



**SHRI DNYANESHWAR MASKUJI  
BURUNGALSCIENCEANDARTSCOLLEGE,  
SHEGAON-444203, Dist. Buldana**

*(Affiliated to Sant Gadge Baba Amravati University, Amravati)*

*(Accredited by NAAC with B<sup>+</sup> Grade with CGPA 2.65)*



**Criterion- III**

**RESEARCH INNOVATIONS AND EXTENSION**

**3.3.2: Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years**



Late Reverend Father Shri, Maskuji Biruji Burungale Education Society, Shegaon (R.No. F-422)

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No.:SDMBCS/NAAC/IQAC/AQAR/2021-22/3343

Date:30/12/2022

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This is to declare that, the information, reports, true copies of the Supporting documents, numerical data, and weblinks etc. furnished in this file are verified by IQAC and the head of the institution and found correct.

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3.3.2: Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years

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3.3.2.1: Total number of books and chapters in edited volumes/books published and papers in national/ international conference proceedings year wise during last five years

| 2021-22 | 2020-21 | 2019-20 | 2018-19 | 2017-18 |
|---------|---------|---------|---------|---------|
| 4       | 6       | 1       | 6       | 2       |

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| Acad Year | SN | Name of the teacher | Title of the book/chapters published  | Title of the paper                                                                             | Title of the proceedings of                               | Name of the conference                                                                            | National / International | Year of publication | ISBN number of the proceedings | Affiliating Institute at the |
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| 20-21     | 1  | Dr.R.K. Javanjal    | NCMR21-<br>Peer reviewed book chapter | Role of Academic Libraries in the human resources development of Information technology        | NCMR21-<br>Peer reviewed book chapter                     | National conference on multidisciplinary research NCMR2021                                        | National                 | Mar-21              | 978-81-95551-4-9               | YES                          |
| 20-21     | 2  | Mr Y.P. Wayal       | NCMR21-<br>Peer reviewed book chapter | Study of Interaction of lightwidth concentration of ligends in various media by refractrometry | NCMR21-<br>Peer reviewed book chapter                     | National conference on multidisciplinary research NCMR-2022                                       | National                 | Mar-21              | 978-81-95551-4-9               | YES                          |
| 20-21     | 3  | DR.R.J. Deshmukh    | NCMR21-<br>Peer reviewed book chapter | Synthesis & Characterisation of s-hepta-o-benzonil lactosyl-1-aryldithi carbamates             | NCMR21-<br>Peer reviewed book chapter                     | National conference on multidisciplinary research NCMR-2023                                       | National                 | Mar-21              | 978-81-95551-4-9               | YES                          |
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| 20-21     | 6  | Mr. V.V. Agarkar    |                                       | An Overview of Technique used for Information Extraction from Scientific Documents             | ICAPCM 2020 SOUVENIR                                      | International Conference on Advanced in Physical, Chemical & Mathematical Science (Abstract only) | international            | 2020                |                                | YES                          |
| 17-18     | 2  | Dr. R K Javanjal    |                                       | From card catalogue to web OPAC                                                                | Maharashtra university and college librarians association | Revamping of academic libraries for new generation Vol-I                                          | National                 | 2018                |                                | YES                          |

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# The Role Of Information Communication Technology New Invention And Development In the Library.

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**M.Sc.II Semester III Practical VI  
(Immunology and Medical Microbiology)**

*Practical Handbook*

*As per Syllabus by Sant Gadge Baba Amravati University, Amravati*



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### Introduction

Dear students, there are several experiments in Microbiology which are based on theoretical aspects. Basic knowledge of laboratory work is important for designing future research plans. It is very crucial for the students that they should learn research skills. However, there are some difficulties that are observed in the minds of students during a scientific demonstration of the practical courses due to a lack of detailed protocols. As a result, we have made sincere efforts to solve the problem in question through this book and provided not only up to date basic information but also experiments based on theoretical knowledge. This book has been written specifically as per the updated syllabus of Sant Gadge Baba Amaravati University, Amaravati. In general, we are sure that the book will be valuable for students to get up the mark in scientific knowledge.

