

### 3.4.4

*Number of books and chapters in edited volumes / books published  
per teacher during the year*

**3.4.4 Details of books and chapters in edited volumes / books per teacher during the year.**

|               |                |
|---------------|----------------|
| <b>Year</b>   | <b>2022-23</b> |
| <b>Number</b> | <b>60</b>      |

| Sr. No. | Name of the Teacher | Title of the Book published | Title of the Chapter published  | Title of the proceedings of the conference | Name of the conference | National / International | Year and month of publication | ISBN of the Book/Conference Proceeding | Affiliating Institute of the teacher at the time of publication | Name of the Publisher |
|---------|---------------------|-----------------------------|---|--|------------------------|--------------------------|-------------------------------|--|---|-----------------------|
| 1.      | Dr.Mrs.S.P. Patil   | Statistics and data science | Generalized prediction Intervals for the scale parameter of the Inverted exponential distribution | --   | --                     | --                       | Feb 2023                      | 978-81-956739-9-5                      | Sadguru Gadage Maharaj College, Karad                           | Prarup Publication    |
| 2.      | Dr.Mrs.R.V. Chavan  | Statistics and data science | Prediction and modeling of prizes of gold big data analysis of India                              |  |                        |                          | Feb 2023                      | 978-81-956739-9-5                      | Sadguru Gadage Maharaj College, Karad                           | Prarup Publication    |

|    |                        |                             |  |  |  |  |          |                    |                                       |                               |
|----|------------------------|-----------------------------|--|--|--|--|----------|--------------------|---------------------------------------|-------------------------------|
| 3. | R.D.Patil              | Statistics and data science | Study of classification techniques (logistic regression, support vector machine and linear discriminant analysis) in prediction of prevalent heart disease |  |  |  | Feb 2023 | 978-81-956739-9-5  | Sadguru Gadage Maharaj College, Karad | R.D.Patil                     |
| 4. | Dr. A. G. Mulik        | Chemistry                   | A textbook of Organic Chemistry B.Sc. I  |  |  |  | 2023     | 978-81-19717-39-2  | Sadguru Gadage Maharaj College, Karad |                               |
| 5. | Dr.S.H.Pisal           | Physics                     | Synthesis of silver nano partials from dragon fruit peel extract an there antibacterial properties   |  |  |  | 2023     | 978-81-956739-7-1  | Sadguru Gadage Maharaj College, Karad |                               |
| 6. | Dr. Nivas M. Desai and | Botany                      | Plant Metabolites under  |  |  |  | Feb.2023 | Hard ISBN: 9781774 | Sadguru Gadage Maharaj College, Karad | Taylor & Francis<br>CRC Press |

|    |   |           |  |  |  |          |  |  |                                       |   |
|----|---|-----------|--|--|--|----------|--|--|---------------------------------------|---|
|    | Dr. Manasi Patil  |           | Environmental Stress: Mechanisms, Responses, and Adaptation Strategies |  |  |          |  | 910948<br>E-Book<br>ISBN:<br>9781003<br>304869 |                                       |   |
| 7. | Dr. A. V. Waghmode, Dr. K. N. Dhumal, Dr. Guari Abhyankar, Dr.M.R.Bhamar e, Dr.N.A.Ghayal, Dr. K. V.C.Gosavi. | Botany    | Manual of Botany Practicals  |  |  | Oct-2022 |  | 978-93-95951-12-8                              | Sadguru Gadage Maharaj College, Karad | Nirali Prakashan  |
| 8. | Nivas M. Desai and Manasi Patil   | Botany    | PLANTA Research Book Series (A Biannual Research Book Series) Vol5     |  |  | Oct-2022 |  | ISBN:<br>978-81-953419-0-0                     | Sadguru Gadage Maharaj College, Karad | Association of Plant Science Researchers (APSR) Plantica Foundation, Dehradun(U.K-) |
| 9. | Dr. M. M. Rajmane Prof. Dr. J. B Thorat Dr.S.H.Pisal Dr.N.S.harale  | Chemistry | Innovation In Smart and Technomaterials                                |  |  | 2023     |  |  | Sadguru Gadage Maharaj College, Karad | Prarup Publication Kolhapur   |



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| 14. | Dr.A.J.Patil  | Making of modern world                                    | Important personality   |                           |   | National      | 2022          | 978-93-92887-63-5  |                                      | Centre for distance and online education |
| 15. | Dr.I.N.Dhole<br>Dr.S.H.Pisal<br>Dr.S.B.Madaake<br>Dr.J.B.Thorat | Recent advances in fibration technology of nano materials | Synthesis methods for metal – organic frame work                      |                           |   | National      | 2022          | 978-81-9567-93-3-3 |                                      |  |
| 16. | Dr.G.B.Pedharka   | Industrial microbiology and biotechnology                 | Reuterin : a broad spectrum anti-microbial agents and its application |                           |   |               |               |                    |                                      |  |
| 17. | Dr.V.S.Shewale  | Sericulture present and future                            |   |                           |   | International | May 2023      | 978-93-95470-32-2  | Sadguru Gadage Maharaj College Karad | Book Sada publication                    |
| 18. | Prof.S.A.Patil and Mr.S.D.Agarwal                               | Computational Mathematics                                 | Terminology and detection of coding theory and decoding               | Computational mathematics | International conference on Computational mathematics | International | February 2023 | 978-81-956739-8-8  | SGM College Karad                    | Prarup Publication Kolhapur              |
| 19. | Mr.P.S.Mane   | Computational Mathematics                                 | On a new subclass of analytical functions defined by using            | Computational mathematics | International conference on Computational             | International | February 2023 | 978-81-956739-8-8  | SGM College Karad                    | Prarup Publication Kolhapur              |

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| 20. | Miss.N.S.Thorat<br>and Miss. S.R.<br>Sawant       |  |  |  | differential<br>operator   | Neural<br>networks<br>based on<br>implementati<br>on using<br>convolution<br>neural<br>network and<br>back | International<br>conference<br>on<br>Statistical<br>data<br>science | International    | February<br>2023                | 978-81-<br>956739-<br>9-5 |                      | Prarup<br>Publication<br>Kolhapur |
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## GENERALIZED PREDICTION INTERVALS FOR THE SCALE PARAMETER OF THE INVERTED EXPONENTIAL DISTRIBUTION

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### Abstract:

We consider a k-unit series system with life time of each unit following inverted exponential distribution with an unknown scale parameter. In this article we consider the problem of setting prediction interval for future sample, when lifetime distribution of a unit in a k-unit series system has inverted exponential distribution based on Generalized Variable approach. We provide generalized prediction interval for the scale parameter based on maximum likelihood estimator and modified maximum likelihood estimator respectively. The performance of proposed generalized prediction interval is evaluated using extensive simulation work. The proposed prediction interval found to perform well for small to moderate sample sizes.

**Keywords:** Series system, maximum likelihood estimator, modified maximum likelihood estimator, generalized prediction interval.

### Introduction:

There is a large amount of literature about the estimation of scale parameter of inverted exponential distribution using different approaches. Inverted exponential distribution is life time distribution which is used in the reliability discipline. The inverted exponential distribution (IED) has been discussed as a life time model by Lin et al (1989) in detail. They have obtained maximum likelihood estimators, confidence limits and uniformly minimum variance unbiased estimators for the parameter and reliability function with complete samples. Stefanski (1996) has discussed some basic properties of the IED. Godase S.S., et.al (2017) explained tolerance intervals and confidence intervals for the scale parameter of Pareto-Rayleigh Distribution. Godase S.S., et.al (2017) derived interval estimation for lifetime distribution of k-unit parallel system. Godase S.S., et.al(2017) prediction and

*Department of Statistics, S. G.M. College, Karad*



## PREDICTING AND MODELLING OF PRICES OF GOLD BIG DATA ANALYSIS OF INDIA

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### Abstract:

India is most powerful shops for gold, and rising wealth is powerful growth in claim. Gold takes a fundamental part in the nation's culture, measured a stock of price, a symbol of prosperity and position and an important portion of numerous ceremonies.

Prices of gold big data records are generating numerous volatile manners. Gold stay remained measured an innocent reoccurrence savings since of his individual to privet in contradiction of increase. Finally, the predicting model of gold obligation replicate its construction as well as outline. Gold prices survey a usual univariate chronological data and there are several methods to estimate gold prices is Box-Jenkins, precisely the autoregressive integrated moving average (ARIMA) models. The prices value records present volatility manners, the Autoregressive conditional heteroskedasticity (ARCH) or Generalized Autoregressive conditional heteroskedasticity (GARCH) model construct this volatile manner data in proper way as compare ARIMA model. The study concluded that the GARCH (1,1) model is better predict as compare the ARIMA model with help of different evaluation measures.

**Keywords:** Gold Data, Big Data, Volatile, ARIMA, ARCH, GARCH

### Introduction:

Gold is well-thought-out to be favorable, mainly in Hindu philosophies. The antique law-giver Manu commanded that gold curios must stay damaged for significant ceremonies and events. Apart since Diwali, one of the furthestmost significant days in the Indian calendar, regional commemorations across the country are famous with gold: in the south, Akshaya Tritiya, Pongal, Onam and Ugadi; in the east, Durga Puja; in the west, Gudi Pavda; in the north, Baisakhi and Karva Chauth. Gold is essential to additional special life actions also. Gifting gold is intensely deep-seated part of wedding ceremonies in Indian civilization—marriages make around 50 percent of annual gold request. [7]

STUDY OF CLASSIFICATION TECHNIQUES (LOGISTIC REGRESSION,  
SUPPORT VECTOR MACHINE AND LINEAR DISCRIMINANT ANALYSIS) IN  
PREDICTION OF PREVALENCE OF HEART DISEASE

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<sup>2</sup>Principal, Vivekananda college Kolhapur,

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<sup>3</sup>satishvkakade@yahoo.co.in

**Abstract:**

In this study we have used the publicly available Cleveland Dataset and compare it through various classification techniques such as Logistic regression, Support vector machine, Linear Discriminant analysis for prediction of the prevalence of heart diseases. From these different models we evaluated their accuracies in predicting a heart disease. We have claimed that logistic regression and Linear Discriminant Analysis give more accurate results than support vector machines for predicting heart disease. We also used F1 score, AUC curves, precision and recall as evaluative measures. Here our aim is to provide a benchmark and improve earlier ones in the field of heart disease diagnostics with the help of different classification techniques.

