631-G basis set is used to calculate some physical properties of the target molecule with the help of Gaussian 09 software.

### II. Computational details

The combination of quantum chemical calculation is very effective to understand the structure and behavior of the compound. The various analysis of the present study of the compound under investigation are carried out by DFT with three parameter hybrid [1,2] functional (B3) [3] for the exchange part and Lee Yang–Parr [4] (LYP) correlation functional using 6-31G basis set. The Gaussian 09 package is used for this calculation [5].

### III. Result and Discussion

#### 3.1 Optimized molecular structure

The list of atoms for the target molecule is shown in Table 1. The optimized molecular structure is shown in Fig 1. The optimized bond length, bond angle and tetrahedral angles for Indacaterol molecule at both levels of theory are listed in Tables 2,3 and 4 respectively.

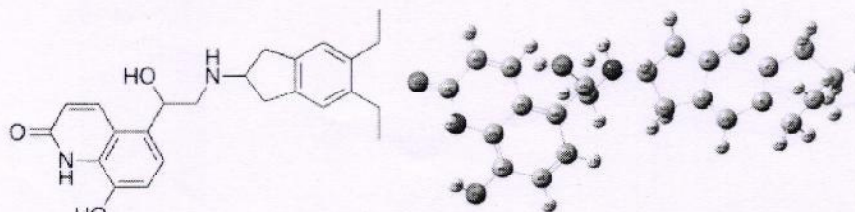


Fig 1: The 2D and 3D optimized molecular structure of Indacaterol

Table 1: The atom list of Indacaterol


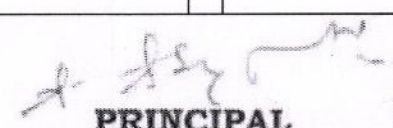

1	2	3	4	5	6	7	8
C	C	C	C	C	C	C	C
9	10	11	12	13	14	15	16
C	C	C	C	C	N	C	C
17	18	19	20	21	22	23	24
O	C	C	C	C	C	O	N
25	26	27	28	29	30	31	32
C	C	O	C	C	H	H	H



## Sadakathullahappa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	S. Khaleel Ahamed, Assistant Professor of English, ATEN05
2	Name of the Collaborating Faculty with Designation	:	Dr.A. Abbas Manthiri Principal
3	Name of the Collaborating Organization	:	Dr.Zakir Husain College Ilayangudi Sivagangai District
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Guest Lecture
6	Period of Collaboration	:	<u>26.10.2016</u>
7	Financial Involvement (if any)	:	Nil
8	Proof Attached	:	Yes / No : Yes

 Signature of Principal	 <b>PRINCIPAL</b> <b>PRINCIPAL</b> Dr. ZAKIR HUSAIN COLLEGE ILAYANGUDI - 630 702 Signature of the Collaborating Faculty	 Signature of the Faculty
---	---	---



## Dr. ZAKIR HUSAIN COLLEGE

(Minority Aided College - Estd. in 1970)  
(Re-accredited by NAAC with "A" Grade)  
ILAYANGUDI-630 702  
Sivagangai District. Tamil Nadu

**Dr. A. ABBAS MANTHIRI, M.Com., M.Phil., Ph.D.,**  
**PRINCIPAL**

Phone : 04564 265 252  
Web Site : www.drzhcily.com  
Email : drzhcily1970@yahoo.in

**Date: 26.10.2016**

### CERTIFICATE


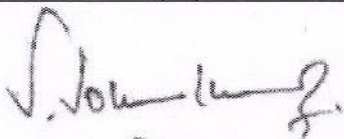

This is to certify that **S. Khaleel Ahamed**, M.A., M.Phil., B.Ed., Assistant Professor of English, Sadakathullah Appa College, Tirunelveli, acted as resource person and chief guest for the Inaugural function of the English Literary Forum of Dr. Zakir Husain College held on 26.10.2016.



*[Handwritten Signature]*  
**PRINCIPAL**  
**PRINCIPAL** 26/10/16  
Dr. ZAKIR HUSAIN COLLEGE  
ILAYANGUDI - 630 702



**SadakathullahAppa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	S. Khaleel Ahamed, Assistant Professor of English, ATEN05		
2	Name of the Collaborating Faculty with Designation	:	Dr.S. John Kennady Principal		
3	Name of the Collaborating Organization	:	ST. John's College Palayamkottai, Tirunelveli		
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic		
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Guest Lecture		
6	Period of Collaboration	:	15.10.2016		
7	Financial Involvement (if any)	:	Nil		
8	Proof Attached	:	Yes / No : Yes		
 Signature of Principal		 PRINCIPAL PRINCIPAL ST. JOHN'S COLLEGE PALAYAMKOTTAI - 627 002 Signature of the Collaborating Faculty		 Signature of the Faculty	



# ST. JOHN'S COLLEGE

PALAYAMKOTTAI, TAMILNADU, INDIA – 627 002

(CHURCH OF SOUTH INDIA – TIRUNELVELI DIOCESE)

PRINCIPAL

Office : 0462-2572218  
Fax : 0462-2580009  
Res : 0462-2575354  
E-mail: esi stjohns @ yahoo. Com

Date: 15.10.2016

## ST. JOHN'S ACADEMY WORKSHOP ON COMMUNICATIVE ENGLISH

### CERTIFICATE

This is to certify that Dr /Mr/Mrs S. Khaleel Ahamed, Asst Prof of English Sadakath  
Appa College  
acted as a Resource Person at the one-day Workshop on Communicative English organized by  
St. John's Academy, at St. John's College, Palayamkottai on 15<sup>th</sup> October 2016.

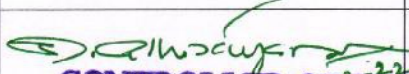
*S. Khaleel Ahamed*  
15.10.16  
COORDINATOR

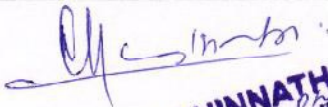
*S. John*  
PRINCIPAL

PRINCIPAL  
ST. JOHN'S COLLEGE  
PALAYAMKOTTAI - 627 002

**Collaborative Work Data Sheet**

1	Name of the Faculty with Designation, Staff ID	Dr. V. Chinnathambi, Assistant Professor, PG & Research Department of Physics, Sadakathullah Appa College, Tirunelveli-627011 Staff ID: STPH05
2	Name of the Collaborating Faculty with Designation	Dr. S. Athisayanathan, Associate Professor
3	Name of the Collaborating Organization	Department of Mathematics, St. Xavier's College, Tirunelveli, Tamilnadu 627 002, India
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	Publications
6	Period of Collaboration	From: 21-03-2016 To: 31-4-2021
7	Financial Involvement (if any)	Nil
8	Proof Attached	Yes
Signature of the Principal	Signature of the Collaborating Faculty with seal	Signature of the Faculty with seal

  
**CONTROLLER OF EXAMS**  
**ST. XAVIER'S COLLEGE**  
**PALAYAMKOTTA**  
**TAMILNADU.**

  
**Dr. V. CHINNATHAMBI**  
**SADAKATHULLAH APPA COLLEGE**  
**(AUTONOMOUS)**  
**Rahmath Nagar, Tirunelveli - 627 011.**



M. V. Sethu Meenakshi, S. Athisayanathan, V. Chinnathambi\* and S. Rajasekar

# Effect of Fractional Damping in Double-Well Duffing–Vander Pol Oscillator Driven by Different Sinusoidal Forces

<https://doi.org/10.1515/ijnsns-2016-0165>

Received November 10, 2016; accepted January 12, 2019

**Abstract:** The effect of nonlinear damping including fractional damping on the onset of horseshoe chaos is studied both analytically and numerically in the double-well Duffing–Vander Pol (DVP) oscillator driven by various sinusoidal forces. The sinusoidal type periodic forces of our interest are sine wave, rectified sine wave, and modulus of sine wave. Using the Melnikov analytical method, the threshold condition for the onset of horseshoe chaos is obtained for each sinusoidal force. Melnikov threshold curves are drawn in  $(f, \omega)$  parameters space for each force. When the damping component ( $p$ ) increases from a small value, the Melnikov threshold value ( $f_M$ ) is decreased for each force. Suppression of horseshoe chaos is predicted due to the effect of weak periodic perturbation and nonlinear fractional damping. Analytical predictions are demonstrated through direct numerical simulations.

**Keywords:** Duffing–Vander Pol oscillator, fractional damping, sinusoidal force, homoclinic bifurcation, Melnikov method, chaos

**AMS Subject Classifications.** primary 37D45, secondary 34C37, 34D10, 34A08, 37J20, 37C29

## 1 Introduction

Damping is a key phenomenon in certain applied systems, since it may be used to suppress large-amplitude oscillations or various instabilities, and it can be also

used as a control mechanism. The damping is a function of the system's velocity. This function is nonlinear in a number of mechanical systems, and similar nonlinear damping behaviour is also seen in many electrical, biological and other dynamical systems. Examples include the damping in aircraft structures, flow through orifices, damping in nanoelectromechanical (NEM) system and the vibration inside the cochlea. Nonlinear damping is the dominant source of nonlinearity in a number of practical systems. The use of nonlinear damping in microspeakers, vibration isolation systems and vibration harvesters illustrates its practical application in extending the dynamic range of these devices using this mechanism. The nonlinear fractional damping has also been considered in many applied sciences such as ship dynamics, vibration engineering, the study of dynamics of galaxies and the motion of the projectiles [1, and references therein].

In the past decade, the study of nonlinear oscillators under the influence of applied periodic force along with the presence of nonlinear damping including fractional damping received much attention. In the presence of such nonlinear damping, various results such as coexistence of multiple attractors, hysteresis, period-doubling bifurcations leading to chaotic motion, strange attractors, existence of homoclinic bifurcation, fractal basin boundaries, etc. have been investigated in certain nonlinear oscillators [2–10]. The dynamics of many nonlinear oscillators and circuits are very often studied with external force being of the form  $f \sin \omega t$ . In recent years, there are few studies with different forms of periodic forces such as rectified sine wave, modulus of sine wave, etc. [11–15]. The study of the influence of different types of periodic forces is very important. This is because certain periodic forces can be generated and easily applied to real physical systems and electronic circuits. The study of effect of such periodic forces will be helpful to choose a external drive in creating and controlling nonlinear behaviours. Analysis of features of a particular dynamics with various periodic forces and a detailed comparative study of effects induced by them will be of great use. It is also important to explore the utility and applicability of analytical methods such as

\*Corresponding author: V. Chinnathambi, Department of Physics, Sadakathullah Appa College, Manonmaniam Sundaranar University, Tirunelveli 627 011, Tamilnadu, India, E-mail: veerchinnathambi@gmail.com

M. V. Sethu Meenakshi, S. Athisayanathan, Department of Mathematics, St. Xavier's College, Manonmaniam Sundaranar University, Tirunelveli-627 002, Tamilnadu, India  
S. Rajasekar School of Physics, Bharathidasan University, Tiruchirapalli 620 024, Tamilnadu, India, E-mail: rajasekar@cndd.bdu.ac.in



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr. M. Mohamed Roshan Assistant Professor, Department of Physics, Sadakathullah Appa College Staff ID – ATPH04
2	Name of the Collaborating Faculty with Designation	:	Dr. G Roy Richi Renold Assistant Professor, Department of Physics, Staff ID – 9534040
3	Name of the Collaborating Organization	:	V V College of Engineering, VV Nagar, Arasoor, Tisaiyanvillai(via)- 627657
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publications
6	Period of Collaboration	:	From : 2017 To: 2020
7	Financial Involvement (if any)	:	
8	Proof Attached	:	Yes

Signature of Principal

Signature of the Collaborating Faculty

Dr. G. ROY RICHY RENOLD M.Sc., M.Phil., Ph.D  
ASSISTANT PROFESSOR,  
DEPARTMENT OF PHYSICS,  
V V COLLEGE OF ENGINEERING,  
VV NAGAR, TISAIYANVILLAI (VIA) - 627 657.

Signature of the Faculty

Dr. M. MOHAMED ROSHAN  
Assistant Professor of Physics  
Sadakathullah Appa College  
Rahmath Nagar, Tirunelveli-11.

# Ultrasonic Studies Of Alanine in Aqueous Paracetamol Solutions at Different Temperatures

Rajagopal. K<sup>1</sup>, Roy Richi Renold. G \*<sup>2</sup>, Mohamed Roshan. M<sup>3</sup>

<sup>1</sup>Professor of Physics (Rtd.), Government College of Engineering, Tirunelveli, Tamil Nadu, India.

<sup>2</sup>Research Scholar, M.S. University, Assistant Professor of Physics, V V College of Engineering, Tisaiyanvilai, Tirunelveli, Tamil Nadu, India.

<sup>3</sup>Assistant Professor of Physics, Sadakathullah Appa College, Tirunelveli, TamilNadu, India.