### CERTIFICATE

This is to certify that Mr./Mrs./Dr./Miss -----

----- has successfully completed the practical course entitled -----

-----on-----

Signature of  
Course Teacher/  
Internal Examiner

Signature of  
Head of Department

Signature of  
External Examiner



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## Experiment No. 1

### Isolation of Pathogen from Urine Samples

**Aim:-** To isolate the pathogen from the urine sample

**a) Collection:-**

The sample should be fresh and evaluated quickly. Since urine is a good growth medium, the reaction at ambient temperature may alter the pH (from acidic to alkaline). The specimen must be delivered within 1–2 minutes; otherwise, organisms present in the specimen may proliferate, and the quantitative test result will be inaccurate. The midstream of a urine sample is collected in a sterile container.

**b) Laboratory Procedure:-**

**i) Microscopic Examination:-**

The 5 ml specimen is centrifuged at 300 rpm for 5 min, and the deposit is resuspended in a small amount of supernatant. After the large part of the supernatant has been decanted, a wet film is made from the resuspended deposit and examined for the presence of bacteria, pus cells, and RBCs.

**ii) Cultivation:-**

The suspended deposit is used for inoculation on MacConkey Agar or Blood Agar plates for Gram positive and also inoculates on BP agar. These plates are incubated in an incubator at 37°C for a time period of 24 hrs. Organism identification is made by different tests such as cultural, morphological, and biochemical characteristics.

**Observation:-**

Observe the MacConkey's agar and Blood agar plates for the presence of typical colonies of the suspected pathogens.

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**M.Sc.II Semester III Practical VII  
(Applied Microbiology and Biotechnology)  
Practical Handbook**

*As per Syllabus by Sant Gadge Baba Amravati University, Amravati*



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# **M.Sc. II Semester-III Practical-VII (Applied Microbiology and Biotechnology)**

## ***Practical Handbook***

*As per the syllabus of Sant Gadge Baba Amaravati, University,*

*Amaravati*

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### Introduction

Dear students, some investigations in Microbiology are theoretical in nature. Basic laboratory expertise is necessary for developing future research goals. It is critical for pupils to develop research abilities. However, owing to a lack of defined procedures, several challenges are seen in the minds of students during a scientific manifestation of the practical courses. As a consequence, we have made earnest attempts to resolve the issue at hand via this book, including not only current fundamental information but also experiments grounded in theoretical understanding. This book has been developed exclusively for the Sant Gadge Baba Amaravati University's new curriculum. In summary, we are certain that the book will be useful to learners seeking to improve their scientific understanding.

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## CERTIFICATE

This is to certify that Mr./Mrs./Dr./Miss -----  
----- has successfully completed the practical course entitled -----  
-----on -----

Signature of  
Course Teacher/  
Internal Examiner

Signature of  
Head of Department

Signature of  
External Examiner



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## **Experiment No. 1**

### **Title: Agarose Gel Electrophoresis**

### **Aim: To Study Agarose Gel Electrophoresis**

#### **Introduction:**

Agarose gel electrophoresis is a powerful method for the separation of DNA, RNA, or proteins based on molecular weight and electric charge. It is a common experiment carried out in domain of molecular biology, biochemistry, and genetics. Natural Agarose polymer is extracted from seaweed. On heating agarose in buffer, hydrogen bonding causes formation of porous matrix on gradual cooling.

Electrophoresis technique used to separate charged molecules in agarose or acrylamide gel. DNA is a negatively charged biomolecule at a neutral pH. When an electric current is applied transversely in the gel, the charged DNA is electrophoresed towards a positive (+ve) end (the anode). The speed of migration of DNA through the gel is relative to molecular size, where smaller fragments move more quickly than large size DNA fragments. Other prominent factors affecting the migration of charged molecules inside the matrix are agarose concentration, conformation of DNA, and applied current/ voltage. The movement is monitored by observing the migration of a visible loading dye transversing through the gel. Commonly used dyes are Xylencyanol and Bromophenol blue, which migrate at a similar speed as double-stranded fragment DNA. These track dyes are -ve charged, low molecular weight compounds that are placed beside each sample at the starting point. As the tracking dye reaches towards the anode, a run is terminated.