**Key words:** Heart disease, Logistic regression(LR), Linear Discriminant Analysis(LDA), classification, Cleveland Heart Disease.

**Introduction:**

In this study we focused on heart disease as it leads to death. Heart disease is very complex to determine due to many problems of health such as cholesterol, chest pain, and blood pressure. Here we have used the heart disease dataset of University of California (UCI). Various investigations of prediction are made by many researches on this dataset. Through this we make comparative study of Logistic regression, Support Vector Machine and Linear discriminant analysis classifiers in the case of classification of heart disease.

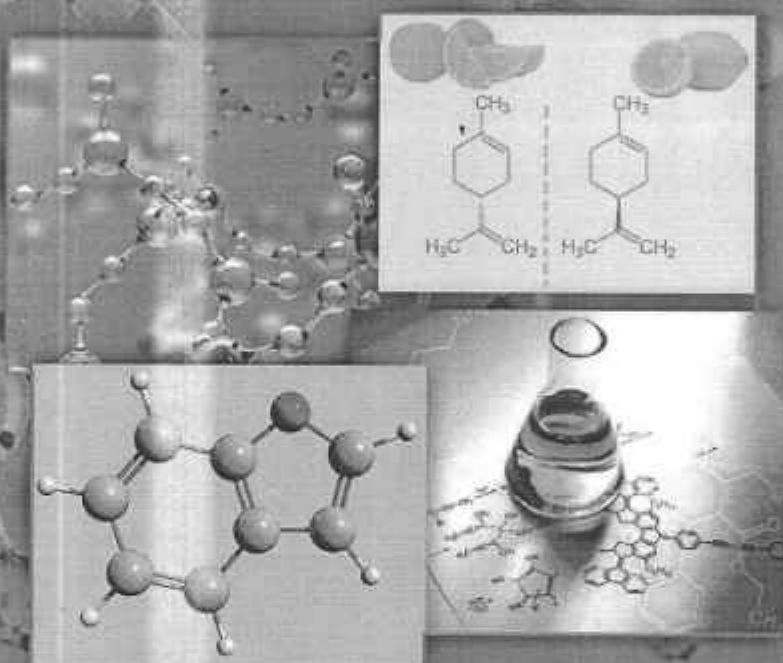
B. Sc. Part I ♦ Semester I ♦ Paper II

B. Sc. Part I ♦ Semester I  
Chemistry Paper II

# ORGANIC CHEMISTRY

ORGANIC CHEMISTRY

Phadke Prakashan



Dr. A. G. Mulik ♦ Dr. D. R. Chandam ♦ V. M. Desai



PHADKE PRAKASHAN

(5)

Book  
Chapter  
Physics

**PP-59: Synthesis of silver nanoparticles from dragon fruit peel extract and their antibacterial properties**

S. R. Shinde, M. A. Hakim, S. R. Nalawade, T. A. Kashid, **Dr. S. H. Pisal\***

Department of Physics, S.G.M. College Karad.

**Abstract:** In order to develop active materials with favourable properties for antibacterial activity the silver nanoparticles are synthesized by biological method which acts as green synthesis method using dragon fruit peel extract. To synthesis silver nanoparticles 10 mM silver nitrate reacted with peel extract of dragon fruit which produces silver nanoparticles. The resultant products were characterized by using UV-Vis spectrophotometer. UV-Vis spectra shows surface plasmon resonance peak at 434 nm, which confirms formation of silver nanoparticles. Further this product with other combination will used to study antibacterial activities.



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Plant Science &amp; Botany

## Plant Metabolites under Environmental Stress Mechanisms, Responses, and Adaptation Strategies

Editors: Nivas M. Desai, PhD  
Manasi Patil, PhD  
Umesh R. Pawar, PhD

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Pages: 332pp w/Index  
Binding Type: hardback / ebook  
Notes: 14 color and 29 b/w illustrations

**Plant Metabolites under Environmental Stress: Mechanisms, Responses, and Adaptation Strategies** provides a timely update on the knowledge of plant responses to various environmental stresses such as salinity, waterlogging, drought, pollution, heat, temperature, oxidative stress, and mineral deficiencies. Chapters focus on physiological and biochemical mechanisms identified in plants that are crucial for them to adapt to biotic and abiotic stress and the methods for improving plant tolerance mechanisms. The book also throws light on plant secondary metabolites such as phenolic compounds and plant growth regulators in ameliorating the stressful conditions in plants.

The scientific knowledge and expertise presented in this volume will be valuable to agronomists, plant physiologists, horticulturists, research scholars of botany and agriculture science, academicians of plant sciences as well students in these areas.

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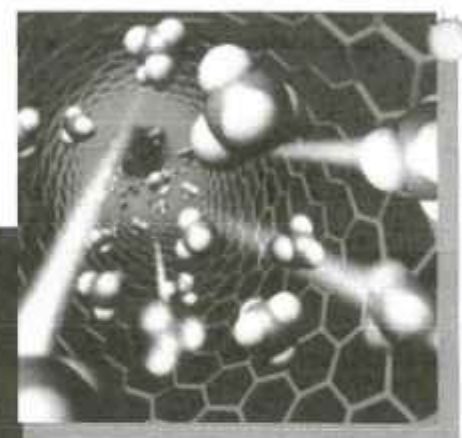
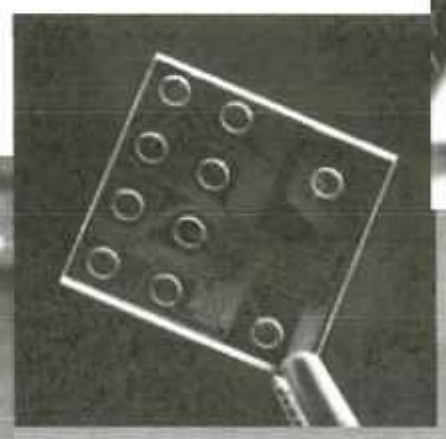
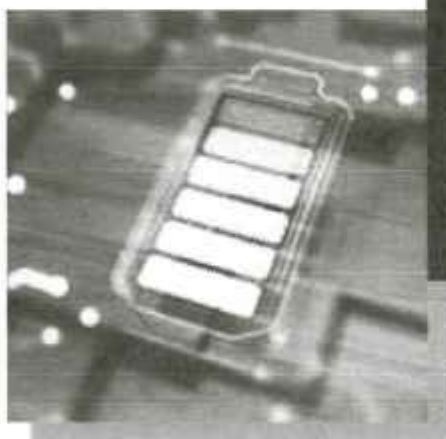
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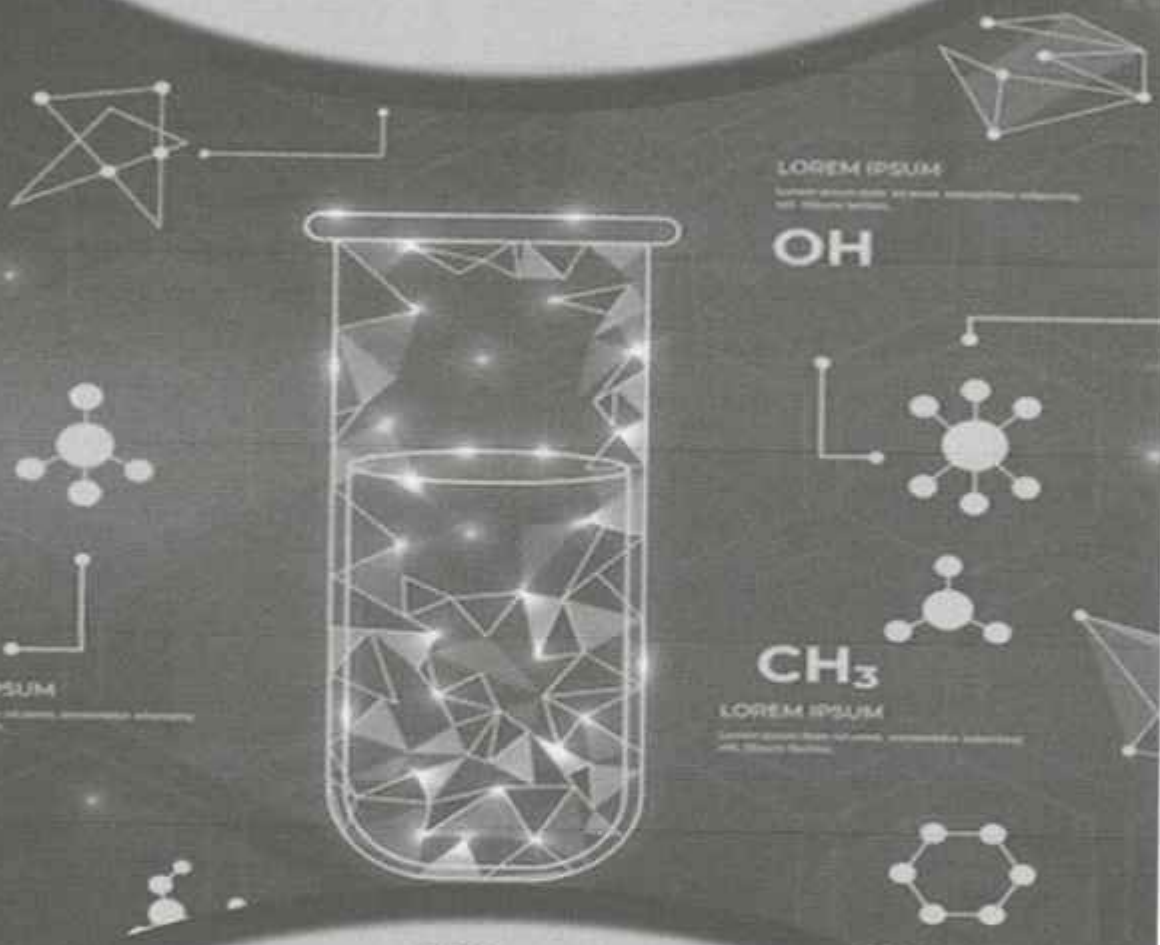
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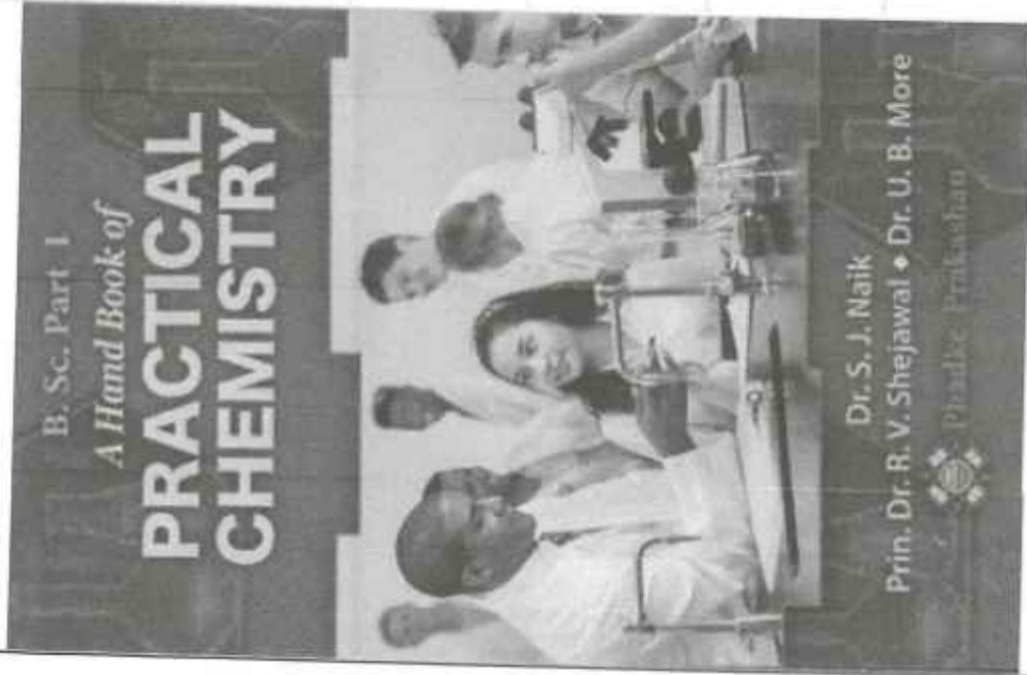
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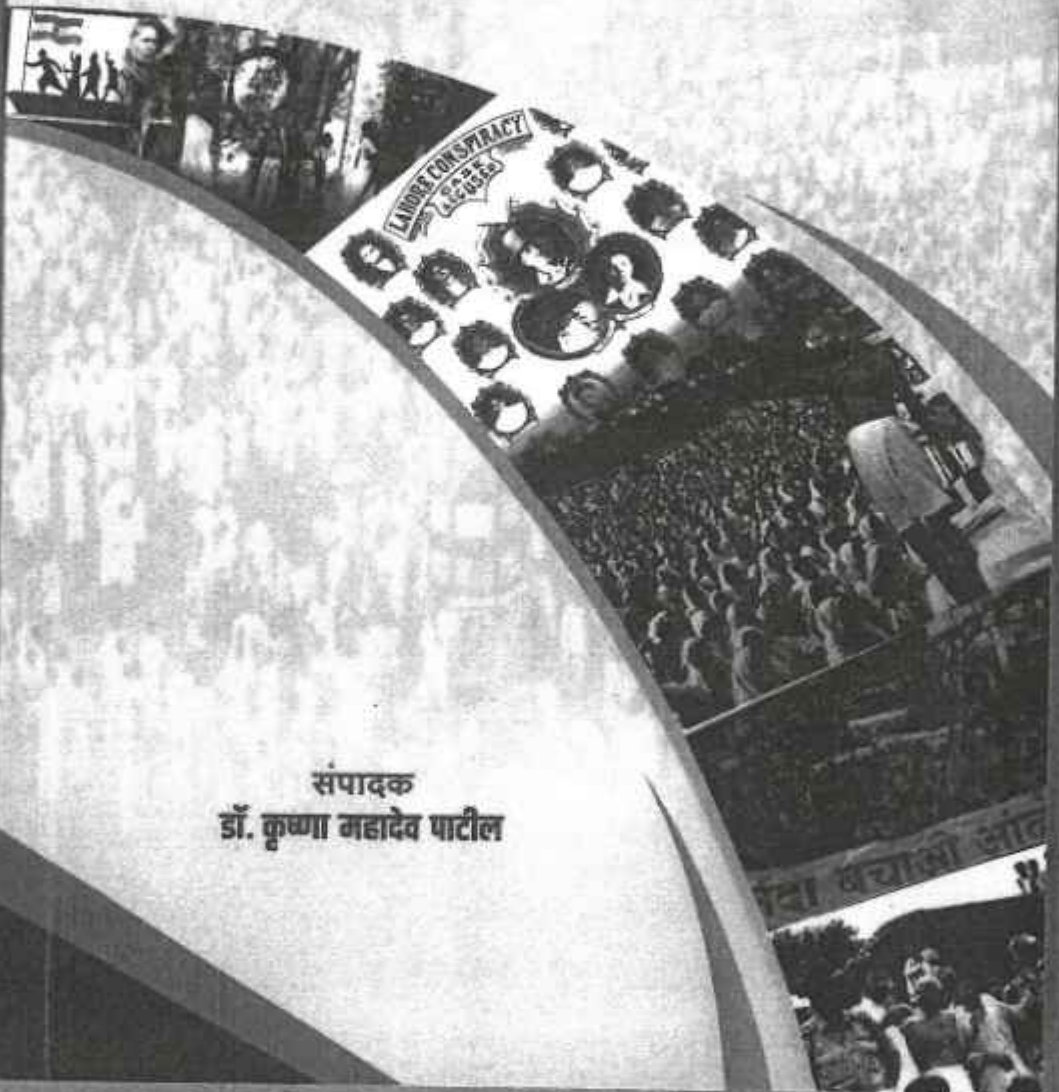