## Abstract:

Ultrasonic velocity and density data of alanine in 0.025, 0.05, 0.075, and 0.1 M concentration of aqueous paracetamol solutions are measured and reported at 298.15, 303.15, 308.15, 313.15 and 318.15 K to compute several thermodynamic parameters like isentropic compressibility ( $\beta_s$ ), the change in isentropic compressibility ( $\Delta\beta_s$ ), the relative change in isentropic compressibility ( $\Delta\beta_s/\beta_s^0$ ), the apparent molal compressibility ( $k_\phi$ ), the limiting apparent molal compressibility ( $k_\phi^0$ ), the limiting apparent molal compressibility of transfer ( $\Delta_t k_\phi^0$ ), the hydration number ( $n_H$ ), and the pair and triplet interaction parameters ( $k_{AH}$ ,  $k_{AHH}$ ). These parameters are used to interpret the solute-solute and solute-solvent interactions of alanine in aqueous paracetamol solutions.

**Keywords:** Hydration number · Isentropic compressibility · Limiting apparent molal compressibility · Paracetamol · Ultrasonic speed

## INTRODUCTION

Drugs are biologically supreme macromolecules which have been in use for a long time for the treatment of various diseases and to provide immunity to the living system. By examining the physio chemical properties of drugs in aqueous, protic solvents and aqueous-protic solutions, one can understand the interaction of drugs at the molecular levels. Interaction studies of drugs with biomolecules will provide vital data about physiological media such as blood, membranes and cellular fluids. Since drugs are organic molecules with both hydrophilic and hydrophobic groups, these molecules show specific as well as electrostatic interactions.

Drug transport, protein binding, and anesthesia are some of the processes where drugs and bio-macromolecules appear to interact in an important and noteworthy manner. However the mechanisms of these molecular processes are not yet to be clearly understood [1]. In protein binding, particular conduct has been noted regarding certain medications. The actions of the drug like drug reaching the blood stream, its expanse of giving out, its binding to the receptors, and eventually producing physiological action, all depend on various physicochemical properties primarily noticed by diverse interactions of the compounds [2,3]. Pharmacokinetics is the study of the use of drugs involving physiological and biochemical effects and their mechanism of action at macromolecular/subcellular/organ system levels [4,5]. Pharmacokinetic process involves the transport of drugs across biological membranes which can be well understood by transport property measurements, like ultrasonic speed, viscosity, diffusion, and thermal conductivity [4]. Thus, knowledge of the physicochemical and thermodynamic properties of drugs plays an important part to perceive their physiological actions showing that they are highly dependent on the solution to respond. Literature survey shows that many authors prefer the model compound amino

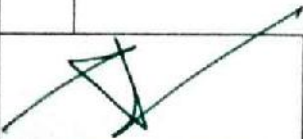
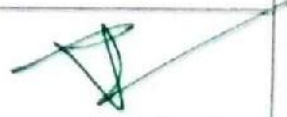
acids in place of proteins as proteins are highly complex molecules in the determination of thermodynamic parameters in aqueous media [6,7]. Recently [8] we have reported the volumetric and viscometric studies of alanine in aqueous paracetamol and confirmed the presence of strong solute-solvent interactions in addition to the presence of weak solute-solute interactions. As Compressibility is being a more sensitive parameter to elucidate the interaction studies in solutions [9], in this paper we report thermodynamic parameters such as adiabatic compressibility ( $\beta_s$ ), change in adiabatic compressibility ( $\Delta\beta_s$ ), the relative change in adiabatic compressibility ( $\Delta\beta_s/\beta_s^0$ ), the apparent molal compressibility ( $k_\phi$ ), the limiting apparent molal compressibility ( $k_\phi^0$ ), the transfer limiting apparent molal compressibility ( $\Delta_t k_\phi^0$ ), the hydration number ( $n_H$ ), and the pair and triplet interaction parameters ( $k_{AH}$ ,  $k_{AHH}$ ) using the measured density and ultrasonic velocity data. These parameters are used to interpret the solute solvent and solute-solute interactions of alanine in aqueous paracetamol solutions. The data at temperatures T = (298.15, 303.15, 308.15, 313.15 and 318.15) K provide insight into the drug macromolecular behavior near physiological temperatures.

## MATERIALS AND METHODS

Paracetamol and the amino acid, L-alanine of full cleanness has been procured from S.D. Fine. Chem. Ltd. Mumbai and Loba Chemie Pvt Ltd (assemble fraction cleanness > 0.990), has been used after drying over P<sub>2</sub>O<sub>5</sub> in a desiccator for 72 hrs before utility. L-alanine of different molality (0.02, 0.04, 0.06, 0.08 and 0.1) M has been added as solutes in four different molal (0.025, 0.05, 0.075 and 0.1) concentration of aqueous paracetamol solvents, made with doubly distilled deionized water of  $1.5 \times 10^{-4} \Omega^{-1} \text{ m}^{-1}$  conductivity. The density of the solutions and speed of



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr. M. Mohamed Sathik
			Associate Professor of Computer Science Principal, Sadakathullah Appa College (Autonomous), Rahmath Nagar, Tirunelveli, Tamil Nadu
2	Name of the Collaborating Faculty with Designation	:	Ms. Fathima Zahira
			Assistant Professor, Department of Computer Science, Syed Hameedha Arts and Science College, Kilakarai, Tamil Nadu, India
3	Name of the Collaborating Organization	:	Syed Hameedha Arts and Science College, Kilakarai, Tamil Nadu, India
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publication - 2 (2016) International Journal of Advanced Research in Biology, Ecology, Science and Technology
6	Period of Collaboration	:	From : 2016 To: 2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>Ms.Fathima Zahira</b> Signature of the Collaborating Faculty	
		 Signature of the Faculty	



# AN EFFECTIVE ANALYSIS OF MRI BRAIN IMAGES AND 3D RECONSTRUCTION

M.Fathima Zahira<sup>1</sup> and M.Mohamed Sathik<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Computer Science, Syed hameedha Arts and Science College, Kilakarai, Tamilnadu, India.

[fathimazahira.m@gmail.com](mailto:fathimazahira.m@gmail.com)

<sup>2</sup>Principal, Sathakathullah Appa Collage, Thirunelveli, Tamilnadu, India.

[mndsadiq@gmail.com](mailto:mndsadiq@gmail.com)

## ABSTRACT:

Medical Image Processing is defined as the process of creating visual representations of the interior of a body for medical intervention. Brain tumor is a major dangerous disease in the world. Many treatments are growing for curing the brain tumor disease. Nowadays 3D images are used for identifying brain tumors. Several techniques such as marching cubes and dividing cubes formed a topological relationship for the slices that converts 2D images into 3D images which does not provide accurate results and they depends on number of input sections, positions and the shape of the images. These processes take more time consuming for running and their tasks are very tedious. Our proposed system introduces a 3D reconstruction for analyzing the MRI brain efficiently. This system involves six stages such as preprocessing, region growing segmentation, feature extraction, feature selection, classification and 3D reconstruction. Our approach gets simulated in Matlab simulation and provides effective results on accuracy, specificity and sensitivity.

**Index terms:** Brain Tumor, Digital Image Processing, 2D images, 3D images, Fuzzy logic

## I. INTRODUCTION:


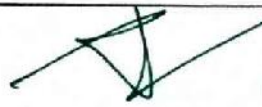
Digital Image Processing is a term used for processing and displaying digital images based on computer algorithms. This process allows wider range of algorithms for input data while processing to avoid problems such as noise and signal distortion. Nowadays, Digital Image processing is used in medicinal field in order to identify diseases in human body. Image processing is used in various applications such as Remote sensing, Medical imaging, Forensic studies, Military, Material science and Biomedical Engineering. Medical Imaging is a part of biological imaging which establishes a database of anatomy and physiology that identifies the abnormalities in human beings. Biomedical Image Processing involves the steps like intelligent image analysis such as feature extraction, segmentation, classification, quantitative measurements and interpretation [1]. The continuous enhancement in applications and techniques such as interpolation, medical diagnosis, compression and image registration are to be improved for the growing technologies that must satisfy the quality of service. These are growing for GPDPU platforms [2]. Heart attack disease causing symptoms such as clot in blood,

thrombus can be identified using image processing techniques. These symptoms identification is processed with help of echocardiographic images [3]. Parallel processing is used in image processing in order to give the high performance in computation problem. These are solved through data, task and pipeline mechanism, medical imaging requires more computation power for processing the images so they use parallel processing [5]. Image processing techniques are widely used in identification of document forensic problems that uses printing technology. Here the processing is based on textures, spatial correlation, spatial variation and features [4]. Material science is enhancing the production process with help of image processing while maintaining physical properties. This leads to improve the materials with excellent properties like global structure, microstructure, electric traits and diffusion [6].



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. M. Mohamed Sathik</b> Associate Professor of Computer Science Prinicipal, Sadakathullah Appa College (Autonomous), Rahmath Nagar, Tirunelveli, Tamil Nadu
2	Name of the Collaborating Faculty with Designation	:	<b>Ms. Fathima Zahira</b> Assistant Professor, Department of Computer Science, Syed Hameedha Arts and Science College, Kilakarai, Tamil Nadu, India Research Scholar, Department of Computer Science Bharathiar University, Coimbatore
3	Name of the Collaborating Organization	:	Syed Hameedha Arts and Science College, Kilakarai, Tamil Nadu, India
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	::	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co- guide / Project Reports / Other Reports/Publications)	:	<b>Publication - 4 (2016) 82</b> International Journal of Advanced Technology in Engineering and Science
6	Period of Collaboration	:	From : 2016 To:2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>Ms. Fathima Zahira</b> Signature of the Collaborating Faculty	 Signature of the Faculty



## LOCATING TUMOR IN MRI BRAIN IMAGE BASED ON CLASSIFICATION AND 3D RECONSTRUCTION

M. Fathima Zahira<sup>1</sup>, E. Synthiya Judith Gnanaselvi<sup>2</sup>,

Dr. M. Mohamed Sathik<sup>3</sup>,

<sup>1,2</sup>Research Scholars, Bharathiar University, Tamil Nadu, (India)

<sup>3</sup>Principal, Sadakathullah Appa College, Tirunelveli, Tamil Nadu, (India)

### ABSTRACT

Brain tumour is the most dangerous disease to cure which occurs when abnormal cells grow in the brain. In this paper, we proposed a methodology to analyse the brain images and 3D reconstruction of MRI images. Initially, the redundant tissues and noises are purged from the input image by means of the skull stripping approach. Then, segmentation using FCM is applied on the skull stripped image. After that the first order statistical attributes and the co-occurrence matrix are calculated from the segmented image. These extracted attributes are then inputted to the K-NN classifier to categorize the normal and the anomalous MRI brain images. Ultimately, the images categorized as anomalous then undergoes 3D reconstruction process by means of the depth map estimation so as to position the tumour precisely.

**Keywords:** Skull Stripping, K-NN Classifier, 3D Reconstruction, MRI, Feature Extraction, Depth-Map Estimation.

### I. INTRODUCTION

The medical imaging is an ingredient of natal imaging which ascertains an anatomy and physiology database that recognizes the aberrations in humans [1]. In accordance with the images of brain it affords signals of brain anatomy and is valuable in the analysis of several brain aberrations like malevolent glioma tumor and skull have appeared intensity that builds


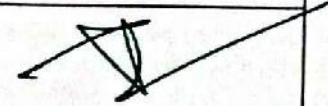
Mechanical tumor detection tricky. In order to conquer this confront, skull-stripping technique is preferred as a pre-processing phase for identifying the brain tumor [2]. The extraction of three dimensional objects and its visualization is the vital step in the psychiatry of the preprocessed medical image data, which facilitates to carry out recognition, treatment planning and treatment deliverance [3][4].

A budding three dimensional method exhibits several applications such as cinema, gaming, photography and edification etc. The two dimension to three dimension conversion is categorized into two approaches namely the i) semi-automatic approach and ii) full-automatic approach. Although the semi-automatic conversion approach [5] is broadly utilized till now, it needs significant period and human reserves. Full mechanical two dimensional to three dimensional conversions is yet again classified into two approaches: The first approach depends on the



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. M. Mohamed Sathik</b>  Associate Professor of Computer Science Principal, Sadakathullah Appa College (Autonomous), Rahmath Nagar, Tirunelveli, Tamil Nadu
2	Name of the Collaborating Faculty with Designation	:	<b>D. Latha</b>  Department of Computer Science Nesamony Memorial Christian College, Tamil Nadu
3	Name of the Collaborating Organization	:	Department of Computer Science Nesamony Memorial Christian College, Tamil Nadu
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Publication - 6 (2016)1174</b> ICTACT Journal on Image and Video Processing
6	Period of Collaboration	:	From : 2016 To: 2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>D. Latha</b> Signature of the Collaborating Faculty	 Signature of the Faculty



## MULTILEVEL APPROACH OF CBIR TECHNIQUES FOR VEGETABLE CLASSIFICATION USING HYBRID IMAGE FEATURES

D. Latha<sup>1</sup>, M. Mohamed Sathik<sup>2</sup> and Y. Jacob Vetha Raj<sup>3</sup>

<sup>1,2</sup>Department of Computer Science, Nesamony Memorial Christian College, India

E-mail: <sup>1</sup>dlathasatheesh@gmail.com, <sup>3</sup>jacobvetharaj@gmail.com

<sup>2</sup>Sadakathullah Appa College, India

E-mail: mmdsadiq@yahoo.com

### Abstract

CBIR is a technique to retrieve images semantically relevant to query image from an image database. The challenge in CBIR is to develop a method that should increase the retrieval accuracy and reduce the retrieval time. In order to improve the retrieval accuracy and runtime, a multilevel CBIR approach is proposed in this paper. In the first level, the color attributes like mean and standard deviations are proposed to calculate on HSV color space to retrieve the images with minimum disparity distance from the database. In order to minimize search area, in the second level Local Ternary Pattern is proposed on images which were selected from the first level. Experimental results and comparisons demonstrate the superiority of the proposed approach.