Various buffers have been suggested for DNA electrophoresis. Tris-acetate EDTA and Tris-borate EDTA are the most often used buffers. The TAE is the most often used technique because its efficiency and resolution. Due to the variation in ionic strengths between these two buffers, DNA migrates at a different pace. Buffers are critical for pH maintenance and also provide ions to enhance conductivity.

Due to the fact that DNA is inherently colourless, it is generally not visible on the gel. As a result, the gel is stained with a dye after electrophoresis. When sufficient DNA material is present to interact with the dye, a distinct band is detected. Contrasting dark-colored DNA bands in colourless gel is conspicuously visible. An intercalating dye called

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**M.Sc.I Semester II Practical III  
(Environmental Microbiology and Biodiversity)  
Practical Handbook**

*As per Syllabus by Sant Gadge Baba Amravati University, Amravati*

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# **Environmental Microbiology and Biodiversity**

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**M. Sc. I Semester-II Practical-III**

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International Journals and presented 97 research papers in National and International Conferences, Seminars, and Symposia. He is on the mailing list of WHO and WEDC, London. Submitted scientific suggestions to the Committee of Public Accounts, Parliament of India on the “Cleanliness and Sanitation in Indian Railways” to improve sanitation and related infrastructure in Railways. He was nominated as an awardee for Environmentalist of the Year 2018 by the National Environmental Science Academy, New Delhi. Work as Resource Person in Sanitation Hygiene Campaign for Zilla Parishad, Buldana during, International Sanitation Year – 2008, a worldwide activity of World Health Organization. He has 36 years of teaching experience and 03 years as a Principal. He was a member of the Board of Studies in Microbiology, Faculty of Science and RRC Sant Gadge Baba Amravati University, Amravati.



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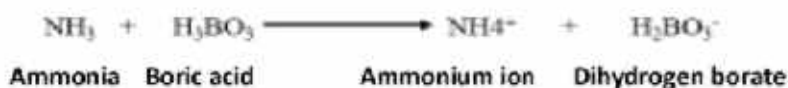


## SECTION I:

### 1. Title: Examination and estimation of water for Ammoniacal Nitrogen

**Aim:** - To estimate the given water for Ammoniacal Nitrogen

**Principle:** - This method consists of two procedures for determining ammonia and biological nitrogen i.e., the first one, the concentration of ammonia from taster into a boric acid solution, and the second one is, titration of ammonia in contrast to a standard sulphuric acid solution. The residue is utilized to determine organic nitrogen after the ammonia has been extracted from the sample. When heated in the presence of sulphuric acid, nitrogen in several biological classes is transformed into ammonium sulfate. To elevate the boiling point of sulphuric acid up to 370° C, two catalysts such as potassium sulfate and copper sulfate are used. Carbon dioxide is produced when organic matter is oxidized. After the ammonia from organic nitrogen has been free, it is purified and the results are calculated as described above. The pH of the sample or processed fluid is elevated to 9.5 before distillation in both situations to induce the creation of ammonia, which can remain purified using haze.



The condensed ammonia is engrossed in boric acid. Back titration is performed with a strong standard acid to determine that the ammonia reacts with boric acid.

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**Academic Year 2020-21**

## Role Of Academic Libraries In the Human Resource Development Of Information Technology

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Dist- Buldana

### Abstract:

This paper reviews about to show a critical view of changing role of academic libraries in the HRD and ICT environment. HRD and ICT have an importance part of all libraries operations and information services. ICT is a driving factor in the process of globalization in new digital era. The management of library human resources is an essential part of how a library is going to attain its targets. The alignment of human resources management implies to integrate decisions about workforce with decision about the outcomes an organization is trying to achieve. When these areas are well planned and successfully implemented, they lead towards the accomplishment of library's mission with the help of right people with right skills and in the right positions. The main objectives of this paper to appraise the prevailing status of Human Resource Management libraries, how it effects on the process of strategic management, Development of IT projects and library services.

**Keywords:** Human Resource Development, Information Technology

### Introduction:

Development of nation is solely dependent on the management of the human resources present in the nation. If this human resource is not coped properly then it is of no use for the nation. One of the fundamental primal matters for the better advancement of the society is civilised human being. HRD is organization, academic library professional staff development and new ICT concept training is the prominent fragment of the immense human resource development. HRD plays the significant role in the chrysalis of the library. HRD is amalgamation of management and operative functions. Any organization's success is solely dependent on the influence of human resource development as training of the employee's plays noteworthy role in its effective development.