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भारत छोडो आंदोलन भारतीय स्वातंत्र्य चळवळीतील एक महत्त्वाचे आंदोलन होते. यापूर्वीच्या आंदोलनांचा म्हणजेच १९२०-२१ - असहकार आणि १९३०-३३ सविनय कायदेभंगच्या चळवळीशी तुलना करता १९४२ ची भारत छोडो चळवळ एक वेगळी चळवळ होती. भारतीय स्वतंत्रता आंदोलनातील इतर कोणत्याही आंदोलनापेक्षा भारत छोडो आंदोलन अत्यंत उग्र स्वरूपाचा लढा होता. आधीच्या सर्व जनआंदोलनांला पुढाऱ्यांचे मार्गदर्शन लाभले होते. परंतु १९४२ चा लढा सर्व नेत्यांची घपकड झाल्यानंतर जनतेने उत्स्फूर्तपणे लढविला. अर्थात अगोदरच्या दीर्घकालीन लढ्यांच्या मानाने हे आंदोलन फारच थोडा काळ, म्हणजे फक्त चार-पाच महिनेच टिकून राहिले होते.

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विन्स्टन चर्चिल यांनी १९३७ मध्ये म्हटले होते की, ब्रिटिश साम्राज्याचे भारतावरील नियंत्रण हटविण्याचा कोणताही विचार नाही. १९४० मध्ये ब्रिटनचे पंतप्रधान बनल्यानंतर सुद्धा विन्स्टन चर्चिल यांच्या विचारसरणीत कोणताही बदल झालेला नव्हता. १९४१ मध्ये विन्स्टन चर्चिल यांनी परत एकदा स्पष्ट केले की, जर ब्रिटिश साम्राज्याने भारताला स्वातंत्र्य दिले तर ब्रिटिश साम्राज्य हे पुढे जाऊन मोठे साम्राज्य राहील याची शाश्वती देता येत नाही. भारताचे पहिले पंतप्रधान पंडित जवाहरलाल नेहरू यांच्या शब्दात सांगायचे झाले तर हीच ब्रिटिश साम्राज्याची विकट समस्या होती. भारताला सोडून ब्रिटनला कोणत्याही प्रकारे मोठी सत्ता किंवा

स्वतंत्र समजावे आणि त्याप्रमाणे व्यवहार करावा.

अखिल भारतीय काँग्रेस कार्यकारिणीचे अधिवेशन मुंबईत ७ ऑगस्ट १९४२ रोजी गवालिया मैदानावर आयोजित करण्यात आले होते. या अधिवेशनाचे अध्यक्षस्थान मौलाना आझाद यांनी भूषविले. या अधिवेशनात तीन हजार प्रतिनिधींनी भाग घेतला होता. भारत छोडो आंदोलनाचा प्रस्ताव पंडित जवाहरलाल नेहरू यांनी मांडला. चळभभाई पटेल यांनी या प्रस्तावाला अनुमोदन दिले. ८ ऑगस्ट १९४२ रोजी हा प्रस्ताव सर्वांच्या मान्यतेने पारित करण्यात आला. विदर्भ व मध्य प्रांतातून या अधिवेशनासाठी गेलेले प्रतिनिधी यावेळी सरदारगुहात थांबले होते.

### भारत छोडो आंदोलनाचा उद्देश

भारत छोडो आंदोलनाचा मुख्य उद्देश भारताला स्वतंत्र करणे, जपानी आक्रमणापासून भारताची रक्षा करणे व लोकांच्या असंतोषाला लोक चळवळीत परिवर्तित करणे हा होता.

महात्मा गांधींच्या दृष्टिकोनातून भारत छोडोचा प्रस्ताव अंतराआत्म्याची शुद्ध आवाज होता. याचा अर्थ अहिंसा व सत्य या दोन शुद्ध मार्गाने परदेशी वर्चस्वाला समाप्त करणे होय. यात परदेशी लोकांसोबत कोणत्याही प्रकारे द्वेष करणे असा होत नाही. महात्मा गांधींनी ८ ऑगस्ट १९४२ च्या रात्री काँग्रेसच्या कार्यकारिणी समोर भारत छोडो आंदोलनाविषयी चर्चा करताना पुढीलप्रमाणे आंदोलनाची पार्श्वभूमी सांगितली. मला एकच गोष्ट प्राप्त करायची आहे ती गोष्ट म्हणजे भारताचे संपूर्ण स्वातंत्र्य, ती जर इंग्रजांकडून मिळत नसेल तर आम्हाला संपवून टाकावे. आता मी पूर्वीचा गांधी नाही की काही दिले तरी घेईल. आता फक्त एकच विश्वास आहे तो म्हणजे स्वातंत्र्यासाठी 'कर अथवा मर'. आजपासून हे निश्चित करा की स्वातंत्र्य मिळवायचे आहे. त्यासाठी मरायला देखील तयार राहावे. स्वातंत्र्यप्राप्ती कमजोर लोकांसाठी नाही, ज्यांच्यात शक्ती आहे ते स्वातंत्र्य प्राप्त करू शकतात.