### Keywords

Content Based Image Retrieval (CBIR), Gray Level Co-occurrence Matrix (GLCM), Local Binary Patterns (LBP), Local Ternary Pattern (LTP)

## 1. INTRODUCTION

In internet applications, every minute image is added to the databases of the server and also images are retrieved from the database. Hence, an image retrieval system becomes a need.

Early image retrieval techniques were generally text based. In this text-based image retrieval system [1], each image is manually annotated by the text descriptor and then this descriptor is used by the database management system to perform image retrieval. Generally, a lot of manpower is required for annotating text descriptors to every image of the large database. Hence it is a difficult and expensive work [3]. There is also a problem of annotation inaccuracy because of the subjectivity of human perception.

To overcome the problems in text-based system approach, content based image retrieval (CBIR) system was introduced in early 1980's. In this, the images are retrieved according to the image content. The primary goal of the CBIR system is to construct meaningful descriptor based on the image features like color, texture and shape of the images, which are automatically calculated by the computer to facilitate efficient and effective retrieval. In CBIR, color is the widely used feature to construct meaningful descriptor for the image [2].

Usually colors are defined in three dimensional color spaces. They could either be RGB (Red, Blue, Green), HSV (Hue, saturation, Value), or HSB Hue, Saturation, Brightness). The CBIR techniques using color feature usually compares the color histograms in the RGB or HSV color space. Generally, there are two types of color histograms, namely Global Color Histograms (GCHs) and Local Color Histograms (LCHs) [8]. A GCH represents one whole image with a single color histogram. An

LCH divides an image into fixed blocks and takes the color histogram of each of these blocks.

Although retrieval methods using color feature information are widely used, it has the disadvantage of being very sensitive to changes in the histogram itself, including changes in brightness and color.

Texture [11] [8] is a feature that describes about the structural arrangement of the surface such as smoothness, coarseness, and regularity. The texture information is captured by several texture extraction methods. Gray Level Co-Occurrence Matrix (GLCM) is one of the widely used methods for texture feature extraction. The GLCM is used to extract certain properties about the spatial distribution of the gray level in the texture image. In order to estimate different gray level co-occurrence matrices, many statistical features like energy, entropy, contrast and homogeneity are extracted

Local Binary Pattern (LBP) [11] is one of the popular texture classification features. LBP encodes the pixel differences between the center pixel (Pc) and the neighboring pixels on a circle of radius. LBP is robust to illumination and contrast variations as it considers the pixel difference. But, it is sensitive to noise and small fluctuations of pixel values. To handle this problem, Local Ternary pattern (LTP) [11] has been introduced.

LTP uses two thresholds which creates three states as compared to two in LBP. So, LTP is more resistant to noise and small pixel variations. In our proposed system Local Ternary Pattern (LTP) is used to evaluate the texture feature.

Shape describes the configuration of an object, as outline or contour. It permits an object to be distinguished from its surroundings by its outline. Retrieval methods using shape feature [1] information distinguishes contours of objects contained in an image. It is not affected by object size and position. However, since contour of an object is sensitive to changes in shape or direction, contour extraction is difficult in itself. The most successful representations for shape categories are Fourier Descriptor and Moment Invariance: The main idea of Fourier Descriptor is to use the transformed boundary. Also, the idea of moment invariants is to use region based moments that are invariant to transformation.


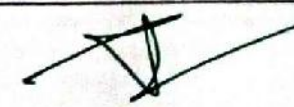
With these image features, region based image retrieval methods using image segmentation were introduced into the CBIR to improve the retrieval accuracy of CBIR system. But the performance of these methods relies in the result of segmentation.

Generally, CBIR involves two steps. The first step is extracting image features like color, texture and shape (edge) to a distinguishable extent. The second step is matching these features to yield a result that is visually similar.



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. M. Mohamed Sathik</b>  Associate Professor of Computer Science Principal, Sadakathullah Appa College (Autonomous), Rahmath Nagar, Tirunelveli, Tamil Nadu
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. Y. Jacob Vetha Raj</b>  Department of Computer Science Nesamony Memorial Christian College, Tamil Nadu
3	Name of the Collaborating Organization	:	Department of Computer Science Nesamony Memorial Christian College, Tamil Nadu
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Publication – 6 (2016)1174</b> ICTACT Journal on Image and Video Processing
6	Period of Collaboration	:	From : 2016 To: 2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>Dr. Jacob Vetha Raj</b> Signature of the Collaborating Faculty	 Signature of the Faculty

## MULTILEVEL APPROACH OF CBIR TECHNIQUES FOR VEGETABLE CLASSIFICATION USING HYBRID IMAGE FEATURES

D. Latha<sup>1</sup>, M. Mohamed Sathik<sup>2</sup> and Y. Jacob Vetha Raj<sup>3</sup>

<sup>1,3</sup>Department of Computer Science, Nesamony Memorial Christian College, India

E-mail: <sup>1</sup>dlathasatheesh@gmail.com, <sup>3</sup>jacobvetharaj@gmail.com

<sup>2</sup>Sadakathullah Appa College, India

E-mail: mmdsadiq@yahoo.com

### Abstract

CBIR is a technique to retrieve images semantically relevant to query image from an image database. The challenge in CBIR is to develop a method that should increase the retrieval accuracy and reduce the retrieval time. In order to improve the retrieval accuracy and runtime, a multilevel CBIR approach is proposed in this paper. In the first level, the color attributes like mean and standard deviations are proposed to calculate on HSV color space to retrieve the images with minimum disparity distance from the database. In order to minimize search area, in the second level Local Ternary Pattern is proposed on images which were selected from the first level. Experimental results and comparisons demonstrate the superiority of the proposed approach.

### Keywords

Content Based Image Retrieval (CBIR), Gray Level Co-occurrence Matrix (GLCM), Local Binary Patterns (LBP), Local Ternary Pattern (LTP)

## 1. INTRODUCTION

In internet applications, every minute image is added to the databases of the server and also images are retrieved from the database. Hence, an image retrieval system becomes a need.

Early image retrieval techniques were generally text based. In this text-based image retrieval system [1], each image is manually annotated by the text descriptor and then this descriptor is used by the database management system to perform image retrieval. Generally, a lot of manpower is required for annotating text descriptors to every image of the large database. Hence it is a difficult and expensive work [3]. There is also a problem of annotation inaccuracy because of the subjectivity of human perception.

To overcome the problems in text-based system approach, content based image retrieval (CBIR) system was introduced in early 1980's. In this, the images are retrieved according to the image content. The primary goal of the CBIR system is to construct meaningful descriptor based on the image features like color, texture and shape of the images, which are automatically calculated by the computer to facilitate efficient and effective retrieval. In CBIR, color is the widely used feature to construct meaningful descriptor for the image [2].

Usually colors are defined in three dimensional color spaces. They could either be RGB (Red, Blue, Green), HSV (Hue, saturation, Value), or HSB Hue, Saturation, Brightness). The CBIR techniques using color feature usually compares the color histograms in the RGB or HSV color space. Generally, there are two types of color histograms, namely Global Color Histograms (GCHs) and Local Color Histograms (LCHs) [8]. A GCH represents one whole image with a single color histogram. An

LCH divides an image into fixed blocks and takes the color histogram of each of these blocks.

Although retrieval methods using color feature information are widely used, it has the disadvantage of being very sensitive to changes in the histogram itself, including changes in brightness and color.

Texture [11] [8] is a feature that describes about the structural arrangement of the surface such as smoothness, coarseness, and regularity. The texture information is captured by several texture extraction methods. Gray Level Co-Occurrence Matrix (GLCM) is one of the widely used methods for texture feature extraction. The GLCM is used to extract certain properties about the spatial distribution of the gray level in the texture image. In order to estimate different gray level co-occurrence matrices, many statistical features like energy, entropy, contrast and homogeneity are extracted

Local Binary Pattern (LBP) [11] is one of the popular texture classification features. LBP encodes the pixel differences between the center pixel (Pc) and the neighboring pixels on a circle of radius. LBP is robust to illumination and contrast variations as it considers the pixel difference. But, it is sensitive to noise and small fluctuations of pixel values. To handle this problem, Local Ternary pattern (LTP) [11] has been introduced.

LTP uses two thresholds which creates three states as compared to two in LBP. So, LTP is more resistant to noise and small pixel variations. In our proposed system Local Ternary Pattern (LTP) is used to evaluate the texture feature.

Shape describes the configuration of an object, as outline or contour. It permits an object to be distinguished from its surroundings by its outline. Retrieval methods using shape feature [1] information distinguishes contours of objects contained in an image. It is not affected by object size and position. However, since contour of an object is sensitive to changes in shape or direction, contour extraction is difficult in itself. The most successful representations for shape categories are Fourier Descriptor and Moment Invariance: The main idea of Fourier Descriptor is to use the transformed boundary. Also, the idea of moment invariants is to use region based moments that are invariant to transformation.

With these image features, region based image retrieval methods using image segmentation were introduced into the CBIR to improve the retrieval accuracy of CBIR system. But the performance of these methods relies in the result of segmentation.

Generally, CBIR involves two steps. The first step is extracting image features like color, texture and shape (edge) to a distinguishable extent. The second step is matching these features to yield a result that is visually similar.



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. M. Mohamed Sathik</b>  Associate Professor of Computer Science Principal, Sadakathullah Appa College (Autonomous), Rahmath Nagar, Tirunelveli, Tamil Nadu
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. K. Aruna Anushiya</b>  Department of Computer Science Manonmaniam Sundaranar University, Tirunelveli
3	Name of the Collaborating Organization	:	Department of Computer Science Manonmaniam Sundaranar University, Tirunelveli
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Publication – 5(2016)186</b> <b>International Journal of Computer Science and Mobile Computing</b>
6	Period of Collaboration	:	From : 2016 To: 2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
Signature of Principal		<b>Dr. K. Aruna Anushiya</b> Signature of the Collaborating Faculty	
		Signature of the Faculty	



# Traffic flow Prediction with Big Data Using SAE'S Algorithm

S.Piramu Kailasam (Ph.d), K.Aruna Anushiya, Dr. M.Mohammed Sathik

<sup>1</sup>Research Scholar, Bharathiar University, India

<sup>2</sup>Assistant Professor, MSU College, India

<sup>3</sup>Principal, Sadakathullah Appa College, Tirunelveli, India

<sup>1</sup>[spkpramu@gmail.com](mailto:spkpramu@gmail.com); <sup>2</sup>[anushia@gmail.com](mailto:anushia@gmail.com)

**Abstract**— Intelligent transportation system is accurate and time based traffic flow information to do best performance . Last few years, traffic data have been huge, existing system used weak traffic prediction models which is unsatisfied. The proposed system is using novel deep learning based traffic flow prediction method, which involves the spatial and temporal correlations inherently. A stack autoencoder model is used to learn generic traffic flow features and it is trained in a greedy layerwise pattern. This is the first time that a deep architecture model is proposed using autoencoders to represent traffic flow features for prediction.

**Keywords**— Deep learning, stacked autoencoders (SAEs), traffic flow prediction.

## I. INTRODUCTION

The traffic flow information is [1] the potential to help road users, which make better travel decisions in traffic congestion and reduce carbon emissions. This will improve traffic operation efficiently. Now days transportation management system and control becomes more complicated data driven. The most of the Traffic flow prediction system method is used shallow traffic model which are unsatisfied. Deep learning , which is a type of machine learning method, has a lot of interest academic and industrial level.

Deep learning algorithms use multiple-layer architectures to extract inherent features in data from the lowest to the highest level using deep learning algorithm. Without prior knowledge, we can represent the traffic feature which has good performance in traffic flow prediction.