### Human Resource Development (HRD):

Human Resource is a collective term for all the people employed by an organization, agency, or institution. Also, the administrative department is responsible for matters pertaining to employment (hiring, evaluation, promotion, termination, etc.). A formal definition of personnel / HRM is that, it is a function performed in organizations that facilitate the most effective use of employee to achieve organizational i.e. Library and Information centres and individuals goals. Large independent libraries and Library system have their own human resources office. Libraries that function as a unit within a larger organization may rely on the parent organization for such services. Human Resource Development (HRD) is a process of raising productive potentialities of manpower resources in terms of knowledge, skills and capabilities through appropriate mechanisms such as education & training, counselling, career planning, performance or self-appraisals, awards or rewards etc. among all these, education and training play a vital role in strengthening both

academic and professional capabilities of human resource to meet the goals of an organization. This is also true in case of Library and information profession to develop appropriate human resources to work in different types of libraries / information and documentation centres and in different environment as well.

#### **Activities of HRD:**

It comprises the number of activities. They are as follows:

- Equal employment opportunity programs
- Task analysis
- Human Resource Planning (HRP)
- Employee Retirement, selection and orientation
- Career development & counselling, performance evaluation and training & development; n Compensation and benefit
- Safety and health
- Employee relation
- Discipline and control
- Quality of work

#### **Need for Human Resource Development in Academic Libraries:**

Human Resource Development is required to cultivate proficiencies: 1. it is almost impossible for the organization to survive, to make a mark, on the society if their staffs are not proficient with the prerequisite understanding, abilities and approach. 2. The prime aim of the For-profit organization is to expand, evolve and develop their work such that they minimize the cost and delays while maximize the quality and customers satisfaction. 3. Human resource development need is whereas traditional human resource development methods have their relevance and usefulness. 4. Human programmers bring about an organization-wide alteration which is envisaged in the thought of human resource development. Functions of Human Resource Development in Academic Libraries.

#### **The most frequently used HRD mechanisms are:**

Training: Improving the library professional staff ICT based knowledge, skills and attitudes changing training are following:

- Library Professional Staff is Orientation and refresher course training provided.
- Skills and technical training
- Coaching
- Library Management training
- Library Supervisor development training

#### **Information Technology (IT):**

The term 'Information Technology' in English, 'Informatique' in French, 'Informa tika' in Russian encompasses the notion of Information handling in other words, Electronic Technologies for collecting, storing, processing and communicating information. There are two main categories: those that process information, such as computer system and those that disseminate information such as telecommunication system. The term can generally be understood to describe system that combines both, but nowadays the more

accurate Information and Communication Technology (ICT) is more commonly used. Information Technology IT has three unique properties such as

- The growth of Information (and technology) is irreversible. It is possible for us to forget something and ignore others. But once something becomes known, it is almost impossible to make it unknown. Similarly, once something has been invented one can't uninvent it.
- The growth of information and technology is exponential; the more is known the more is invented, the easier it is to know still more, and invent still more.
- There is no faceable upper limit to the growth of knowledge or inventions.

#### **Impact of New Technology on Academic Libraries:**

Changes in information communication technology have generated corresponding changes in society, higher education and academic libraries as follows.

- Shift from paper based resources to electronic one,
- Shift from acquisition to accessing the resources.
- Media convergence in ICT resources.
- Knowledge about web page designing and e-books, e-journals in essentials.
- Library users demands for access facilities in his place at his desktop.
- Growing importance of consortia agreements for e-journal subscription.
- Provision of resource sharing to overcome budgetary constraint.
- Maintaining of Internet, LAN, and WAN Facilities with faster access, getting access.