### महात्मा गांधींचा स्वतंत्र भारताला संदेश

- प्रत्येक भारतीयाला अहिंसापूर्वक कार्य करण्याचे स्वातंत्र्य आहे.
- आपण कशाप्रकारे या सूचना प्रसारित करू शकतो-
- भारतीय लोकांनी स्वतःचे नेतृत्व स्वतः स्वीकारावे.
- सुतगिरण्या, महाविद्यालय, बाजार, कारखाने बंद ठेवावे.
- सरकारशी असहकार करावा.
- सरकारी कार्यालयीन प्रक्रियेला पंगू बनवावे.

- सरकारी कार्यालयासमोर आंदोलन करून सरकारी प्रक्रिया बंद करावी.
- ट्राम व बससेवेला पूर्णतः बंद करावे.
- टेलिफोन व तारव्यंजना ठप्प करावी.
- सरकारचा आदेश न मानण्यासाठी पोलिस बांधवांना प्रोत्साहित करावे.

उपलब्ध साधनांद्वारे भिंतीवर लिहिणे, जमिनीवर लिहिणे, एक दुसऱ्यांना सांगणे-बोलणे, माहिती पत्रकाद्वारे लोकांचा सरकारविरुद्धचा असंतोष देशाच्या काना कोपर्यात पसरविणे. इत्यादी.

### विदर्भात भारत छोडो आंदोलनाची सुरुवात

भारतातील इतर प्रदेशांसारखे विदर्भातही भारत छोडो आंदोलनाचा मोठा प्रसार झाला. विदर्भाच्या नागपूर, भंडारा, वर्धा, चंद्रपूर, अमरावती, अकोला, बुलढाणा व यवतमाळ या जिल्हांमध्ये आंदोलन वणव्यासारखे पसरले.

विदर्भातील यालढ्याला प्रखर आणि घगधगता निखारा देण्याचे काम राष्ट्रसंत तुकडोजी महाराज यांनी केले. हजारो लोकांना आपल्या भजनातून तसेच प्रभावी भाषणातून राष्ट्रीयत्वाची जाणीव करून देणाऱ्या राष्ट्रसंतांनी १९४२ च्या भारताच्या स्वातंत्र्य संग्रामात अभूतपूर्व असा रंग भरला. बासरी सोडून द्या. बना सुदर्शन चक्रधारी असा संदेश त्यांनी दिला होता. महाराजांनी आरती व भजन मंडळाची स्थापना करून आष्टी, चिमूर, नागपूर, चंद्रपूर या ठिकाणी चळवळीचा प्रसार केला. आरती व भजन मंडळाच्या माध्यमातून स्वातंत्र्यलढ्याची मशागत होत होती आणि स्वातंत्र्यलढ्याची भूमी तयार होत होती. आरती मंडळाचे अतिशय सूत्रबद्ध काम गोपनीय पद्धतीने नामराव दादा मुकदम यांच्या मार्गदर्शनात चालत होते.

### आंदोलनाची सुरुवात

नागपूर

नागपूर येथील स्वातंत्र्यसेनानी ब्रिजलाल बियाणी यांनी विदर्भ प्रांतातील विद्यार्थ्यांना संदेश दिला की भारतातलेला इंग्रजांच्या जोखडातून मुक्त करण्याचा शेवटचा संघर्ष सुरू झालेला आहे. प्रत्येक देशाच्या स्वातंत्र्याचे बीज तरुणांच्या हातात असते. प्रत्येक तरुणांमध्ये देशाच्या स्वातंत्र्यासाठी अपार प्रेम आहे. भारताच्या कानाकोपऱ्यातील तरुण स्वातंत्र्यप्राप्तीसाठी संघर्ष करण्यासाठी आतुर झालेले आहे. महात्मा गांधींनी सोळावर्षावरील तरुणांकडून अधिक त्यागाची अपेक्षा ठेवलेली आहे. विद्यार्थ्यांनी या राष्ट्रीय संघर्षाचे नेतृत्व करावे व भारतीय राष्ट्रीय आंदोलन यशस्वी करावे. तरुणांनी बलिदानासाठी तत्पर राहावे असा संदेश दिला.

ऑफिस, कचेऱ्या, सरकारी इमारती व गोडाऊन यांवर मोर्चे नेवून ताब्यात घेण्याचे प्रयत्न करीत होते.

वरील परिस्थितीवर नियंत्रण मिळवण्यासाठी जबलपूरवरून ग्रीन हावर्ड यांच्या नेतृत्वात लष्कराची कुमक नागपुरात बोलावण्यात आली होती. ग्रीन हावर्डने कस्तुरचंद पार्क येथे आंदोलनकर्त्यांनी लावलेला काँग्रेसचा झेंडा उतरवला. नागपुरातील तेथील आवळीत महार रेजिमेंटच्या लष्कराने १४ ऑगस्ट रोजी रस्त्यावर आडकाठी आणणा-यांवर फायरिंग केली. या गोळीबारात बाजीराव तेली, गणपती कलार, नारायण कलार, शिवराम कोन्हाली, रामचंद्र गोडे, नत्थू गोंड हे बळी पडले. यावेळी जिल्हा प्रशासनाने नागपुरातील महत्त्वाच्या जागांवर पोलिसांची गलत वाढवली होती.

२३ ऑगस्टला इंग्रज सरकारने नागपुरातील अनेक काँग्रेस नेत्यांच्या घराची झाडाझडती घेतली परंतु त्यातून काहीही निष्पन्न झाले नाही. मॉरिस कॉलेजला आग लावण्याचा अयशस्वी प्रयत्न काही अग्र लोकांनी केला. यात तेरा लोकांना ताब्यात घेण्यात आले होते. दरम्यानच्या काळात शाळेतील विद्यार्थ्यांचे सत्याग्रह सुरू होते. काही विद्यार्थ्यांनी नगरपालिका कार्यालय आणि महाल पोस्ट ऑफिसमध्ये जाऊन कर्मचाऱ्यांना काम थांबवण्याची धमकी दिली. ३० ऑगस्टला यशवंत नामक व्यक्तीला बंदी बनवले गेले. पोलीस शिपाई बालगोविंद याच्या हतेचा आरोप त्याच्यावर होता. यावेळी काँग्रेस कार्यकर्त्यांची मोठ्या प्रमाणात धरपकड सुरू होती. आठ विद्यार्थ्यांना काँग्रेसच्या आंदोलनात सामील झाल्यामुळे अटक करण्यात आली होती. यात पी. एम. नायडू, पि. के. साळवे, हरिभाऊ दलाल आणि बी. एन. साहू यांचा समावेश होता. यांनी १९४२ च्या आंदोलनाचे पत्रके शहरात वाटली होती लक्ष्मण शिवाजी तेली यांनी राष्ट्रसंत तुकडोजी महाराज यांना इंग्रजांनी अटक केल्याच्या निषेधार्थ मोठी मितवणूक काढली होती. परंतु पोलिसांनी त्यास अटक केली नाही.

#### रामटेक

नागपूर शहरात सुरु असलेल्या या आंदोलनाचे पडसाद आजूबाजूच्या परिसरात मोठ्या प्रमाणात दिसून आले. रामटेकमध्ये तीनशे लोकांनी लाठ्या-काठ्या घेऊन रामटेकमधील पोस्ट ऑफिसवर आक्रमण केले. तेथील तारलाईन कापल्या आणि पोस्ट ऑफिसमधील सर्व रेकॉर्ड जाळून टाकले. जमावाने तेथील पोस्टमास्तरला पकडून तहसील ऑफिसपर्यंत नेले. पोलीस स्टेशनमधील ठाणेदाराला पकडून तेथील बंदी असलेल्या तीन कैद्यांना सोडविले. ठाणेदाराला विद्वेषकाचा पोषाळ

घालून त्याची मितवणूक संपूर्ण रामटेकमधून काढण्यात आली. रामटेकचे नायब तहसीलदार रामटेकहून नागपूरला जात होते. त्याला पकडून त्याच्या डोक्यावर गांधी टोपी घालून हातात काँग्रेसचा झेंडा दिला व रामटेकमधील जुन्या वस्तीतून त्याची मितवणूक काढण्यात आली. नंतर या जमावाने तहसील ऑफिसला आग लावून जाळले. येथील खजान्यातील तीन लाख रुपये लुटले. त्यानंतर नगर पालिकेच्या इमारतीला आग लावून सर्व रेकॉर्ड जाळले.

#### खापा

तालुक्यातील महत्त्वपूर्ण ठिकाण असलेल्या खापा येथील पोस्ट ऑफिस, पोलीस ठाणे कार्यालयांना आंदोलकांनी आगी लावून जाळून टाकले. नगर कार्यालय आणि वन कार्यालयाची तोडफोड केली. युरोपियन लोकांच्या निवास्थानांची तोड-फोड केली. पोलिसांच्या अटकसत्रात अनेक लोक ताब्यात घेण्यात आले. त्यांच्याकडून प्रत्येकी दहा हजार रुपये नुकसानभरपाई वसूल करण्यात आली होती. अटक करण्यात आलेल्या लोकांच्या परिवारातील लहान मुलं, महिला यांना अनेक यातना देण्यात आल्या होत्या.

#### सावनेर

येथील रेल्वे स्टेशन, रेल्वे वर्कशाॅप आणि केरोसिनचे डेपो व तेथील फर्निचर अग्र लोकांनी लुटून नेले. पोस्ट ऑफिसला आग लावून नष्ट करण्यात आले. यामध्ये दोन व्यक्ती जख्म झाले होते.