## II. LITERATURE REVIEW

A Traffic flow prediction is a key functional component in ITSs. A countable traffic flow prediction models have been developed to assist in traffic management .These models will control and improving transportation efficiency ranging from route guidance and vehicle routing . The traffic flow can be considered a temporal and spatial process. The traffic flow prediction problem can be stated as follows. Let  $X_i$  denote the observed traffic flow quantity during the  $i$ th time interval at the  $i$ th observation location in a transportation network. Given a sequence  $\{X_i\}$  of observed traffic flow data,  $i = 1, 2, \dots, m$ ,  $t = 1, 2, \dots, T$ , the problem is to predict the traffic flow at time interval  $(t+\Delta)$  for some prediction horizon  $\Delta$ . As early as 1970s, the autoregressive integrated moving average (ARIMA) model was used to predict short-term freeway traffic flow [3]. The variety of models for traffic flow prediction have been proposed by researchers from different areas, such as transportation



**Sadakathullah Appa College  
(Autonomous)  
Rahmath Nagar, Tirunelveli - 627011**

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. A. Benazir (ATCO08)</b> Assistant Professor, PG and Research Department of Commerce Sadakathullah Appa College (Autonomous) Rahmath Nagar, Tirunelveli - 11
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. S. Archana Bai</b> Assistant Professor, Department of Commerce Sir Theagaraya College, Chennai 21
3	Name of the Collaborating Organization	:	Sir Theagaraya College, Chennai 21
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Publications -</b> International Journal of Business Intelligence and Innovations Volume 2/Special Issue/ Aug 2017 "A Study on Customer Awareness Towards Green Banking with Special Reference to Tirunelveli District"
6	Period of Collaboration	:	From : April 2016 To: July 2017
7	Financial Involvement (if any)	:	NO
8	Proof Attached	:	Yes

Signature of Principal

Signature of the Collaborating Faculty

**Dr. S. ARCHANA BAI**  
M.B.A., M.Com., M.Phil., Ph.D.,  
ASSISTANT PROFESSOR  
DEPARTMENT OF COMMERCE  
SIR THEAGARAYA COLLEGE  
CHENNAI-600-021.

Signature of the Faculty

#### 47. A Study on Customer Awareness towards Green Banking- with Special reference to Tirunelveli District

A. Benazir, Research Scholar, Mother Teresa Women's University, Kodaikanal.

Dr. S. Archana, Research supervisor, Assistant Professor, Department of Commerce, Sri Theagaraya College, Chennai - 21.

##### ABSTRACT

In the present era the ecological preservation and development are recognized globally for protecting our earth from global warming and climatic change. Due to this there is a wave of changes with all business activities and they started to focus on people and planet and not on their profit alone. This leads to a move towards green economy and one such area is green banking. Green banking is comparatively a new development in this modern world. It is a form of banking taking into account the social and environmental impact. Its main motive is to protect and preserve environment. The banking sector should go green and also should play a pro-active role to take environmental and ecological aspects as a part of their lending principle. This paper attempts to find out the major problems in creating awareness among customers about green banking in tirunelveli district. This study also focuses on the effect of demonetization in the usage of green banking system. The researcher collects primary data through questionnaire from 150 respondents. The collected data are analyzed using percentage technique and Garrett ranking method. The secondary data are collected from various bank websites, RBI reports, journals etc. The findings of the study are that the banks have to take green initiatives in a big way and also should create a awareness among customers about green banking.

Key words: Green banking strategies, products, initiative, customer awareness.

##### 1. INTRODUCTION

The concept of Green Banking is emerged in 2009. Green Banking is not a separate bank. Green Banking means ensuring environment friendly practices in banking sector and thereby reducing internal and external carbon footprints. Banking industry is generally not considered as polluting industry. But it impacts the environment in terms of increasing energy consumption (lighting, air conditioning), paper consumption. Green banking considers all the social and environmental/ecological factors with an aim to protect the environment and conserve natural resources. It is also called as an ethical bank or a sustainable bank. Green Banking therefore covers two aspects. The first one being judicious use of all resources, energy and reducing carbon footprints and second being encouraging and financing only environment friendly investment. So Green Banking is not only about making sustainable use of resources but also about environment friendly. The Institute for Development and Research in Banking and Technology established by RBI defines Green Banking as:

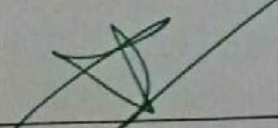
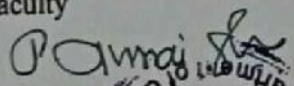
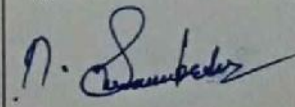
'Green Banking is an umbrella term referring to practices and guidelines that make banks sustainable in economic, environment, and social dimensions. It aims to make banking processes and the use of IT and physical infrastructure as efficient and effective as possible, with zero or minimal impact on the environment.'

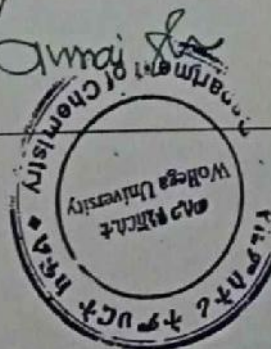
##### 1.1 IMPORTANCE OF GREEN BANKING

The importance of Green Banking in India is increasing rapidly as it is moving on the path of economic development and industrial sector is playing an important role in that. However, Indian industry faces the challenges of controlling environmental impact of their business i.e. reducing pollution and emission of their clients. Though government has been trying to address the issue by framing environmental legislations and encouraging industry to follow



**SadakathullahAppa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	: <b>Dr. M. SHEIK MUHIDEEN BADHUSHA</b> Assistant professor of Chemistry ATCH03
2	Name of the Collaborating Faculty with Designation	: <b>Dr. P. THILLAI ARASU</b> Professor of Chemistry Department of Chemistry
3	Name of the Collaborating Organization	: College of Natural and Computational Science Wollega University Nekemte, Post Box. No. 395 Ethiopia
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	: <b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	: <b>Publications / Guest Lecture</b>
6	Period of Collaboration	: From : 2016 To:
7	Financial Involvement (if any)	: no
8	Proof Attached	: Yes
Signature of Principal		Signature of the Collaborating Faculty
		
		Signature of the Faculty
		







www.cafetinnova.org

Indexed in  
Scopus Compendex and Geobase Elsevier,  
Geo-Ref Information Services-USA, List B of Scientific  
Journals, Poland, Directory of Research Journals

ISSN 0974-5904, Volume 09, No. 06

**International Journal  
of Earth Sciences  
and Engineering**

December 2016, P.P. 2499-2502

## A Study of Physico-Chemical Analysis of Ground Water in and around SIPCOT, Tuticorin, Tamil Nadu, India

P THILLAI ARASU<sup>1</sup>, A MURUGAN<sup>2</sup> AND M S M BADUSHA<sup>3</sup>

<sup>1</sup>Department of Chemistry, Wollega University, Nekemte, ETHIOPIA

<sup>2</sup>Department of Chemistry, North Eastern Regional Institute of Science and Technology, Nirjuli, Papum Pare (Dist.), Itanagar 791 109, Arunachal Pradesh, INDIA

<sup>3</sup>Department of Chemistry, Sadokathullah Appa college, Tirunelveli 627 011, Tamil Nadu, INDIA

Email: drphillaiarasu@gmail.com, nspmurugan@gmail.com

**Abstract:** Physico-Chemical study was carried out in and around State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT) area, Tuticorin, Tamilnadu, with an attempt to determine the characteristics of ground water status and public health in this region, which includes a network of some major industries. Twelve ground water sample were collected from different bore wells and open wells in the study area and were analyzed for pH, total dissolved solid (TDS), total hardness (TH), Nitrogen dioxide (NO<sub>2</sub>), Sulphate (SO<sub>4</sub><sup>2-</sup>), Chloride (Cl<sup>-</sup>), Fluoride (F<sup>-</sup>), and Iron (Fe). The analysis show that all the twelve samples collected from the places located in and around the industrial belt of SIPCOT has been grossly polluted. The present study clearly highlight that the Physico-chemical parameters like pH, TDS, TH, NO<sub>2</sub>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, F<sup>-</sup>, and Fe of majority of the samples are exceeds BIS permissible limits due to industrial activities. There is also a possible for more metals to seep into the soil to reach the ground water and due to higher withdrawal of groundwater leading to intrusion of seawater in and around SIPCOT area Tuticorin. Hence, it is indention to prevent ground water contamination at the earliest in this area and save the human health.

**Keywords:** SIPCOT-Tuticorin, Ground Water, Water quality parameter

### 1. Introduction

Water is the most essential and the prime commodity in our life. Water covers about 75% of earth's surface, of the total volume of water available. 97% is in vast oceans which is of no use to our daily needs, 2% is in the forms of icebergs and less than 1% is available as fresh water (Ponnusamy et al., 2014 & 2013). Water is subjected to pollution easily due to the excessive use of fertilizers, pesticides, discharge effluents from industries and runoff water from agricultural fields. Ground water is an important source of fresh water supply globally. It is readily available than surface water.

It is a major source of drinking water for urban and rural areas. The rapid growth of urban areas has adversely affected the ground water quality due to over exploitation of resources and improper waste disposal practices (Harilal et al., 2004).

Due to the constant addition of industrial, agricultural and domestic water the ground water resource are degrading and are contaminated greatly in many parts of India. At present, effluents are being discharged into sewer but surrounding land receives them due to over flow of sewer system (Sastri et al., 2003).

Polluted water can act as a key vehicle in the direct transmission of various diseases (Jain et al., 2003). The present study is an attempt to examine the ground water quality in the SIPCOT, Tuticorin that includes a

network of some major industries (Thillai Arasu et al., 2007).

### 2. Material and Method

The study was carried out in the SIPCOT industrial complex, Tuticorin. The Latitude and Longitude of SIPCOT Tuticorin is 8.8075 ° N and 78.0829 ° E, respectively. It is 8 km away from Tuticorin town. This industrial complex mainly hosts the chemical industries and marine food processing industries. Twelve ground water samples are collected from bore wells and open wells near the study area within a distance of 1 to 2 km (Table-1).

The bore wells were among the range of 40 to 60 ft. The water samples collected during February 2008.

*Table 1: Sample number and Sample Sites*

Sl.No.	Sample No.	Site / Location of the Sampling
1	S1	Kilburn Chemicals
2	S2	Sterlite Industries
3	S3	KTV Oil company
4	S4	Amulya Sea foods
5	S5	Tuticorin Alkali Chemical(TAC)
6	S6	Heavy Water Plant (HWP)
7	S7	SPIC Industries
8	S8	Thermal Power Station
9	S9	Old Bus Stand
10	S10	Rahmathullapuram Mosque
11	S11	Kamaraj College



**Sadakathullah Appa College  
(Autonomous)  
Rahmath Nagar, Tirunelveli - 627011**

1	Name of the Faculty with Designation, Staff ID	:	Dr. A. Benazir (ATCO08) Assistant Professor, PG and Research Department of Commerce Sadakathullah Appa College (Autonomous) Rahmath Nagar, Tirunelveli - 11
2	Name of the Collaborating Faculty with Designation	:	Dr. S. Archana Bai Assistant Professor, Department of Commerce Sir Theagaraya College, Chennai 21
3	Name of the Collaborating Organization	:	Sir Theagaraya College, Chennai 21
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Research
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Publications – Opportunities for Growth in Trade, Commerce, and Business Management in Afro- Asian countries.ICOG-AAC'16 - March 2016 "A Study on work life balance and job satisfaction among women teachers with special reference to Tirunelveli district"
6	Period of Collaboration	:	From : Nov 2015 To: Feb 2016
7	Financial Involvement (if any)	:	NO
8	Proof Attached	:	Yes

Signature of Principal

Signature of the Collaborating Faculty

*Dr. S. Archana Bai*  
**Dr. S. ARCHANA BAI**  
M.B.A., M.Com., M.Phil., Ph.D.,  
ASSISTANT PROFESSOR  
DEPARTMENT OF COMMERCE  
SIR THEAGARAYA COLLEGE  
CHENNAI-600 021.

Signature of the Faculty

**A STUDY ON WORK LIFE BALANCE AND JOB SATISFACTION AMONG WOMEN  
TEACHERS- WITH SPECIAL REFERENCE TO TIRUNELVELI DISTRICT**

---

**A.BENAZIR M.COM.,M.PHIL.,**

Research Scholar,  
Mother Teresa Women's University,  
Kodaikanal.

**DR. S. ARCHANABAI M.COM., M.PHIL., M.B.A.,M.PHIL., PHD.,**

Research Supervisor,  
Assistant Professor,  
Department of Commerce,  
Sri Thiyagaraya College, Chennai - 21

---

**ABSTRACT**

In the present scenario, work life balance for women employees is highly desirable and if there is no job satisfaction and consistency in life, it can create a dilemma for working women. Work life balance requires attaining equilibrium between professional work and personal work, so that it reduces friction between official and domestic life. The ultimate performance of any organization depends on the performance of its employees, which in turn depends on numerous factors. These factors can be related to job satisfaction or family or both. The objective of this research is to study women their working environment and perception about the work life balance and job satisfaction. Apart from it, another significant objective is to study effects of work life balance on job satisfaction and initiatives taken by the organizations for effective work life balance and its relation with the job satisfaction. Findings suggests that WLB can be achieved by the factors responsible for job satisfaction such as: supportive colleagues, supportive working conditions, mentally challenging work, equitable rewards and employee oriented policies.