#### **Role of Academic Libraries:**

The new technology as we have been made greater impact on the structure, functioning and services of academic libraries. Library service is no more confined to the four walls of the library. Printing material documents are supplanted by electronic and digital resources. In the new environment user-librarian interaction is reduced to the minimum. Users are adapted to the use of electronic sources of information. Library may at most become an intermediary in the information transfer chain. In future users can have direct access to the source and the library may conveniently be bypassed. It is in this context librarian having to re-orient their services to provide easy access and conserve the time of research potential. Users need not commute to the library for information. Library of the future will be a reprocessing centre where information is gathered, processed, packaged in a suitable way so that the packet contains information tailored to the needs of the users.

#### **Conclusion:**

HRD mechanisms should lead to the generation of IIR processes like role clarity, performance planning, development climate, risk. Taking and dynamism in library staff. Such and HRD process should result in developing more competent, satisfied and committed people, who, by their contribution would make the organization, grow. Such HRD outcome influence organizational effectiveness. Information communication technology is not a technology but also it manages with library objectives with the adoption of ICT, libraries can face the new information techniques. ICT has generally affected the information environment. The Librarians have to skilful awareness regarding the management of information. Due to skill up gradation among the library professional's library render the best service and give the more satisfaction of the library customers.

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## Studies Of Interaction Of Light with Different Concentration Of Ligands In Various Media By Refractrometry.

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### ABSTRACT

The additive properties such as Refractive index, Molar polarizability and molar refractivities of some heterocyclic drugs such as **Chlorothalidon** -2-chloro-5-(1-hydroxy-3-oxo-1,2-dihydroisoindol-1-yl)-benzenesulfonamide.. **Doxycycline** i.e. 4-(dimethyl amino) 1,4,4a,5,5a,6,11,12a octahydro 3,6,10,12,12a Pentahydroxyl-1,11-dioxo naphthacence-2-carboxamide .have been studied in DMSO, DMF and THF media at  $27 \pm 0.1^\circ\text{C}$  temperature and concentration.

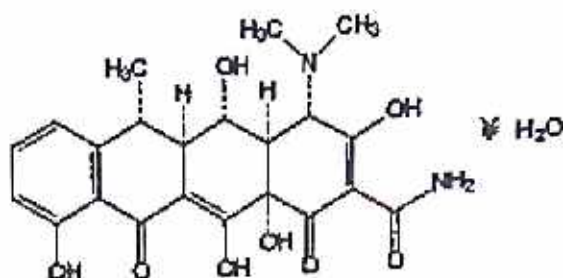
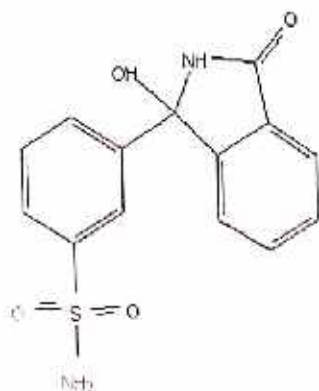
The values of molar refractivity(R) and molar polarizability ( $\alpha$ ) are found to be decreased with decreasing the concentration of solute.

**Key words:** Additive property, Doxycycline

### INTRODUCTION-

Refractive index is one of the important additives properties of liquid. When a ray of light passes from one medium to another, it suffers to refraction, that is a change of direction. If it passes from less dense to more dense medium, it is reflected towards the normal to form angle of refraction (r) which is less then angle incidence (i).The refractive index is the ratio of the velocity of light in vacuum to that in the medium and it depends upon the temperature and wave length of light. The properties of liquid such as refractive index, viscosity and ultrasonic velocity of binary mixtures are studied by many workers<sup>1-3</sup>. Mahajan<sup>4</sup> has studied molar refraction and polarizability constant of 2-amino-5-chloro benzene sulphonic acid in different percentage of dioxane-water mixture. Burghate<sup>5</sup> and Agrawal<sup>6</sup> studied the refractive indices in mixed solvents. Oswalet al<sup>7</sup> have studied dielectric constants and refractive indices of binary mixtures. Ikhe<sup>8</sup> has studies molar refraction and polarisability constant of pyrazoles and isoxazoles in different percentage of dioxane-water mixtures. Meshram et al<sup>36</sup> studied the molar refraction and polarizability constant of Al(III), Ce(III) and Fe(III) complexes with some substituted isoxazolines, pyrazole and pyrazolinerefractometrically.