#### उमरेड

९ आणि १० ऑगस्टला उमरेड तालुक्यातील पोलिस अधिकाऱ्यांनी भारतीय राष्ट्रीय काँग्रेसचे मुख्य कार्यालय आणि हिंदुस्थान रेड आर्मीच्या कार्यालयाची झाडाझडती घेतली. शहरातील प्रमुख व्यक्तींना ताब्यात घेतले. त्यामुळे तेथील जनतेने उत्तेजीत होऊन पंचगाव येथील पोस्ट ऑफिस व कांजी हाऊस जाळले. चला येथील सरकारी कार्यालयातील कर्मचाऱ्यांवर बहिष्कार टाकण्यात आला. संपूर्ण तालुक्यात अकरा व्यक्तींना ताब्यात घेण्यात आले होते. त्यांच्यावर एक हजार रुपये सामूहिक दंड आकारण्यात आला होता.

#### वंधो

वंधो शहरात महात्मा गांधींच्या अटकेची बातमी मिळताच तेथील जनता आंदोलनासाठी तयार झाली. वधेतील जनतेने आंदोलन शांततेच्या मार्गाने करण्याचे ठरविले होते. वंधा येथील सत्याग्रही दीनदयाल चुडीवाले हे मुंबईहून वधेला आले तेव्हा लोकां गांधीजींनी भारत छोडो आंदोलनाविषयी कोणत्या सूचना केलेल्या

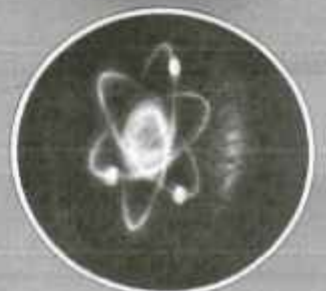
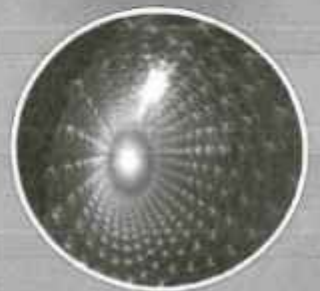
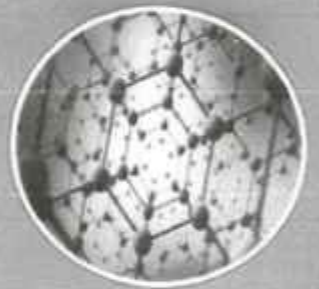
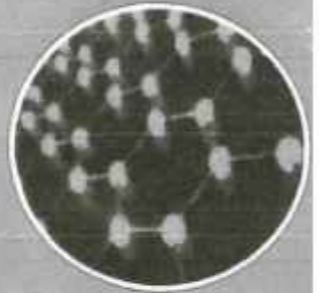


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**Recent Advances in Fabrication Technology  
of Nanomaterials**

Organized by Department of Physics, Balwant College, Vita



## Synthesis methods for metal-organic framework (MOF)

I.A. Dhole\*, P.P. Rakate, S.B. Waghmare, A.B. Patil, S.S. Mane, S.K. Kurde, P.S. Mahadar, S.B. Madake, S.H. Pisal, J.B. Thorat

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### KEYWORDS

Metal-organic frameworks, Synthesis methods

### ABSTRACT

Metal-organic frameworks (MOFs) are porous crystalline materials constructed of metal centers and organic linkers, creating 1D, 2D, or 3D well-organized frameworks with high surface areas. The study of MOFs has become one of the main topics for research in many fields, due to the broad potential applications projected for these materials in various areas. It is well known that synthesis methods dictate the structure and properties and performance of the resulting MOFs. This chapter provides a completely up-to-date overview of the synthesis methods for MOFs. Using different synthesis methods, the size and crystal morphology can be manipulated.

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### 1. Introduction

Porous materials are solid compounds with an ordered and/or disordered pore structure, volume, and large surface area. These combined with some of their distinctive chemistries make them a special class of chemical and engineering materials. Over the past few decades, porous materials have become one of the leading research fields in chemistry, physics, materials science, and engineering. The diversity in the pore orientation and dimensionality, combined with the variety in pore shapes and sizes, makes the porous materials highly interesting and vastly studied. The IUPAC defines porous materials according to the pore dimensions and classifies them as materials with dimensions less than 2 nm pore as microporous materials, materials ranging from 2 to 50 nm as mesoporous materials, and materials with pores larger than 50 nm as microporous materials [1]. Porous materials have shown great applications in some industries, such as oil and gas processing, industrial catalysis, adsorption/separation, and fine chemical industries [2]. They are also being recognized and explored in the research fields of water treatment, sustained release of drugs, and fuel cells, in the recent decade [3].

Among all porous materials, zeolites are the most famous microporous materials. Chemically, the acidity of zeolites is adjustable, in addition to their high-quality pore channel selectivity and hydrothermal stability. These help the research value of zeolites in industrial applications like petroleum processing. However, the inorganic nature of zeolites limits their adjustability in chemical properties and designability in pore structures and sizes, which restricts the further development and applications of zeolites [2]. For decades, there have been research efforts trying to combine various metal centers and functional organic molecules into porous structures for the regulation of physical and chemical properties. This effort has resulted in the development of hybrid porous crystalline materials formed by the coordination of inorganic metal centers and organic linkers in the 1990s. This new type of porous material is commonly called the metal-organic framework (MOF) [4]. Ever since their discovery, MOFs have received significant attention from scientists, engineers, and technologists because of their versatility in structures and chemistries. Since the synthesis of MOFs directly influences the

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Pradeep Verma *Editor*

# Industrial Microbiology Biotechnology

Emerging concepts in Microbial  
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The front cover has the following text, Pradeep Verma Editor, Industrial Microbiology and Biotechnology, Emerging concepts in Microbial Technology, The Springer logo is at the bottom right corner of the page.

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Micro



## Reuterin: A Broad Spectrum Antimicrobial Agent and Its Applications **20**

Kiran S. Dalal, Sandip P. Patil, Girish B. Pendharkar, Dipak S. Dalal, and Bhushan L. Chaudhari

### Abstract

Probiotic bacteria play a vital role in living animals including human health by helping in the digestion of foods and boosting the immune system. Hence, microbes with better properties are of interest. Some probiotic bacteria produce specific substances that can inhibit or inactivate other organisms which compete for nutrients and space. The  $\beta$ -hydroxypropionaldehyde (3-HPA) known as reuterin is produced by *Lactobacillus reuteri*. It has broad antimicrobial activity against potentially harmful microorganisms without adversely affecting the beneficial gut flora. Its production occurs under the anaerobic condition where the enzyme glycerol dehydratase facilitates the conversion of glycerol to reuterin by removing water molecules. The structure of reuterin contains both hydroxy and aldehyde functional groups. Reuterin is a low molecular weight water-soluble compound resilient to proteolytic and lipolytic enzymes, and remains active at a varied pH and hence finds applications in industries. This chapter focuses on reuterin production, stability, antimicrobial activity, and its applications.

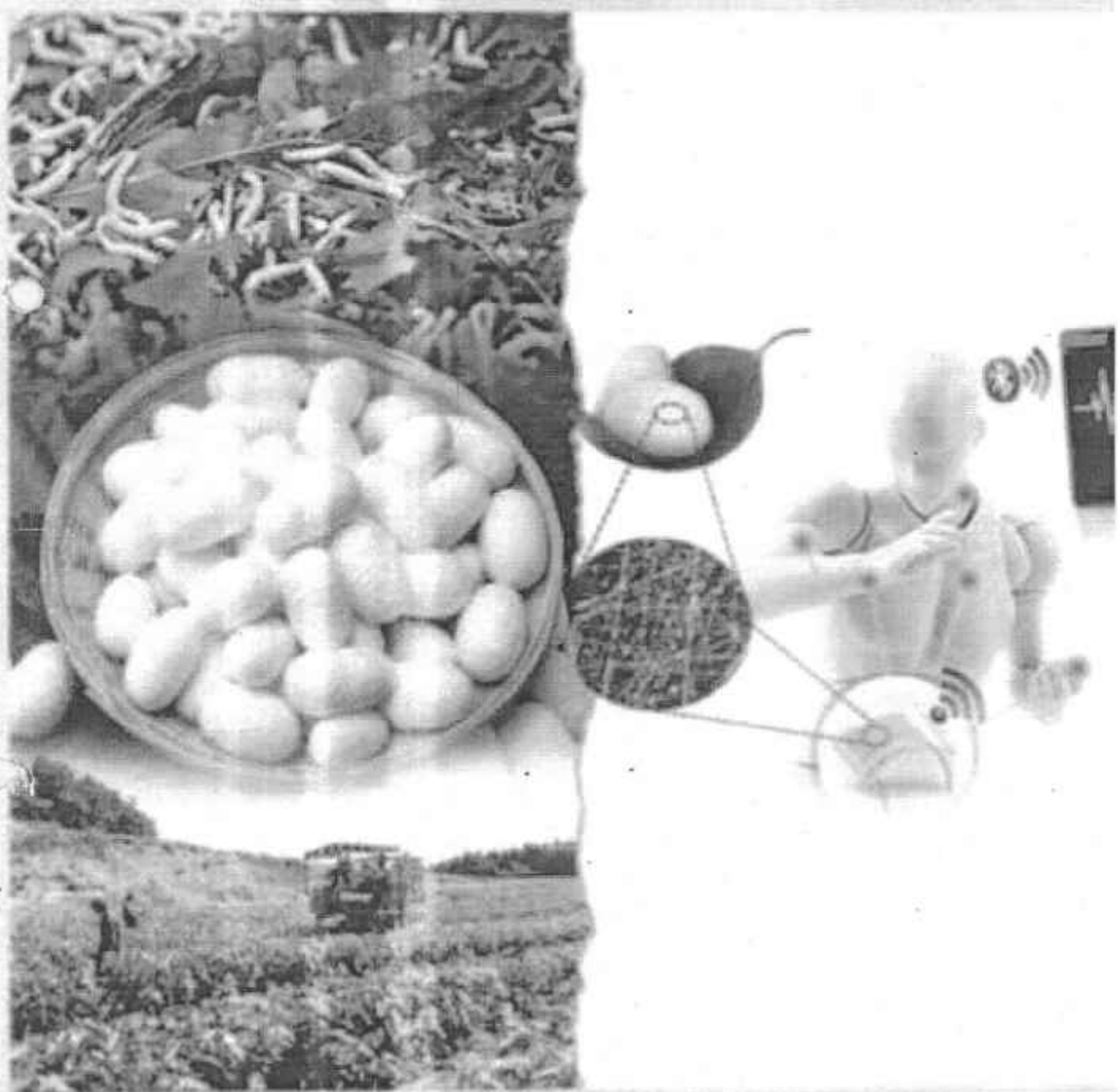
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# STATISTICS AND DATA SCIENCE



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**Prarup Publication, Kolhapur**

## “Research On Deep Learning for Artificial Neural Networks Based On Implementation Using Convolutional Neural Networks & Back Propagation”

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### ABSTRACT

Deep learning refers to the shining branch of machine learning that is based on learning levels of representations. Convolutional Neural Networks (CNN) is one kind of deep neural network. It can study concurrently. In this article, we gave a detailed analysis of the process of CNN algorithm both the forward process and back propagation. Then we applied the particular convolutional neural network to implement the typical face recognition problem by java. Then, a parallel strategy was proposed in section4. In addition, by measuring the actual time of forward and backward computing, we analyzed the maximal speed up and parallel efficiency therotically.