*Keywords: Family, Employee's satisfaction, Job, Performance, Productivity and Rewards etc.*

---



## Sadakathullah Appa College (Autonomous)

Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<p style="text-align: center;"><b>Dr. K. Hema</b></p> <p style="text-align: center;">Assistant Prof. of English</p> <p style="text-align: center;">Staff ID : ATEN04</p>
2	Name of the Collaborating Faculty with Designation	:	<p style="text-align: center;"><b>Dr. S. Viji</b></p> <p style="text-align: center;">Assistant Prof. of English</p>
3	Name of the Collaborating Organization	:	<p style="text-align: center;">Sri Sarada College,</p> <p style="text-align: center;">Tirunelveli</p>
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<p style="text-align: center;"><b>Publications</b></p> <p style="text-align: center;">A Study on Gynocentrism in Terry Macmillan's 'The Interruption Everything'</p>
6	Period of Collaboration	:	From : 14.3.2017 To: 31.01.2022
7	Financial Involvement (if any)	:	—
8	Proof Attached	:	Yes / No
Signature of Principal		Signature of the Collaborating Faculty	Signature of the Faculty

**A STUDY ON GYNOCENTRISM IN TERRY MCMILLAN'S *THE INTERRUPTION OF EVERYTHING***

**Dr. K. HemaMrs**

Research Supervisor

Assistant Professor of English

SadakathullahAppa College, Tirunelveli, Tamil Nadu, India

Affiliated to ManonmaniamSundaranar University

Abishekapatti, Tirunelveli-627012, Tamil Nadu, India

**Viji.S**

Ph.D. Reg.No. 12542

Assistant Professor of English

Sri Sarada College for Women, Tirunelveli, Tamilnadu, India

Affiliated to ManonmaniamSundaranar University

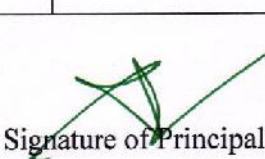
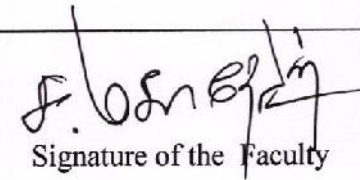
Abishekapatti, Tirunelveli-627012, Tamil Nadu, India

**ABSTRACT**

African American women writers are the real representatives of the black women living in America. They depict the accurate real life occurrence of black women through their fictions. The main aim of the twentieth century African American women writers is to disintegrate the mistaken belief about black women. The bitter past of these women writers force them to deal with the day-to-day experiences of a black woman in their novels. In the specific history of African American fiction Terry McMillan has a distinctive place for herself because of her portrayed of interpersonal relationships in her novels. Unlike other writers who give priority to racism or any other issues which are common in African American Literature, she surveys current issues such as single parenthood, dissolution, sexual abuse and drunkenness. The depiction of motherhood and friendship play an important role in McMillan's novels. As female bonding gives protection, development, comfort and emotional support, McMillan's women characters confide on their female friends. It is also unavoidable and necessary for black woman because of the boundless deficiencies of the Black men. The representation of



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr. S. Mahadevan, Associate Professor & Head, Department of Tamil. Staff ID - ATTA01
2	Name of the Collaborating Faculty with Designation	:	Dr. S. SHAFRIN MUNEEB Head, Department of Tamil,
3	Name of the Collaborating Organization	:	Annai Hajira Women's college, Melapalayam, Tirunelveli.
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Guest Lecture
6	Period of Collaboration	:	From : 7.9.2016 To:
7	Financial Involvement (if any)	:	—
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>Dr. S. Shafrin Muneer</b> Signature of the Collaborating Faculty	
		 Signature of the Faculty	




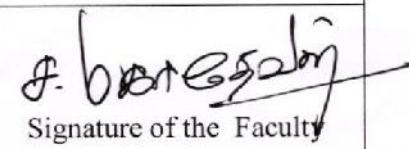
அன்னை ஹாஜிரா பெண்கள் கல்லூரி,  
மேலப்பாளையம், திருநெல்வேலி-5  
தமிழ்த்துறை  
“பழந்தமிழர் வாழ்வியல் - காட்சிப்படுத்துதல்”  
பொருளை 2016

- இடம்** : கல்லூரி அரங்கம்
- தாள்** : 07.09.2016, புதன்கிழமை காலை 10.00 மணி
- தலைவர்** : ஹாஜி Er.S.K.செய்யது அகமது, B.E., M.Tech, MBA அவர்கள்  
தலைவர், அன்னை ஹாஜிரா பெண்கள் கல்லூரி
- முன்னிலை** : ஹாஜி Er.S.K.குதா முகம்மது, B.E அவர்கள்  
தாளாளர், அன்னை ஹாஜிரா பெண்கள் கல்லூரி
- வரவேற்புரை** : பேராசிரியர் முனைவர் K.ரஜிப் பாத்திமா,  
முதல்வர், அன்னை ஹாஜிரா பெண்கள் கல்லூரி
- தலைமையுரை** : ஹாஜி Er.S.K.செய்யது அகமது, B.E., M.Tech, MBA அவர்கள்  
தலைவர், அன்னை ஹாஜிரா பெண்கள் கல்லூரி
- அறிமுகவுரை** : முனைவர் சு.உமா, Ph.D அவர்கள்  
உதவிப்பேராசிரியர், தமிழ்த்துறை, அன்னை ஹாஜிரா பெண்கள் கல்லூரி
- வாழ்த்துரை** : பேராசிரியர் முனைவர் ஆ.செல்லப்பா, Ph.D அவர்கள்  
தமிழ்த்துறைத்தலைவர், மதி.தள இந்துக்கல்லூரி, திருநெல்வேலி  
பேராசிரியர் முனைவர் சு.சிவசங்கரன், Ph.D அவர்கள்  
தமிழ்த்துறைத்தலைவர், திருவள்ளூர் கல்லூரி, பாமநாசம்  
தேசியப் பாவலர் ஹாஜி.த.மு.சா.காசா முகைதீன், M.A., M.Phil  
அவர்கள்  
கவிஞர், மாநிலத் தமிழ்ச்சங்கம், திருநெல்வேலி
- சிறப்புரை** : பேராசிரியர் முனைவர் அ.ராமசாமி, Ph.D அவர்கள்  
பேராசிரியர், தமிழியல்புத்தறை, மனோன்மனியம் சுந்தரனார் பல்கலைக்கழகம்,  
திருநெல்வேலி  
பேராசிரியர் முனைவர் செளந்தரமகாதேவன், Ph.D அவர்கள்  
தமிழ்த்துறைத்தலைவர், சதக்கத்துல்லாஹ் அப்யா கல்லூரி, திருநெல்வேலி
- நன்றியுரை** : முனைவர்.செ.ஷரீன் முனீர், Ph.D அவர்கள்  
தமிழ்த்துறைத் தலைவர், அன்னை ஹாஜிரா பெண்கள் கல்லூரி

பழந்தமிழர்களின் வாழ்வியலைக் காட்சிப்படுத்தும் நோக்கில் நிகழ்த்தப்பெறும்  
“பொருளை 2016” நிகழ்விற்கு, தாங்கள் அனைவரையும்  
அன்புடன் அழைக்கிறோம்



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr. S. Mahadevan, Associate Professor & Head, Department of Tamil, Staff ID - ATTA01
2	Name of the Collaborating Faculty with Designation	:	The principal, St. Mary's college (Autonomous) Thoothukudi.
3	Name of the Collaborating Organization	:	St. Mary's college, (Autonomous) Thoothukudi.
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Other Reports.
6	Period of Collaboration	:	From : 6.2.2016 To:
7	Financial Involvement (if any)	:	-
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>The Principal</b> <b>St. Mary's College</b> Signature of the Collaborating Faculty	
		 Signature of the Faculty	





Principal

**ST. MARY'S COLLEGE** (Autonomous)

(Re-accredited with "A" Grade by NAAC)

THOOTHUKUDI - 628 001.

Principal : 0461 - 2321606

Resi : 0461 - 2321460

Fax : 0461 - 2320947

E-mail : smctuty@gmail.com

smctuty1948@gmail.com

Website : www.stmaryscollege.edu.in

Date: 29.01.2016

To

**Dr. S. Mahadevan,**

H.O.D & Associate Professor

Sadakathulahappa College (Autonomous)

Tirunelveli – 627 011

Respected Sir,

**Sub:** Meeting of Board of Studies - reg.

Greetings from St. Mary's College!

We inform you that the Board of Studies for the Department of Tamil. The meeting is to be held on 06.02.2016, at 10 a.m. Kindly make it convenient to attend the meeting and contribute your valuable suggestions. TA & DA will be paid as per university norms.

Thank you

Yours sincerely

(Dr. Sr. S. Alphonse Roseline Mary)


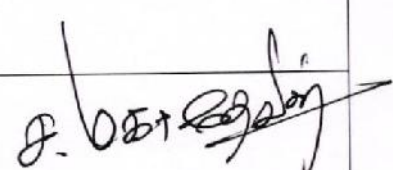
Principal

St. Mary's College (Autonomous)

Thoothukudi - 628 001.



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr. S.MAHADEVAN ASSOCIATE PROFESSOR & HEAD, DEPARTMENT OF TAMIL. STAFF ID - ATTA01
2	Name of the Collaborating Faculty with Designation	:	THE SECRETARY, WAVOO WAJEEHA WOMEN'S COLLEGE OF ARTS & SCIENCE KAYALPATNAM, TAMILNADU.
3	Name of the Collaborating Organization	:	WAVOO WAJEEHA WOMEN'S COLLEGE OF ARTS & SCIENCE KAYALPATNAM, TAMILNADU
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Other Reports
6	Period of Collaboration	:	From : 24.4.2017 To:
7	Financial Involvement (if any)	:	—
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>The Secretary</b> <b>Wavoo Wajeetha College</b> Signature of the Collaborating Faculty	
		 Signature of the Faculty	

☎ 95-04639 - 280900  
Tele Fax : 954639 - 284499



## WAVOO WAJEEHA WOMEN'S COLLEGE OF ARTS & SCIENCE

(Run by : Wavoo SAR Educational Trust)

Tiruchendur Road, Kayalpatnam - 628 204. Thoothukudi Dist.

e-mail : wavoo\_college@yahoo.co.in, Website : www.wavoowajeethacollege.com

PRESIDENT ABDUL ABDOUR RAHMAN	VICE PRESIDENT W.S.A.R. SHAIJUL HAMEED, B.E. M.S.	SECRETARY W.M.M. MOHUTHAZEEM, B.A. (CS)	ASST. SECRETARY W.S.A.R. AHAMED ISHAQUE, B.A.	TREASURER W.S. HABIBULLAH, B.E.	ASST. TREASURER W.S.A.R. KATHEEJATHUL FATHIMA
----------------------------------	--	--	--	------------------------------------	--

To

**Dr. S. Mahadevan**

Department of Tamil,

Sadakatulla Appa College (Autonomous)

RahmathNagar

Tirunelveli.

Sir,

*Selection of the subject expert on Tamil for Wavoo Wajeetha Women's College - Kayalpatnam - Interview on Monday 24-04-2017- intimation given-reg*

-----

You are hereby nominated to be the subject expert for the staff interview to be conducted to select tamil teaching staff for our college on Monday 24.04.2017 at 2.00pm in the college premises. You are requested to be present for the same.

Thanking you.

Kayalpatnam

20.04.2017

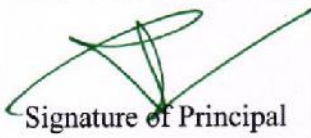
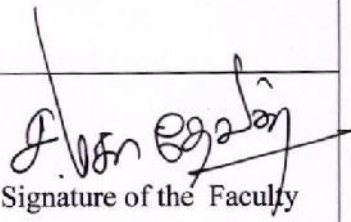
Yours sincerely,

  
**W.M.M. Mohuthazeem**

SECRETARY  
WAVOO WAJEEHA WOMEN'S COLLEGE  
OF ARTS & SCIENCE  
Tiruchendur Road, Kayalpatnam-628 204.  
Thoothukudi Dist., Tamil Nadu,



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<u>Dr. S. Mahadevan,</u> Associate Professor & Head, Department of Tamil. Staff ID - ATTA01		
2	Name of the Collaborating Faculty with Designation	:	<u>The Principal,</u> St. Mary's College (Autonomous) Thoothukudi		
3	Name of the Collaborating Organization	:	St. Mary's College, (Autonomous) Thoothukudi.		
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<u>Academic</u>		
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Other Reports		
6	Period of Collaboration	:	From : 3.2.2017. To:		
7	Financial Involvement (if any)	:	—		
8	Proof Attached	:	Yes / No		
 Signature of Principal		<b>The Principal</b> <b>St. Mary's College</b> Signature of the Collaborating Faculty		 Signature of the Faculty	



Principal

**ST. MARY'S COLLEGE** (Autonomous)

(Re-accredited with "A" Grade by NAAC)

THOOTHUKUDI - 628 001.

Principal : 0461 - 2321606

Resi : 0461 - 2321460

Fax : 0461 - 2320947

E-mail : smctuty@gmail.com

smctuty1948@gmail.com

Website : www.stmaryscollege.edu.in

Date: 15.12.2016

To

**Dr. S. Mahadevan,**  
H.O.D & Associate Professor  
Sadakathulahappa College (Autonomous)  
Tirunelveli – 627 011

Respected Sir,

Sub: Meeting of Board of Studies - reg.

Greetings from St. Mary's College!

We would like to inform you that the meeting of the Board of Studies for Tamil is to be held on 03.02.2017 at 10.30 a.m. Kindly make it convenient to attend the meeting and contribute your valuable suggestions. TA & DA will be paid as per university norms.