However study of molar refractivity and molar polarizability constant of novel compounds such as **Chlorothalidon**-2-chloro-5-(1-hydroxy-3-oxo-1,2-dihydroisoindol-1-yl)-benzenesulfonamide and **Idoquinol** -5,7 di-iodo-8 – quinolinol in non aqueous solvent such as THF,DMF and DMSO under identical set of experimental conditions which could cover manifold aspect of solute-solvent interaction is scanty.



**Chlorothalidon Doxycycline** Therefore the present work is undertaken to make the systematic study of above novel compounds refractometrically at 27<sup>0</sup>C temperature.

#### EXPERIMENTAL:

Above novel compound are extensively used as drugs in pharmaceutical. These compounds provide the photographic material with good storage stability even at high temperature and high humidity. The compounds are synthesized by standard method and purity is checked by M.P, TLC, IR, and NMR.etc.

The solution of the compounds are prepared in different solvents (THF,DMF,DMSO etc.) by dissolving an appropriate amount by weight. All the weighing are made on MechanikiZactadyPreczyzing Gdansk balance made in Poland (±0.001gm).The accuracy of density measurements is within 0.1Kg/m<sup>-3</sup>.

The refractive index of solvent and solutions are measure at different concentrations by Abbe's refractometer having accuracy with (±0.01unit) .The temperature of prism box maintained constant by circulating water form thermostat at 27± 0.1<sup>0</sup>C.Refractometer is initially calibrated with glass piece (n=1.5220) provided with the instrument. The molar refraction of solvent and solution mixtures are determined from

$$R_m = \left( \frac{n^2 + 1}{d} \right) \frac{M}{n^2 - 1}$$

$$R_{m(solute)} = X_1 R_{m1} + X_2 R_{m2}$$

$R_m \rightarrow$  molar refraction,  $n \rightarrow$  refractive index,  $d \rightarrow$  density of solution,

$N_A \rightarrow$  Avogadro's number,  $\alpha \rightarrow$  polarizability constant,

$R_{m1}$  &  $R_{m2} \rightarrow$  molar refractivity of solvent and solute and

$X_1$  &  $X_2 \rightarrow$  mole fraction of solvent and solute in solution.

The molar refraction represents actual or true volume of the substances molecules in mole.

The molar refraction of solute can be calculated as:

$$R_m(solute) = R(mixture) - R(solvent)$$

The refractive index of solvent and solution at different concentration are measured from Abbe's refractometer and the values of molar refraction and polaribility constants are evaluated and presented in tables 1 to 4 for different systems.

Table

Molar refraction and polarizability constant for Ligand 1 (Chlorothalidon) in DMF

| Molarity (M) | R.I.   | R <sub>m</sub> (cm <sup>3</sup> mole <sup>-1</sup> ) | $\bar{\alpha} \times 10^{-23}$ cm <sup>3</sup> |
|--------------|--------|------------------------------------------------------|------------------------------------------------|
| 0.01         | 1.417  | 0.06509                                              | 0.002582                                       |
| 0.005        | 1.416  | 0.032591                                             | 0.001288                                       |
| 0.0025       | 1.414  | 0.016390                                             | 0.0006503                                      |
| 0.00125      | 1.4135 | 0.00820                                              | 0.0003252                                      |
| 0.000625     | 1.413  | 0.00408                                              | 0.0001618                                      |

Molar refraction and polarizability constant for Ligand 1 (Chlorothalidon) in THF

| Molarity (M) | R.I.  | R <sub>m</sub> (cm <sup>3</sup> mole <sup>-1</sup> ) | $\bar{\alpha} \times 10^{-23}$ cm <sup>3</sup> |
|--------------|-------|------------------------------------------------------|------------------------------------------------|
| 0.01         | 1.418 | 0.1069                                               | 0.004241                                       |
| 0.005        | 1.414 | 0.0539                                               | 0.002138                                       |
| 0.0025       | 1.413 | 0.0270                                               | 0.001071                                       |
| 0.00125      | 1.412 | 0.0136                                               | 0.000539                                       |
| 0.000625     | 1.411 | 0.00682                                              | 0.000270                                       |