**Keywords:** Convolutional Neural Networks, Face training, Parallel Strategy, Maximal speedup.

### 1. INTRODUCTION

Deep learning refers to a subfield of machine learning that is based on learning levels of representations, corresponding to a hierarchy of features, factors or concepts, where higher-lever concepts are defined from lower-level ones, and the same lower-level concepts can help to define many higher-level concepts.

Deep learning is learning multiple levels of representation and abstraction, helps to understand the data such as images, audio and text. The concept of Deep Learning comes from the study of Artificial Neural Network; Multilayer Perceptron which contains more hidden layers is a Deep Learning structure.

In the late 1980s, the invention of Back Propagation algorithm used in Artificial Neural Network brings hope to machine learning and creates a trend of machine learning based on statistical models. In the 1990s, a variety of Shallow Learning models have been proposed such as Support Vector Machines (SVM), Boosting, and Logistic Regression (LR). The structure of these models can be seen as one hidden node (SVM, Boosting), or no hidden nodes (LR). These models gained a great success both in theoretical analysis and applications.

In 2006, Geoffrey Hinton who is the professor of University of Toronto, Canada and the dean of machine learning and his students Ruslan Salakhutdinov published an article in "Science", led to a trend of machine learning in academia and industry. The article had two points: 1) Artificial Neural Network with multiple hidden layers has an excellent ability of characteristic learning. The Characteristics obtained from learning have an essential description to data, and then facilitate visualization or classification. 2) The difficulties of deep neural network in training can overcome by layer-wise pre-training. In this article, the implementation of layer-wise pre-training is achieved through unsupervised learning. Feed forward neural network or Multilayer Perceptron with multiple hidden layers in artificial neural networks is usually known as Deep Neural Networks (DNNs). Convolutional Neural Networks (CNN) is one kind of feed forward neural network. In 1960s, when Hubel and Wiesel researched the neurons used for local sensitive orientation-selective in the cat's visual system, they found the special network structure can effectively reduce the complexity of Feedback Neural Networks and then proposed Convolution Neural Network. CNN is an efficient recognition algorithm which is widely used in pattern recognition and image processing. It has many features such as simple structure, less training parameters and adaptability. It has become a hot topic in voice analysis and image recognition. Their weight shared network structures make it more similar to biological neural networks. It reduces the complexity of the network model and the number of weights. Generally, the structure of CNN includes two layers one is feature extraction layer, the input of each neuron is connected to the local receptive fields of the previous layer, and extracts the local feature.

Once the local features are extracted, the positional relationship between it and other features also will be determined. The other is feature map layer; each computing layer of the network is composed of a plurality of feature map. Every feature map is a plane, the weight of the neurons in the plane are equal. The structure of feature map uses the sigmoid function as activation function of the convolution network, which makes the feature map have shift invariance. Besides, since the neurons in the same mapping plane share weight, the number of free parameters of the network is reduced. Each convolution layer in the convolution neural network is followed by a computing layer which is

**2. BACKGROUND AND RELATED WORK**

Convolutional Neural Networks can be applied in many different areas. Yann LeCun and his team specially designed Convolutional Neural Networks to deal with the variability of 2D shapes, which are shown to outperform all other techniques.[1] Dan C and his team present a fast, fully parameterizable GPU implementation of Convolutional Neural Network variants for Image Classification. [2] Another team proposes two novel frontends for robust language identification (LID) using a convolutional neural network (CNN) trained for automatic speech recognition (ASR). [5] What's more, Convolutional Neural Networks are used in Visual Recognition [9] and many other areas, such as Facial Point Detection [6], House Numbers Digit Classification [10], and Multi-digit Number Recognition from Street View Imagery [11].

Besides these works, many teams are focusing on the speed up of ConvNets. For example, Multi-GPU Training of ConvNets. In this work, Facebook AI Group consider a standard architecture [1] trained on the Image net dataset [2] for classification and investigate methods to speed convergence by parallelizing training across multiple GPUs.[4]

**3. PRINCIPLE OF CONVELUTIONAL NEURAL NETWORK**

**3.1 Methodology**

Convolution neural network algorithm is a multilayer perceptron that is the special design for identification of two-dimensional image information. Always have more layers: input layer, convolution layer, sample layer and output layer. In addition, in deep network architecture the convolution layer and sample layer can have multiple. CNN is not as restricted Boltzmann machine, need to be before and after the layer of neurons in the adjacent layer for all connections, convolution neural network algorithms, each neuron don't need to do feel global image, just feel the local area of the image. In addition, each neuron parameter is set to the same, namely, the sharing of weights, namely each neuron with the same convolution kernels to deconvolution image.



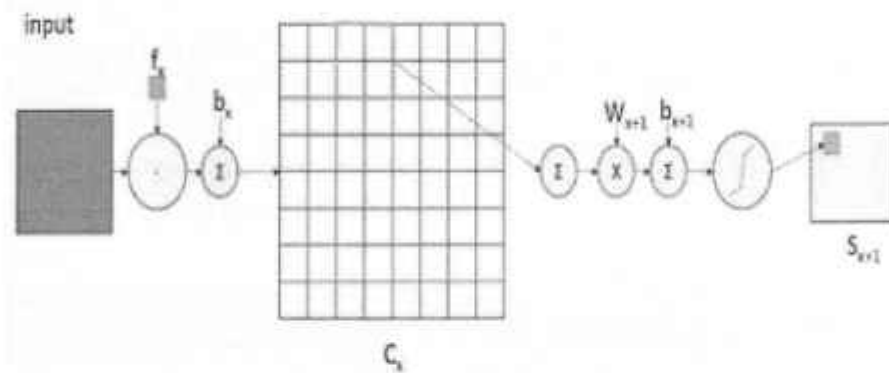
**Fig 1 fully connection vs. partial connection**



*CNN algorithm has two main processes: convolution and sampling.*

Convolution process: use a trainable filter  $f_x$ , deconvolution of the input image (the first stage is the input image, the input of the after convolution is the feature image of each layer, namely Feature Map), then add a bias  $b_x$ , we can get convolution layer  $C_x$ .

A sampling process:  $n$  pixels of each neighborhood through pooling steps, become a pixel, and then by scalar weighting  $W_{x+1}$  weighted, add bias  $b_{x+1}$ , and then by an activation function, produce a narrow  $n$  times feature map  $S_{x+1}$ .



**Fig 2 main process of CNN**

The key technology of CNN is the local receptive field, sharing of weights, sub sampling by time or space, so as to extract feature and reduce the size of the training parameters. The advantage of CNN algorithm is that to avoid the explicit feature extraction, and implicitly to learn from the training data; The same neuron weights on the surface of the feature mapping, thus network can learn parallelly, reduce the complexity of the network; Adopting sub sampling structure by time or space, can achieve some degree of robustness, scale and deformation displacement; Input information and network topology can be a very good match, It has unique advantages in speech recognition and image processing.

### 3.2 CNN Architecture Design

CNN algorithm need experience in architecture design, and need to debug unceasingly in the practical application, in order to obtain the most suitable for particular application architecture of CNN. Based on gray image as the input of  $96 \times 96$ , in the preprocess stage, turning it into  $32 \times 32$  of the size of the image. Design depth of the layer 7 convolution model: input layer, convolution layer C1, sub sampling layer S1, convolution layer C2, sampling layer S2, hidden layer H and output layer F.

Among them,  $f$  is the number of convolution cores in a feature pattern.

Output of neuron of row  $x$ , column  $y$  in the  $l^{\text{th}}$  sub sample layer and  $k^{\text{th}}$  feature pattern.

$$O_{x,y}^{(l,k)} = \tan h \left( w^{(k)} \sum_{y=0}^{sh} \sum_{c=0}^{sw} O_{(x+fh+y,y+sw+c)}^{(l-1,k)} + Bias^{(l,k)} \right) \quad (3.2)$$

The output of the  $j^{\text{th}}$  neuron in  $l^{\text{th}}$  hide layer  $H$  :

$$O_{(l,j)} = \tan h, \sum_{k=0}^{s-1} \sum_{x=0}^{sh} \sum_{y=0}^{sw} w_{(x,y)}^{(l,k)} O_{(x,y)}^{(l-1,k)} + Bias^{(l,j)} \quad (3.3)$$

Among them,  $s$  is the number of feature patterns in sample layer.

Output of the  $i^{\text{th}}$  neuron  $l^{\text{th}}$  output layer  $F$

$$O_{(l,i)} = \tan h, \sum_{j=0}^H O_{(l-1,j)} W_{(l,i)}^j + Bias^{(l,i)} \quad (3.4)$$

### 3.1.2 Back propagation

Output deviation of the  $k^{\text{th}}$  neuron in output layer  $O$  :

$$\delta(O_k^o) = y_k - t_k \quad (3.5)$$

Input deviation of the  $k^{\text{th}}$  neuron in output layer:

$$\delta(I_k^o) = (y_k - t_k) \phi'(y_k) = \phi'(y_k) \delta(O_k^o) \quad (3.6)$$

Weight and bias variation of  $k^{\text{th}}$  neuron in output  $O$  :

$$\Delta W_{i,k}^o = \delta(I_k^o) y_{i,k} \quad (3.7)$$

$$\Delta Bias_{i,k}^o = \delta(I_k^o) \quad (3.8)$$

Output bias of  $k^{\text{th}}$  neuron in hide layer  $H$  :

4 EXPERIMENTS

4.1 Setups

Table 1 setups of the experiment

|                         |                                   |
|-------------------------|-----------------------------------|
| CPU                     | Intel Core i5-3570 CPU3.40GHz × 4 |
| The number of CPU cores | 4                                 |
| Memory Size             | 4GB                               |
| Operation System        | Ubuntu 14.10                      |

4.2 Parallel Strategy and Parallel Efficiency

This analysis is based on a hypothesis that both serial and parallel method have the same number of training in serial realization method, the total execution time is N times of the sum of t1 and t2.