Thank you

Yours sincerely

(Dr. Sr. S. Alphonse Roseline Mary)

Principal


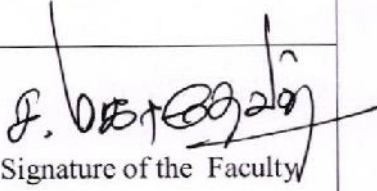
St. Mary's College (Autonomous)

Thoothukudi - 628 001.



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<p style="text-align: center;"><b>Dr. S. MAHADEVAN</b></p> <p style="text-align: center;">ASSOCIATE PROFESSOR &amp; HEAD, DEPARTMENT OF TAMIL,</p> <p style="text-align: center;">STAFF ID - ATTA 01</p>
2	Name of the Collaborating Faculty with Designation	:	<p style="text-align: center;"><b>Dr. ARANGIA PARI,</b></p> <p style="text-align: center;">PROF. HEAD. DEPT OF TAMIL STUDIES &amp; RESEARCH</p> <p style="text-align: center;">Annamalai University.</p>
3	Name of the Collaborating Organization	:	<p style="text-align: center;">Annamalai University,</p> <p style="text-align: center;">Chidambaram.</p>
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Faculty Exchange
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Other Reports
6	Period of Collaboration	:	From : 12, 13.9.2016 To:
7	Financial Involvement (if any)	:	-
8	Proof Attached	:	Yes / No
 Signature of Principal		<b>Dr. Aranga Pari</b> Signature of the Collaborating Faculty	
		 Signature of the Faculty	



**UNIVERSITY  
OF MALAYA**



## *Certificate of Appreciation*

This is to certify that

**DR. S. MAHADEVAN**

has presented a book in the function of releasing 500 books  
"A World Record Event"

**INTERNATIONAL CONFERENCE ON TAMIL SCHOLARS**

jointly organized by

Department of Tamil Studies & Research, Annamalai University, Chidambaram  
Department of Indian Studies, University of Malaya, Malaysia  
Kalaignaan Pathipagam & Anuragam, Chennai, Tamilnadu

held on

12<sup>th</sup> & 13<sup>th</sup> September 2016

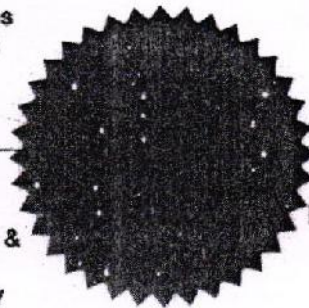
at

Annamalai University, Chidambaram

DR. R. MOHANA DASS  
Head  
Dept. of Indian Studies  
University of Malaya

DR. K. ARUMUGAM  
Registrar  
Annamalai University  
Chidambaram

DR. ARANGA. PARI  
Prof. Head  
Dept. of Tamil Studies &  
Research  
Annamalai University

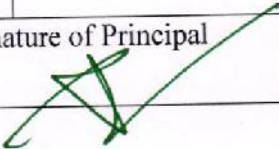
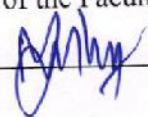


NANDAN MASILAMANI  
Kalaignaan Pathipagam &  
Anuragam  
Chennai, Tamilnadu



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	Dr.M.I.Zahir Hussain Assistant Professor Department of Zoology Sadakathullah Appa College (Autonomous) Tirunelveli – 627 011 Staff ID: ATZO02
2	Name of the Collaborating Faculty with Designation	:	Dr. K. Sahayaraj Head and Associate Professor in Zoology, Former Dean of Sciences, Department of Zoology St. Xavier's College (Autonomous), Palayamkottai – 627 002
3	Name of the Collaborating Organization	:	St. Xavier's College (Autonomous), Palayamkottai – 627 002
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	Academic
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Guest Lecture
6	Period of Collaboration	:	From : June 2016 to May 2017
7	Financial Involvement (if any)	:	
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. k. Sahayaraj</b>	
		Signature of the Faculty	
			





**Rev. Dr. V. Britto, S.J., M.A., M.Phil., Ph.D.**  
Principal

**St. Xavier's College (Autonomous)**

(Recognized as "College with Potential for Excellence" by UGC)

(Re-accredited by NAAC with "A" Grade with a CGPA of 3.50)

Palayamkottai - 627 002

Tamilnadu - India

### CERTIFICATE

This is certify that **Dr.M.J.ZAHIR HUSSAIN**, Assistant Professor of Zoology, Sadakathullah Appa College (Autonomous), Rehmath Nagar – 627 011, has delivered a special address on "Assessment of Water Pollution" for the Zoology Association meeting held on 10<sup>th</sup> February 2017.


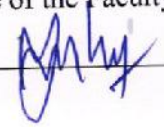
10.02.2017

  
PRINCIPAL



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr.M.I.Zahir Hussain</b> Assistant Professor Department of Zoology Sadakathullah Appa College (Autonomous) Tirunelveli – 627 011 Staff ID: ATZO02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr.A.G.Murugesan</b> Professor and Head Manonmaniam Sundaranar University Sri Paramakalayani Centre of Excellence in Environmental Sciences Alwarkurichi
3	Name of the Collaborating Organization	:	Manonmaniam Sundaranar University Sri Paramakalayani Centre of Excellence in Environmental Sciences Alwarkurichi
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Academic</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Guest Lecture
6	Period of Collaboration	:	From : June 2016 to May 2017
7	Financial Involvement (if any)	:	
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. A.G. Murugesan</b>	
		Signature of the Faculty	
			



**MANONMANIAM SUNDARANAR UNIVERSITY**

Sri Paramakalyani Centre of Excellence in Environmental Sciences  
Alwarkurichi



**Silver Jubilee Commemorative  
National Wokshop on**

# **Environmental Pollution and Assessment**

(UGC - XII Plan)

10<sup>th</sup> and 11<sup>th</sup> January 2017

## **CERTIFICATE**

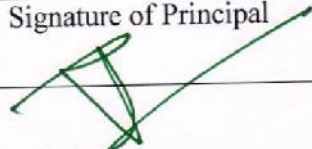
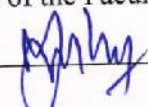
This is to certify that Dr. M.I. Zahin Hussain, Asst Professor of  
Sathakkabulshah Appa College, Palayamkottai has actively  
participated in the workshop on Environmental Pollution and Assessment held at this  
centre during 10<sup>th</sup> and 11<sup>th</sup> January 2017. (Resource Person)

**Dr.A.G. Murgesan**  
Professor and Head  
Convenor



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr.M.I.Zahir Hussain</b> Assistant Professor Department of Zoology Sadakathullah Appa College (Autonomous) Tirunelveli – 627 011 Staff ID: ATZO02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr.P.Veeramuthumari</b> Assistant Professor Department of Zoology V.V. Vanniaperumal College for women (Autonomous) Virudhunagar – 626 001.
3	Name of the Collaborating Organization	:	V.V. Vanniaperumal College for women (Autonomous) Virudhunagar – 626 001.
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Academic</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Guest Lecture
6	Period of Collaboration	:	From : June 2016 to May 2017
7	Financial Involvement (if any)	:	
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. P. Veeramuthumari</b>	
		Signature of the Faculty	
			



# V.V. VANNIAPERUMAL COLLEGE FOR WOMEN (AUTONOMOUS)

(Belonging to Virudhunagar Hindu Nadars)  
VIRUDHUNAGAR - 626 001, (TAMIL NADU)

Re-accredited with 'A' Grade by NAAC



**Dr. (Tmt) S.M. Meena Rani, M.Sc., M.Phil., P.G.D.C.A., Ph.D.,**

Principal

Mobile : 89033 00236

e-mail : vvcgeneral@bsnl.in

officevvc2014@gmail.com

Ph : 04562 - 243133

Resi : 04562 - 246962

Fax : 04562 - 248694

Cell : 94890 88703

website : www.vvccollege.org

Date: 03.08.2016

## ATTENDANCE CERTIFICATE

This is to certify that **Dr.M.I. Zahir Hussain, M.Sc., (Evt.Bio), M.Sc(Zoo), Ph.D.,**  
Assistant Professor, Department of Zoology, Sadakathullah Appa College,  
Tirunelveli delivered a lecture on "Baseline Thermal Studies on Marine  
Environment" organized by the Department of Zoology, V.V.Vanniaperumal  
College for Women (Autonomous), Virudhunagar on 03.08.2016.

*S. M. Meena Rani*

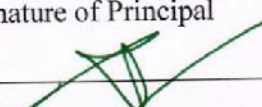
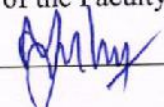
Principal

J.A/-



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr.M.I.Zahir Hussain</b> Assistant Professor Department of Zoology Sadakathullah Appa College (Autonomous) Tirunelveli – 627 011 Staff ID: ATZO02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr.Sasi Premila</b> Assistant Professor and Head Department of Biotechnology Annai Velankanni College Tholayavattam – 629 157 Karunkal, K.K. District
3	Name of the Collaborating Organization	:	Annai Velankanni College Tholayavattam – 629 157 Karunkal, K.K. District
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Academic</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Reviewer for multidisciplinary Research Journal AVION
6	Period of Collaboration	:	From : June 2016 to May 2017
7	Financial Involvement (if any)	:	
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	Signature of the Faculty
		<b>Dr. Sasi Premila</b>	



## ANNAI VELANKANNI COLLEGE

THOLAYAVATTAM - 629 157, (VIA) KARUNGAL, K.K. DIST.

☎ : 04651 - 235270, 234651, Off. Mobile : 9486935270

E-mail: annaivelankannioffice@gmail.com, annaivelankannicollege@gmail.com.

**Dr. S. Maria John,** M.Com., B.Ed., PGDCA, MBA, Ph.D.

Principal

29.08.2016

Date .....

No. 605/Research/AVION/AVC/2016

To

**Dr. M.I. Zahir Hussain,**  
Department of Zoology,  
Sadak Abdullah Appa College,  
Tirunelveli.

Sir,

Sub : Reviewer - Research Journal - Reg.  
.....

We are thankful to you for accepting to be a reviewer for the articles to be published  
in the proposed Multi-disciplinary Research Journal 'AVION' of our College.

Yours faithfully,


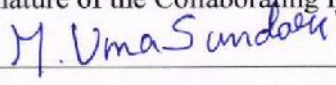
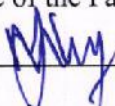


*[Handwritten Signature]*  
Principal  
29/8



## Sadakathullah Appa College (Autonomous)

### Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr.M.I.Zahir Hussain</b> Assistant Professor Department of Zoology Sadakathullah Appa College (Autonomous) Tirunelveli – 627 011 Staff ID: ATZO02
2	Name of the Collaborating Faculty with Designation	:	<b>M.Uma Sundari</b> The Secretary PEARL Foundation Madurai
3	Name of the Collaborating Organization	:	PEARL Foundation Madurai
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Academic</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Award</b>
6	Period of Collaboration	:	From : June 2016 to May 2017
7	Financial Involvement (if any)	:	
8	Proof Attached	:	Yes
Signature of Principal		Signature of the Collaborating Faculty	Signature of the Faculty
			



# PEARL - A Foundation For Educational Excellence



(Registration No.101/2015, under the Indian Trust Act)  
2/133B, Palkalai Nagar East, Madurai – 625 021, Tamil Nadu, India.

## PEARL Foundation Educational Excellence Awards to Higher Education in India 2016

*This is to certify that*

**Dr. M. J. Zahir Hussain**

Assistant Professor, Department of Zoology,  
Sadakathullah Appa College, Tirunelveli, Tamil Nadu

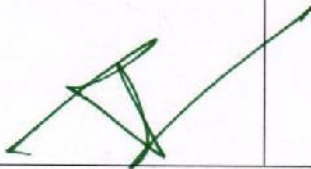



*has been honoured with the PEARL Foundation Best Assistant Professor Award  
in recognition of his outstanding contributions in the field of Zoology in India.  
This award is hereby conferred on the recommendations made by the Adjudication Committee.*

**M. Uma Sundari**  
The Secretary  
PEARL Foundation  
Madurai, India



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. A. SYED MOHAMED</b> Assistant Professor of Chemistry ATCH02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. Gnanendra Shanmugam</b>
3	Name of the Collaborating Organization	:	Bioinformatics Division, Center for Research and Development, Mahendra Educational Institutions, Tiruchengode, Tamil Nadu
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Publication</b> International Journal of Bioautomation 20 (2016) 441-456
6	Period of Collaboration	:	2016-17
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. Gnanendra shanmugam</b>	
		Signature of the Faculty	
			

## 2D- and 3D-QSAR Study of Acyl Homoserine Lactone Derivatives as Potent Inhibitors of Quorum Sensor, SdiA in *Salmonella typhimurium*

Gnanendra Shanmugam<sup>1,3</sup>, Syed Mohamed<sup>2</sup>, Jeyakumar Natarajan<sup>3\*</sup>

<sup>1</sup>Bioinformatics Division, Center for Research and Development  
Mahendra Educational Institutions, Mallasamudram  
Tiruchengode, Tamil Nadu, India  
E-mail: [gnani\\_science@gmail.com](mailto:gnani_science@gmail.com)

<sup>2</sup>Department of Molecular Modeling  
Sadakathullah Appa College  
Tirunelveli, Tamil Nadu, India  
E-mail: [asm2032@gmail.com](mailto:asm2032@gmail.com)

<sup>3</sup>Department of Bioinformatics  
Bharathiar University  
Coimbatore, Tamil Nadu, India.  
E-mail: [n.jeyakumar@yahoo.co.in](mailto:n.jeyakumar@yahoo.co.in)

\*Corresponding author

Received: February 12, 2016

Accepted: November 10, 2016

Published: December 31, 2016

**Abstract:** A series of Acyl homoserine lactone derivatives against quorum sensing (QS) enhanced transcriptional regulator SdiA of *S. typhimurium* were used to establish the physicochemical and structural requirements for the inhibition of QS using 2D- and 3D-QSAR methods. The QSAR model was developed by employing 35 compounds as a training set and the predictive ability was assessed by a test set of 12 compounds. The best 2D-QSAR model for the prediction of SdiA, quorum sensor inhibitory activity has been developed using Multiple Linear Regression (MLR) method (giving  $r^2 = 0.8012$  and  $q^2 = 0.657$ ), Principal Component Regression (PCR) method (giving  $r^2 = 0.8104$  and  $q^2 = 0.625$ ), and Partial Least Squares Regression (PLS) method (giving  $r^2 = 0.8023$  and  $q^2 = 0.648$ ). The best model for 3D-QSAR has been obtained using Comparative Molecular Field Analysis (CoMFA) method, giving  $r^2 = 0.896$  and  $q^2 = 0.772$ . The 2D-QSAR results revealed that the most important descriptors for predicting the anti-quorum sensing activity were alignment-independent descriptors and the topology index descriptors. The 3D-QSAR results of CoMFA contour maps impart some important structural features-like electronegative substituent (Br, Cl, F) on lactone ring favors the strong inhibitory activity. These results will be further useful for development of new quorum sensing inhibitors with structural diversity.



**Keywords:** *Salmonella typhimurium*, 2D-QSAR, 3D-QSAR, CoMFA, QS inhibitors.

### Introduction

*Salmonella typhimurium* is an enteric bacterium causing gastroenteritis, a life threatening disease in human beings. In recent years problems related to *Salmonella* have increased both in terms of prevalence and severe cases of human salmonellosis and millions of human cases are reported worldwide every year resulting in thousands of mortality [26]. Worldwide, nearly 21.6 million cases of typhoid fever resulting in 200,000 deaths are estimated every year [3]. In Asia, the rate of incidence of typhoid fever is estimated to be 900 per 100,000 people per annum [17]. In contrast, human gastroenteritis is increasing because of food contamination.



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. A. SYED MOHAMED</b> Assistant Professor of Chemistry ATCH02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. Jeyakumar Natarajan</b>
3	Name of the Collaborating Organization	:	Department of Bioinformatics, Bharathiar University, Coimbatore, Tamil Nadu
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	<b>Publication</b> International Journal of Bioautomation 20 (2016) 441-456
6	Period of Collaboration	:	2016-17
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. Jeyakumar Natarajan</b>	
		Signature of the Faculty	
			

## 2D- and 3D-QSAR Study of Acyl Homoserine Lactone Derivatives as Potent Inhibitors of Quorum Sensor, SdiA in *Salmonella typhimurium*

Gnanendra Shanmugam<sup>1,3</sup>, Syed Mohamed<sup>2</sup>, Jeyakumar Natarajan<sup>3\*</sup>

<sup>1</sup>Bioinformatics Division, Center for Research and Development  
Mahendra Educational Institutions, Mallasamudram  
Tiruchengode, Tamil Nadu, India  
E-mail: [gnani\\_science@gmail.com](mailto:gnani_science@gmail.com)

<sup>2</sup>Department of Molecular Modeling  
Sadakathullah Appa College  
Tirunelveli, Tamil Nadu, India  
E-mail: [asm2032@gmail.com](mailto:asm2032@gmail.com)

<sup>3</sup>Department of Bioinformatics  
Bharathiar University  
Coimbatore, Tamil Nadu, India.  
E-mail: [n.jeyakumar@yahoo.co.in](mailto:n.jeyakumar@yahoo.co.in)

\*Corresponding author

Received: February 12, 2016

Accepted: November 10, 2016

Published: December 31, 2016

**Abstract:** A series of Acyl homoserine lactone derivatives against quorum sensing (QS) enhanced transcriptional regulator SdiA of *S. typhimurium* were used to establish the physicochemical and structural requirements for the inhibition of QS using 2D- and 3D-QSAR methods. The QSAR model was developed by employing 35 compounds as a training set and the predictive ability was assessed by a test set of 12 compounds. The best 2D-QSAR model for the prediction of SdiA, quorum sensor inhibitory activity has been developed using Multiple Linear Regression (MLR) method (giving  $r^2 = 0.8012$  and  $q^2 = 0.657$ ), Principal Component Regression (PCR) method (giving  $r^2 = 0.8104$  and  $q^2 = 0.625$ ), and Partial Least Squares Regression (PLS) method (giving  $r^2 = 0.8023$  and  $q^2 = 0.648$ ). The best model for 3D-QSAR has been obtained using Comparative Molecular Field Analysis (CoMFA) method, giving  $r^2 = 0.896$  and  $q^2 = 0.772$ . The 2D-QSAR results revealed that the most important descriptors for predicting the anti-quorum sensing activity were alignment-independent descriptors and the topology index descriptors. The 3D-QSAR results of CoMFA contour maps impart some important structural features-like electronegative substituent (Br, Cl, F) on lactone ring favors the strong inhibitory activity. These results will be further useful for development of new quorum sensing inhibitors with structural diversity.


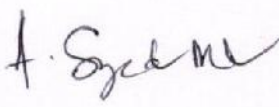
**Keywords:** *Salmonella typhimurium*, 2D-QSAR, 3D-QSAR, CoMFA, QS inhibitors.

### Introduction

*Salmonella typhimurium* is an enteric bacterium causing gastroenteritis, a life threatening disease in human beings. In recent years problems related to *Salmonella* have increased both in terms of prevalence and severe cases of human salmonellosis and millions of human cases are reported worldwide every year resulting in thousands of mortality [26]. Worldwide, nearly 21.6 million cases of typhoid fever resulting in 200,000 deaths are estimated every year [3]. In Asia, the rate of incidence of typhoid fever is estimated to be 900 per 100,000 people per annum [17]. In contrast, human gastroenteritis is increasing because of food contamination.



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. A. SYED MOHAMED</b> Assistant Professor of Chemistry ATCH02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. V. Aroulmoji</b>
3	Name of the Collaborating Organization	:	<i>Centre for Research &amp; Development, Mahendra Educational Institutions, Namakkal-637503, Tamilnadu, India</i>
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Paper published in the Natural Product Communications. 2017, Vol. 12, 813-819 entitled "Molecular Insights of Hyaluronic Acid as Potential Source of Polymer-Drug Conjugate in the Target-Mediated Treatment of Cancer"
6	Period of Collaboration	:	From : Jan. 2017 To: Dec. 2017
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. V. Aroulmoji</b>	
		Signature of the Faculty	
			

## Molecular Insights of Hyaluronic Acid as Potential Source of Polymer-Drug Conjugate in the Target-Mediated Treatment of Cancer

Gnanendra Shanmugam<sup>a</sup>, Rajesh Salem Varadharajan<sup>b</sup>, Desika Prabakar<sup>c</sup>, Syed Mohammed<sup>d</sup>, Sathyapriya Renganathan<sup>e</sup>, Murano Ermino<sup>f,g</sup> and Vincent Aroulmoji<sup>h</sup>\*

<sup>a</sup>Department of Biotechnology, Yeungnam University, Gyeongsan, South Korea

<sup>b</sup>Department of Botany, Vivekanandha College of Arts and Science, Tiruchengode, Tamilnadu, India

<sup>c</sup>Bioinformatics Division, Origene Biosolutions, Salem, Tamilnadu, India

<sup>d</sup>Department of Chemistry, Sadakathullah Appa College, Tirunelveli, Tamilnadu, India

<sup>e</sup>Center for Research & Development, Mahendra Educational Institutions, Namakkal, Tamilnadu, India

<sup>f</sup>Protos Research Institute, Via Flavia 23/1, 34148, Trieste, Italy

<sup>g</sup>Nealys srl, Via Flavia 23/1, 34148, Trieste, Italy

aroulmoji@gmail.com

Received: June 24<sup>th</sup>, 2016; Accepted: December 28<sup>th</sup>, 2016

The naturally occurring polysaccharide hyaluronic acid (HA) is a major component of the extracellular matrix and is found over expressed in many cancer cells. Hyaluronic acid is reported to be a potential carrier for drug delivery with the dual advantage of accumulation at the tumor site and receptor-mediated uptake. The use of drugs conjugated with macromolecules was shown to improve the drug pharmacokinetic profile. The various biological potentials such as biodegradability, biocompatibility, non-toxicity, hydrophilicity and non-immunogenicity, together with the availability of various chemical groups that allow the conjugation of drugs, put forward HA as a potential choice for the development of drug conjugates. In this context, the present study is focused to provide, through docking studies, insights on the activity of cancer drugs such as methotrexate, 3',5'-dichloromethotrexate and ornithine-methotrexate and their activity against the receptor caspase-1, which is a well-established drug target in the treatment of cancer. The docking study envisages that the usage of methotrexate properly conjugated to the natural polysaccharide HA might serve as a potential drug to effectively treat some cancer diseases.

**Keywords:** Hyaluronic acid, Methotrexate, Cancer, Docking studies, Drug-conjugate.

### INTRODUCTION

The naturally occurring polysaccharide hyaluronic acid (HA) is a major component of the extracellular matrix and, additionally, it is found in the synovial fluid of joints and scaffolding that comprises cartilages. Peculiarly, one of its cellular receptors (CD44) it is found over expressed in many cancer cells [1,2]. Structurally, HA consists of  $\beta$ -(1 $\rightarrow$ 4)-linked D-glucopyranuronic acid and  $\beta$ -(1 $\rightarrow$ 3)-linked 2-acetamido-2-deoxy-D-glucopyranose. Its basic disaccharide repeating unit presents a carboxyl group at C-5' and two free hydroxyl groups at the C-2' and C-3' positions in the  $\beta$ -D-GlcP and two hydroxyl groups at C-4 and C-6 position in the  $\beta$ -D-GlcPNAc moiety; chemical and enzyme-catalyzed reactions at some of these positions have led to a wide range of derivatives [3-5].

The well documented physico-chemical and biochemical characteristics such as network-forming and viscoelastic and polyelectrolytic behaviour of HA signifies its importance in contributing the biochemical properties of living tissues and also put forward this polymer as a potential nano carriers for the development of new anticancer drug-conjugates [6]. HA appears to be important in cell-cell interactions and takes part in regulating cell behavior during various morphogenic processes in the body [7]. The role of this natural polysaccharides in diseases such as various forms of cancers, arthritis and osteoporosis has led to the development of both biomaterials for surgical implants and drug conjugates for targeted delivery [8-10]. The use of drugs conjugated with macromolecules improves their pharmacokinetic

profile. The various biological potentials such as biodegradability, biocompatibility, non-toxicity, hydrophilicity and non-immunogenicity together with the presence of chemical groups favoring the conjugations with drugs put forward HA as a potential choice for carrier macromolecules to be employed for the development of drug conjugates.

In cancer disease, some cells display uncontrolled growth, invasion and sometimes metastasis. These malignant properties differentiate cancer from benign tumors, which are self-limited, do not invade or metastasize [11]. The development of cancer is generally considered a multistep process driven by carcinogen-induced genetic and epigenetic damage in susceptible cells, which as a result, gain selective growth damage. Subsequently, cells may undergo clonal expansion as the result of activation of proto-oncogenes and/or inactivation of tumor suppressor genes [12].