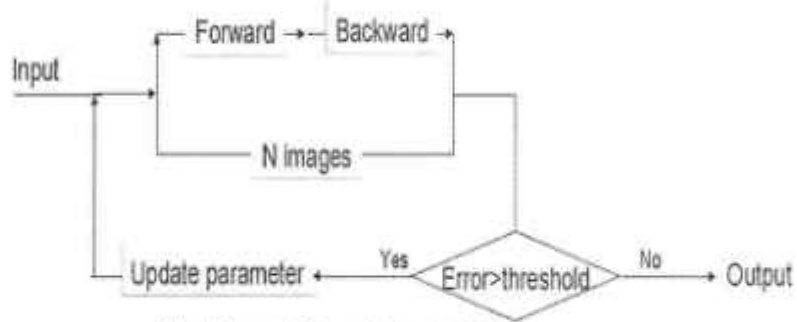


Fig 4 the serial algorithm of training

Time of serial execution:  $(t_1 + t_2) \times N + t_3 = t_{total}$

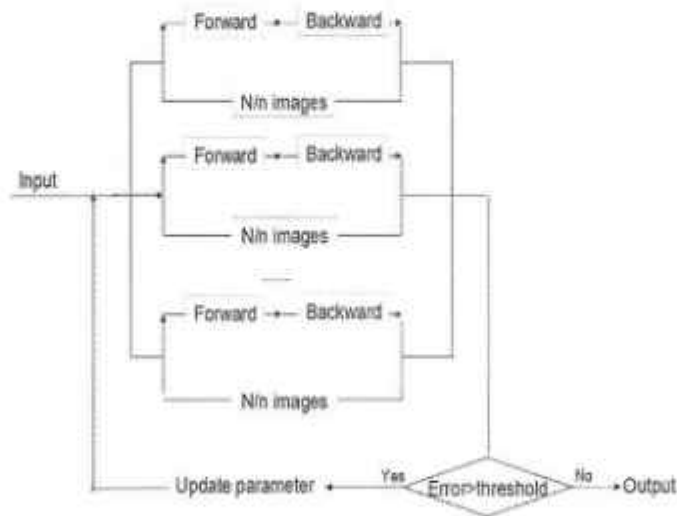


Fig 5 the parallel strategy

|            | 1       | 2     | 3     | 4  | 5     | 6     | 7     | 8     | 9     | 10    | 11    |
|------------|---------|-------|-------|----|-------|-------|-------|-------|-------|-------|-------|
| Result     | yes     | yes   | yes   | no | yes   | no    | yes   | yes   | yes   | yes   | yes   |
| time/ms    | 11642   | 23163 | 11615 |    | 11794 | 11715 | 11966 | 11687 | 11633 | 11892 | 11636 |
| average/ms | 12874.3 |       |       |    |       |       |       |       |       |       |       |

**Table II time consumed by the algorithm**

#### 4.4 Theoretically Analysis of the Maximal Speedup

By measuring the time overhead of training, especially the average time of  $t_1$ ,  $t_2$  and  $t_3$ , the maximal speedup and speed-up efficiency are listed below:

Time of serial execution: 5317.000000

Time of parallel execution: 2665.000000

Speed-up ratio : 1.995122

Speed-up efficiency : 0.997561

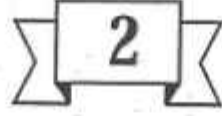
## 5 CONCLUSION

In this work, we accomplish face recognition by using deep learning algorithm. We mainly apply the algorithm of convolution neural network to excavate the deep information of multi-layer network in the process of face recognition. And we also utilize the algorithm to make parallel computing on the cloud platform for accelerating the process of face recognition, analyzing theoretical acceleration ratio, and experimental verification. Experimental results show that we have achieved good results. Of course, the parallelism we do is coarse-grained, and there are still many modules that can be fine-grained in the algorithm. This will be the focus for us in the future to continue to improve the work.

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तेविसावी

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पुरुष कर्तृत्वाचे योगदान

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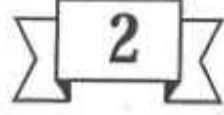
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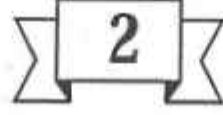


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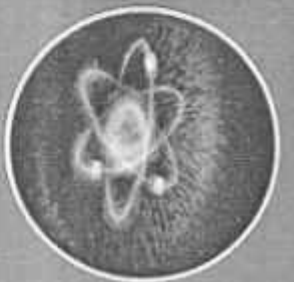
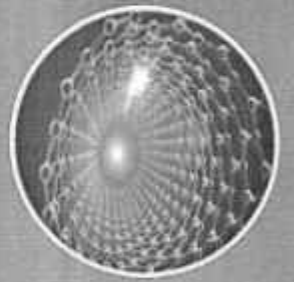
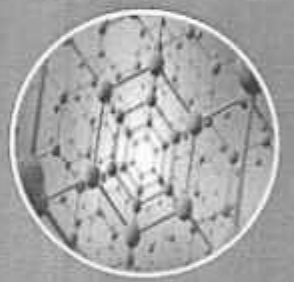
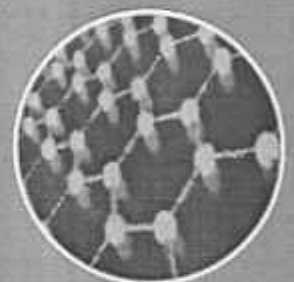
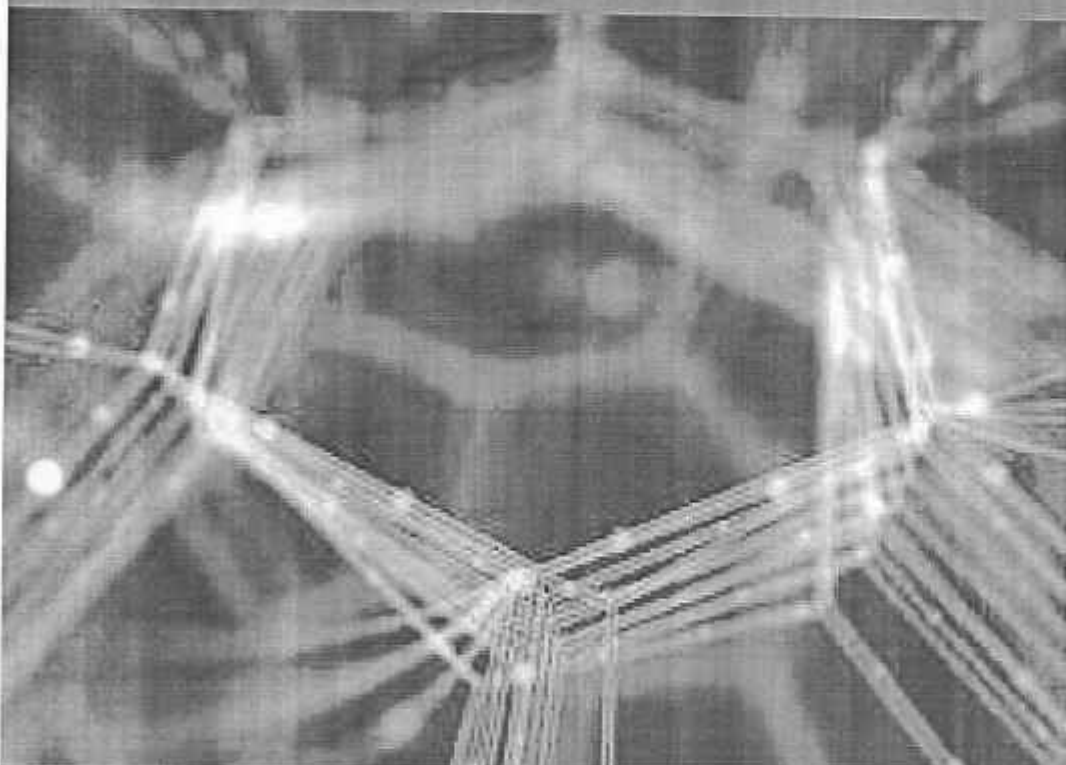




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**Recent Advances in Fabrication Technology of  
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## Recent Advances in Electrospun Composite Nanofibers for Energy Storage in high performance Supercapacitors

V. A. Nimat<sup>1</sup>, J. B. Thorat<sup>1</sup>, N. S. Harale<sup>1\*</sup>

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### KEYWORDS

Electrospinning,  
 Supercapacitor,  
 1D Nanofibers,  
 Energy storage.

### ABSTRACT

The development of electrochemical energy storage has been spurred by the ongoing need for sustainable and clean energy as well as the depletion of fossil fuels. Nanomaterials are characterized by their particle size measured in nanoscale. Supercapacitors (SCs) are efficient electrochemical energy storage devices with a wide range of uses. The performance of these devices is based on the makeup and arrangement of the electrodes. Effective supercapacitive materials are those made of carbon-based compounds and transition metal oxides. Electrospinning has been utilised to create planned one-dimensional structure with specific components for cutting-edge energy storage devices since it is a practical and affordable technique. The ability to produce and electro spin inorganic materials, particularly metal oxides, to improve conducting and ceramic characteristics, is extremely advantageous for energy storage. In this work, an overview of the recent progress and applications of hybrid supercapacitors that utilize activated carbon derived nanofibers, along with transitional metal oxides, as electrode materials is presented. This article also summarizes the performance of SCs electrospinning 1D nanofibers for energy storage in supercapacitor.