Nowadays, various types of cancers are reported spreading according to various mechanisms. The most frequently diagnosed cancers are bone, brain, breast, colon and skin cancers. There are many known causes of cancer like exposure to chemicals, drinking excess alcohol, excessive exposure to sunlight, and genetic differences, to name a few [13]. The caspase are a family of cysteine proteases that are one of the main executors of the apoptotic process and exist within the cell as inactive pro-forms or zymogens. These zymogens can be cleaved to form active enzymes following the induction of apoptosis [14]. The origin of cancer involves deregulated cellular proliferation and the suppression of



**Sadakathullah Appa College (Autonomous)**  
Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. A. SYED MOHAMED</b> Assistant Professor of Chemistry ATCH02
2	Name of the Collaborating Faculty with Designation	:	<b>Sreenivas Enaganti</b>
3	Name of the Collaborating Organization	:	Averin Biotech Pvt.Ltd, 208, 2ndfloor, Windsor Plaza, Nallakunta, Hyderabad, India
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Paper published in the Journal of Chemical and Pharmaceutical Research, 2016, 8(6):342-350 entitled "Sequence analysis, Homology Modeling, Docking and Pharmacophore Studies of Phosphocholine Cytidylyltransferase in <i>Plasmodium Falciparum</i> "
6	Period of Collaboration	:	From : Jan. 2016 To: Dec. 2016
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Sreenivas Enaganti</b>	
		Signature of the Faculty	



SNC / CHE / ATOM 2 / ASM / 2016 / 1

Available online [www.jocpr.com](http://www.jocpr.com)

Journal of Chemical and Pharmaceutical Research, 2016, 8(6):342-350



Research Article

ISSN : 0975-7384  
CODEN(USA) : JCPRC5

## Sequence analysis, Homology Modeling, Docking and Pharmacophore Studies of Phosphocholine Cytidylyltransferase in *Plasmodium Falciparum*

Pavanchand Akkiraju<sup>1</sup>, V. Vijaya Lakshmi<sup>2</sup>, P. Praveen Reddy<sup>3</sup>, Shailima R. D. Vardhini<sup>4</sup>,  
Syed Mohamed Abubacker<sup>5</sup> and Sreenivas Enaganti<sup>4\*</sup>

<sup>1</sup>Head & Assistant Professor, Department of Biotechnology, PVP College of Arts, Science & Commerce,  
Pravaranagar, Maharashtra, India

<sup>2</sup>Associate Professor, Department of Chemistry, Government Degree College for Women, Begumpet, Hyderabad,  
India

<sup>3</sup>Research Scholar, Department of Microbiology, Acharya Nagarjuna University, Guntur, India

<sup>5</sup>Dept. of Chemistry, Sadakathullah Appa College, Rahmath Nagar, Tirunelveli, India

<sup>4</sup>Averin Biotech Pvt.Ltd, 208, 2ndfloor, Windsor Plaza, Nallakunta, Hyderabad, India

### ABSTRACT

By virtue of the most fatal pandemic disease, Malaria, about a million individuals reach lethality globally every year and with ever consummating drug-resistant malarial parasite species, there occurred a coercive demand for the identification of incipient drug targets. Here we have evaluated a new drug target in phospholipid metabolic pathway such as Phosphocholine cytidylyltransferase (PfCCT) which is involved in the synthesis of Phosphatidylcholine, a class of phospholipids that significantly sways the developmental aspects of malarial parasite along with its replication and longevity within human red blood cells. The Objective of Present study is to identify potential lead molecule against PfCCT through docking with homology model of our target protein and common pharmacophore approach of our target inhibitor molecules. In this study, we computationally modeled the structure of PfCCT using Molsoft and validated by PROCHECK, ProSA and RMSD. With the finally refined target structure we performed docking using GOLD 3.1 and pharmacophore studies using Discovery Studio with 12 natural compounds. The predicted homology model of PfCCT is reliable. On the basis of the docking scores and pharmacophoric features, we have identified the compounds Amodiaquine and Quinidine showing better binding affinity towards PfCCT respectively with good fit values. In conclusion, the two compounds Amodiaquine and Quinidine shows potential inhibition against PfCCT respectively as targeted for malaria and also having better pharmacophoric features that could aid in the design of new lead molecules.

**Keywords:** Docking, Malaria, pharmacophore, Phosphatidylcholine, Phosphocholine cytidylyltransferase, Phospholipids.

### INTRODUCTION

An inductive agent of the world's uttermost significant parasitic malady, Malaria, is an intraerythrocytic protozoan parasite belonging to the genus *Plasmodium* among which *Plasmodium falciparum* is found felonious for severe human malarial cases with death rates beyond 1 million every year [1,2]. Advancements in strategies to encounter this disease has been made obligatory, in view of predicaments in the treatment and prophylaxis of malaria with an ever emerging drug resistant strains of *P. falciparum*, which paved the path for an incipient approach that suggests to target critical metabolic pathways known to be regulated parasite infection and transmission. Excellent targets have been provided by the recent studies on *P. falciparum* for lipid-based antimalarial therapy development involving the metabolic pathways which lead to the major *P. falciparum* phospholipids synthesis that requires enzymes, which are afflictive for a Brisky parasitic multiplication within human erythrocytes [3,4,5]. During the



**Sadakathullah Appa College (Autonomous)**  
 Rahmath Nagar, Tirunelveli - 627011

1	Name of the Faculty with Designation, Staff ID	:	<b>Dr. A. SYED MOHAMED</b> Assistant Professor of Chemistry ATCH02
2	Name of the Collaborating Faculty with Designation	:	<b>Dr. C. Vedhi</b>
3	Name of the Collaborating Organization	:	Department of Chemistry, VOC College, Tuticorin, Tamilnadu, India
4	Nature of Collaboration (Academic / Research / Faculty Exchange / Student Exchange / Project / Internship / On-the Job Training)	:	<b>Research</b>
5	Nature / Details of Outcome (Guest Lecture / DC member / Co-guide / Project Reports / Other Reports/Publications)	:	Co-guide
6	Period of Collaboration	:	From : Jan. 2016 To: Dec. 2019
7	Financial Involvement (if any)	:	No
8	Proof Attached	:	Yes / No
Signature of Principal		Signature of the Collaborating Faculty	
		<b>Dr. C. Vedhi</b>	
		Signature of the Faculty	

MANONMANIAM SUNDARANAR UNIVERSITY  
TIRUNELVELI-627 012, TAMIL NADU, INDIA

**Dr. K.SENTHAMARAI KANNAN**  
DIRECTOR  
Centre for Research

University Buildings,  
Abishekapatti,  
Tirunelveli - 627 012.

Ref.MSU/RES/Ph.D/VIVA/R-4/ 11512

17.04.2018

To

1. **Dr A Syed Mohamed** Guide Convener of Viva-voce Board  
Assistant Professor of Chemistry,  
Sadakathullah Appa College,  
Rahmath Nagar, Tirunelveli - 627 011.
2. Dr.K.Pandian, Examiner of Viva - Voce Board  
Associate Professor, Dept. of Inorganic Chemistry,  
University of Madras,  
Gundy Campus, Chennai - 600 025.
3. Dr C Vedhi, Co-Guide Member of Viva-voce Board  
Assistant Professor of Chemistry,  
V O C. College, Thoothukudi - 628 008

Sir/Madam,

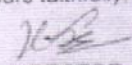
Sub: Conduct of Ph.D. Public Viva-Voce Examination - Reg.

I am, by direction, to inform that you have been appointed as Convener/ Member for the Viva-Voce examination on the Ph.D. thesis entitled " **In - Silico Design and Development of Novel Potent ACE Inhibitors of Hypertension** " submitted by **Mr/Ms. C.Zozimus Divya Lobo** for the award of Doctor of Philosophy.

You are requested to conduct the viva-voce Examination at **V.O.C. College, Thoothukudi** on any one of the working day (**except Saturday, Sunday and Government Holidays**) mutually convenient to all the members inclusive of guide & Co - Guide (if applicable) and submit the following to the undersigned immediately after the viva is over.

1. Detailed report along with the questions posed to the scholar or the Viva - Voce duly Signed by all Board members with seal.
2. Attendance Sheet in the proforma enclosed.
3. Viva - Voce Fee of Rs.10,000/- Drawn in favour of the Registrar, Manonmaniam Sundaranar University payable at Tirunelveli issued by any Nationalised Bank (or) through Challan, Indian Bank, M.S.University Branch (or) through Challan in State Bank of India, Power Jyothi Account to MSU A/c No. 32723606944.

Yours faithfully,

  
DIRECTOR

15/4/18  
P.T.O.  
15/4/18

16-10/1



**PUSHPALATA**  
**Vidya mandir**

SENIOR SECONDARY SCHOOL

Affiliated to CBSE, New Delhi | Affiliation Code No. 1930237

THIYAGARAJANAGAR  
TIRUNELVELI - 627 011  
Phone: 0462 - 2532823  
6530332

23.06.16

To

Dr. A. Syed Mohamed,  
Asst. Professor,  
Dept. of Chemistry,  
Sadakathullah Appa College  
Tirunelveli

Dear Sir,

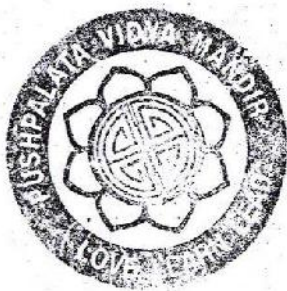
We would be honoured if you could kindly accept our invitation to inaugurate our Junior Science Lab which falls on Friday 24<sup>th</sup> 2016.

Thanking you,

Yours sincerely,

*Rajpaveni Ayyappan*  
PRINCIPAL

PRINCIPAL  
PUSHPALATA VIDYA MANDIR  
THIYAGARAJANAGAR,  
TIRUNELVELI - 627 011





**PUSHPALATA**  
**Vidya mandir**  
SENIOR SECONDARY SCHOOL  
Affiliated to CBSE, New Delhi | Affiliation Code No. 1930237

5

THIYAGARAJANAGAR  
TIRUNELVELI - 627 011  
Phone: 0462 - 2532823  
6530332

• To

**Dr. A. Syed Mohamed,**  
**Asst. Prof. of Chemistry,**  
**Sadakathullah Appa College,**  
**Tirunelveli - 11.**

**Dear Sir / Madam,**

We are thankful to you for consenting to be an observer for NEET 2017 to be held on Sunday 07.05.17 in Tirunelveli.

You are requested to attend a briefing meeting held by CBSE officials on 6<sup>th</sup> May 2017 at 10.30 am at Pushpalata Vidya Mandir for the smooth and fair conduct of NEET (UG) 2017 Examination.

With Regards,

Yours sincerely,

*Pushpaveni Ayyappan*  
**Mrs. Pushpaveni Ayyappan,**  
**Principal of Pushpalata Vidya Mandir**  
**City Co-Ordinator.**

CITY CO-ORDINATOR  
TIRUNELVELI





# PET ENGINEERING COLLEGE

An ISO 9001:2008 Certified Institution

Accredited by Institution of Engineers (India)

Approved by AICTE, New Delhi, vide file No 732-52-095 ET/97

Dated 15-07-1998

Recognized by Government of Tamil Nadu and Affiliated to Anna University



24

PETEC/S&H/IST2016/1

24.02.2016

This is to certify that **Dr.A.SYED MOHAMED** AP/ Chemistry,  
Coordinator, UGC Innovative Programme (MMDD) college name  
**SADAKATHULLA APPA ARTS AND SCIENCE COLLEGE,**  
**PALAYAMKOTTAI** as a chief guest has attended IST 2016  
Programme at **PET ENGINEERING COLLEGE, VALLIOOR** on  
24-02-2016.



*Armani*  
24/2/16  
PRINCIPAL



# HOLY CROSS HOME SCIENCE COLLEGE

( Accredited with " B" Grade by NAAC )

52, New Colony, THOOTHUKUDI - 628 003.

Phone : 0461-2328295, Fax : 0461-2328294

Website : www.hchsc.com E-mail : hchsc@rediffmail.com

12.12.2016

Date :

20

To  
Dr.A.Syed Mohamed  
Department of Chemistry  
Sadakathullah Appa College  
Tirunelveli.

Respected Sir,

Greetings from Dr.Sr.Mary Hilda,

I write this requesting letter to inform you that we had applied for the visit of NAAC (Cycle II) for our institution and the NAAC Peer Team is visiting our institution on 20-21<sup>st</sup> January 2017. In view of their visit to our college in our governing body meeting we had decided to invite the experts for MOCK visit.

We will be extremely pleased to have your presence with us on 17<sup>th</sup> December 2016. Kindly accept our invitation and give your constructive and critical feedback about our college.

Thanking you

Yours sincerely

Dr.Sr.Mary Hilda  
PRINCIPAL

HOLY CROSS HOME SCIENCE COLLEGE  
52, NEW COLONY,  
THOOTHUKUDI - 628 003.

16-17/4



## VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN



21

[ Autonomous ]  
SPONSORED BY : ANGAMMAL EDUCATIONAL TRUST.  
An ISO 9001 : 2008 Certified Institution

(Approved by AICTE, Affiliated to Periyar University and  
Re-accredited with 'A' grade by NAAC, Recognized under section 2(f) and 12(B) of UGC Act, 1956)  
Elayampalayam - 637 205. Tiruchengode, Namakkal Dt., Tamil Nadu.  
Phone : 04288 - 234560 (7 Lines), FAX : 04288 - 234033.

VIVEKANANDHA  
EDUCATIONAL INSTITUTIONS

Ref.No:46/VICAS-ATTN-CERT/2016

Date: 18.09.2016

B.T.Sureshkumar, M.Sc., M.Phil., Ph.D.,  
Principal

### ATTENDANCE CERTIFICATE

This is to certify that **Dr.A.Syed Mohamed, Asst. Prof. of Chemistry,**  
Sadakathullah Appa College, Tirunelveli, inspected as Mock visit member  
for Autonomous Extension Inspection Commission to our College on  
17.09.2016 and 18.09.2016.

PRINCIPAL

VIVEKANANDHA COLLEGE OF ARTS AND  
SCIENCES FOR WOMEN (Autonomous),  
ELAYAMPALAYAM - 637 205  
TIRUCHENGODE TK, NAMAKKAL DT,  
TAMIL NADU