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### 1. Introduction

The issue of energy has emerged as one of the most pressing global issues. Demand for renewable and sustainable energy storage technologies is heightened by the depletion of fossil fuel supplies, the growth of the world's population, and pollution from mining and hydrocarbon use [1]. To achieve highly efficient utilization of energy storage by using multiple renewable energy sources for storage and employing nanomaterials, it is crucial to create high-performance supercapacitor. Nanomaterials are substances with nanoscale dimensions in which surface or interface characteristics predominate over bulk characteristics [2]. Due to their high surface-to-volume ratio and short ion and electron transit lengths, which result in improved intercalation kinetics, nanomaterials and their composites are regarded as optimal candidates to enhance the electrochemical activity of electrode materials [3]. Supercapacitors receive a lot of attention because of their superior qualities compared to batteries, including quick charging and discharging, high power density, exceptional cycle stability, and minimal maintenance costs. Since H. I. Becker of General Electric Company received a patent for them in 1957, supercapacitors have been the most widely used kind of energy storage. The patent made the first mention of porous carbon's capacity to store charge in an aqueous electrolyte. The energy storage of porous carbon supercapacitors took place at the interface between the electrode and the electrolyte, as confirmed in the 1960s by the Standard Oil Company of Ohio (SOHIO) and in 1970, they created the first supercapacitor for commercial use utilizing porous carbon as the electrode material [4]. The creation of 1D nanostructures has been researched using a variety of techniques, including solvothermal or hydrothermal synthesis, self-assembly, solution growth, chemical vapor deposition, template-directed

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## Electrochemical Supercapacitor Performance of Electro spun Nanofibers

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### KEYWORDS

Electrospinning  
 Nanofibers,  
 Energy storage,  
 Metal oxide,  
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 Conducting polymers.

### ABSTRACT

The rapid development of electric appliances and vehicles has increased the demand for energy storage systems, and this desire has sparked researchers on the next generation of high-performance, high-density energy storage devices. Future energy sustainability is currently being assured by new opportunities and solutions made possible by nanotechnology. The synthesis of metal oxides and sophisticated functional nanofibers can be done on a wide scale using one of these techniques, electrospinning, which is particularly straightforward and affordable. Particular attention is given to nanofibers in this work that have good electrochemical characteristics. Due to the intriguing confinement effects and structure-related features, one-dimensional (1D) nanostructures including nanofibers, nanorods, and nanotubes have garnered a great deal of attention. Because of their large surface areas, porosities, and quick charge transport, metal oxides with 1D nanostructures are particularly recognized as promising candidates in the applications of energy conversion and storage devices. The synthesis of pure metal oxides via electrospinning and their use in energy storage make up the three main components of this research.

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### 1. Introduction

Rapid population expansion and technological advancements have led to an enormous increase in the usage of fossil fuels, which not only depletes available resources but also has a negative influence on the sustainable development of world economics and ecology. Renewable energy sources are regarded to be the worthiest replacement for fossil fuel in the coming days because they are environmentally friendly and sustainable [1]. Science and technology specialists have been grappling with the problem of converting this enormous energy into electrical power for an extremely long time. Photovoltaic cells, Li-ion batteries, supercapacitors, and fuel cells are today the most efficient clean alternative energy sources [2]. The ease and sustainability of human progress in the wide spreading use of Electric vehicles (EV), flexible wearable electronic devices depend on both primary and rechargeable batteries, which can produce clean electric energy from the stored chemical energy and transform chemical energy back into electric energy. More researchers will focus on supercapacitors because of their high-power density, which efficiently satisfies people's desire for a fast-paced lifestyle [3]. Because there is a significant association between the forms, sizes, and morphology of nanomaterials and their physical/chemical properties, scientists are striving to optimize these parameters. This also suggests more stringent specifications for energy storage technologies, going beyond those that only stores energy and then deliver energy when required.

As supercapacitors operate as a bridge between batteries and electrochemical capacitors in terms of electrochemical characteristics, they are a possible alternative to batteries [4]. Nanomaterials offer significantly better ionic transport and electrical conductivity to supercapacitor. They also make it possible for all intercalation sites in the particle volume to be occupied, which results in high specific

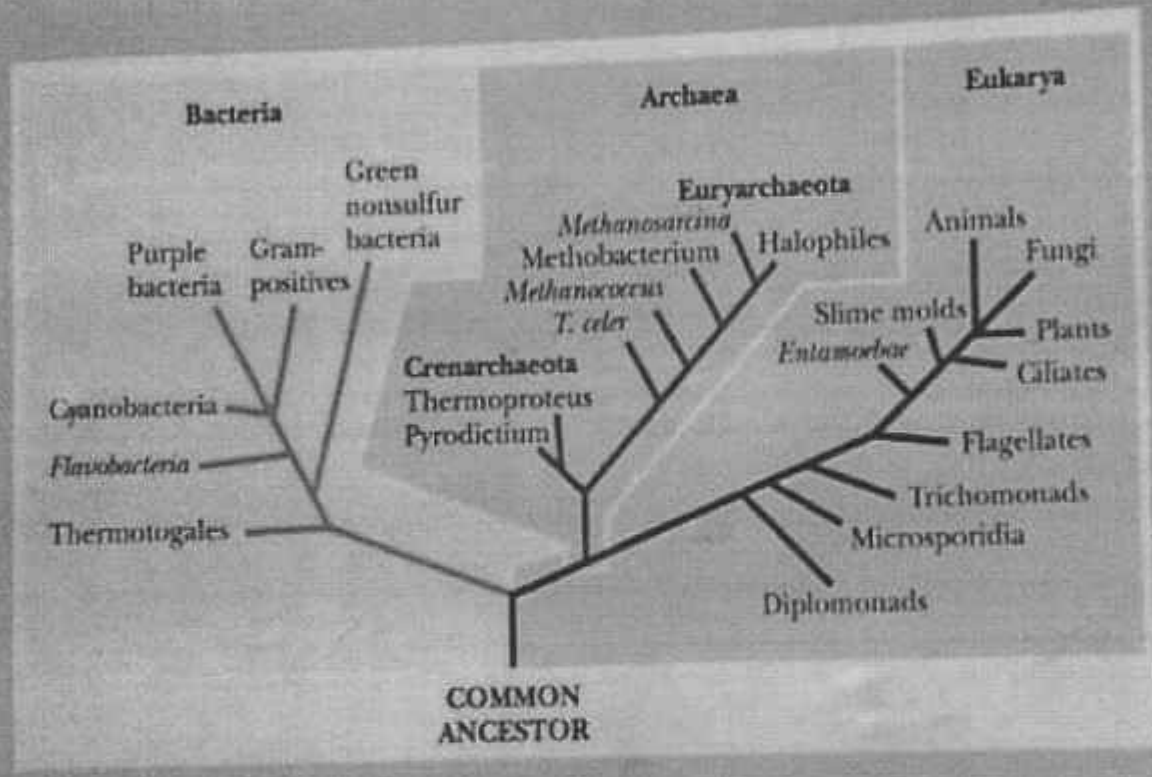
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# Text book of Microbial Systematics

Applicable to all Universities/Other Equivalent Organizations and National Education Policy (NEP) 2020



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 Soniya Sunil Dhole  
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A text book on  
**Microbial Systematics**

Applicable to all Universities/other equivalent institutions  
and National Education Policy (NEP) 2020

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|   |  |                                   |
|---|--|-----------------------------------|
| 4 | <p><b>Credit IV</b></p> <p><b>Evolution</b></p> <p>1. History and development of evolutionary theory (Lamarckism, Darwinism), Neo Darwinism: Spontaneous mutation controversy, evolution of rates of mutation, types of selection, levels of selection, group selection and selfish gene.</p> <p>2. Socio-biology, kin selection, evolutionary stability of cooperation, sociality and multi-cellularity in microorganisms, Game theory. Co-evolutionary strategies, host parasite co-evolution</p> <p>3. Molecular evolution: origin of life, the origin of new genes and proteins ageing, evolutionary trade-offs, <i>r</i> and <i>k</i> selection</p> | <p>Dr. Arati Prabhakar Kamble</p> |
|   | <p><b>Question Bank</b></p>  | <p>Soniya<br/>Sunil<br/>Dhole</p> |



selection

Author: Dr. Arati Prabhakar Kamble

### 1. History and Development of Evolutionary Theory (Lamarckism, Darwinism)

The word "evolution" derives from the Latin evolution. Evolution development in the sciences of life, changes in the heritable traits of a population of organisms, diversification and origin of new species, or development, or growth of the organism. Evolution takes place at the level of the species. Evolution is the process by which the inherited traits of biological populations change over successive generations (Hall *et al.*, 2008).

Certain features gradually start to become more or less widespread within a population as a result of evolutionary processes like natural selection (including sexual selection) and genetic drift (Scott-Phillips, *et al.*, 2014). The theory of evolution by natural selection was conceived independently by Charles Darwin and Alfred Russel Wallace in the mid-19th century and was set out in detail in Darwin's book *On the Origin of Species* (Darwin, Charles 1859).

**Lamarckism** – Jean-Baptiste Lamarck (1744-1829) French naturalist, Biologists proposed the theory of evolution which was based on the principle that acquired characteristics are transmitted from parent to their offspring. This theory is also known as the use and disuse of organs or the theory of inheritance of acquired characteristics. In 1809 Lamarck proposed the theory of inheritance of acquired characteristics which is based on the following hypotheses;

1. Through the use and abuse of body parts, organisms develop their qualities.
2. Parents pass on acquired traits to their children.

Lamarckism explained how new organs and new habits arise when there is a change in the environment and which modifies the organ or

Pradeep Verma *Editor*

# Industrial Microbiology and Biotechnology

Emerging concepts in Microbial  
Technology



# Reuterin: A Broad Spectrum Antimicrobial Agent and Its Applications

# 20

Kiran S. Dalal, Sandip P. Patil, Girish B. Pendharkar, Dipak S. Dalal, and Bhushan L. Chaudhari

## Abstract

Probiotic bacteria play a vital role in living animals including human health by helping in the digestion of foods and boosting the immune system. Hence, microbes with better properties are of interest. Some probiotic bacteria produce specific substances that can inhibit or inactivate other organisms which compete for nutrients and space. The  $\beta$ -hydroxypropionaldehyde (3-HPA) known as reuterin is produced by *Lactobacillus reuteri*. It has broad antimicrobial activity against potentially harmful microorganisms without adversely affecting the beneficial gut flora. Its production occurs under the anaerobic condition where the enzyme glycerol dehydratase facilitates the conversion of glycerol to reuterin by removing water molecules. The structure of reuterin contains both hydroxy and aldehyde functional groups. Reuterin is a low molecular weight water-soluble compound resilient to proteolytic and lipolytic enzymes, and remains active at a varied pH and hence finds applications in industries. This chapter focuses on reuterin production, stability, antimicrobial activity, and its applications.

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