Molar refraction and polarizability constant for Ligand 1 (Chlorothalidon) in DMSO

| Molarity (M) | R.I.   | R <sub>m</sub> (cm <sup>3</sup> mole <sup>-1</sup> ) | $\bar{\alpha} \times 10^{-23}$ cm <sup>3</sup> |
|--------------|--------|------------------------------------------------------|------------------------------------------------|
| 0.01         | 1.415  | 0.06800                                              | 0.002698                                       |
| 0.005        | 1.413  | 0.03427                                              | 0.001359                                       |
| 0.0025       | 1.4135 | 0.01718                                              | 0.000681                                       |
| 0.00125      | 1.412  | 0.00861                                              | 0.000341                                       |
| 0.000625     | 1.411  | 0.00431                                              | 0.000171                                       |

Molar refraction and polarizability constant for Ligand 2 (Doxycycline) in DMF

| Molarity (M) | R.I.   | R <sub>m</sub> (cm <sup>3</sup> mole <sup>-1</sup> ) | $\bar{\alpha} \times 10^{-23}$ cm <sup>3</sup> |
|--------------|--------|------------------------------------------------------|------------------------------------------------|
| 0.01         | 1.415  | 0.06261                                              | 0.002484                                       |
| 0.005        | 1.414  | 0.03140                                              | 0.001245                                       |
| 0.0025       | 1.4135 | 0.01571                                              | 0.000623                                       |
| 0.00125      | 1.413  | 0.00826                                              | 0.000327                                       |
| 0.000625     | 1.412  | 0.00415                                              | 0.000164                                       |

Molar refraction and polarizability constant for Ligand 2 (Doxycycline) in THF

| Molarity (M) | R.I.  | R <sub>m</sub> (cm <sup>3</sup> mole <sup>-1</sup> ) | $\bar{\alpha} \times 10^{-23}$ cm <sup>3</sup> |
|--------------|-------|------------------------------------------------------|------------------------------------------------|
| 0.01         | 1.468 | 0.08094                                              | 0.003118                                       |
| 0.005        | 1.467 | 0.04058                                              | 0.001563                                       |
| 0.0025       | 1.467 | 0.02003                                              | 0.0007827                                      |
| 0.00125      | 1.466 | 0.01018                                              | 0.0003940                                      |
| 0.000625     | 1.464 | 0.005201                                             | 0.00006570                                     |

**Molar refraction and polarizability constant for Ligand 2(.. Doxycycline) in DMSO**

| Molarity (M) | R.I.  | R <sub>m</sub> (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|-------|------------------------------------------------------|------------------------------------------|
| 0.01         | 1.416 | 0.08372                                              | 0.003321                                 |
| 0.005        | 1.413 | 0.04224                                              | 0.001675                                 |
| 0.0025       | 1.412 | 0.02123                                              | 0.0008423                                |
| 0.00125      | 1.411 | 0.01065                                              | 0.0004225                                |
| 0.000625     | 1.399 | 0.00545                                              | 0.000216                                 |

**Result and discussion:**

It could be seen from above tables (1 to 4) that molar refractivity and polarizability constants decrease with decreasing the concentration of solution. It is also observed that the values of R<sub>m</sub> and  $\alpha$  are found to be greater in polar solvents, THF and DMF. Polar solvents involve H-bonding, may form complex with solute and non polar solvent does not involve H-bonding and does not associate with solute. This may also be attribute to the fact that the dipole in the compound lies perpendicular to the longer axis of the molecules considerable dipole association (inter molecular attraction) takes place which would be accompanied by increase in polarizability constants ( $\alpha$ ) as well as molar refractions (R<sub>m</sub>) with increasing the concentration because of mutual compensation of the dipoles.

**ACKNOWLEDGEMENT:** Authors are thankful to the principal of D M Burungale College, Shegaon for providing necessary facilities.

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Khobragade B.G.,  
Narwade M.L. and Yaul A.R.

## Synthesis And Characterisation Of *S*-Hepta-*O*-Benzoyl Lactosyl-1-Aryldithiocarbamates

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Shri. D.M. Burungale Science and Arts College, Shegaon Dist-Buldhana.

### Abstract :-

Several *S*-hepta-*O*-benzoyl lactosyl aryldithiocarbamates have been synthesized by the interaction of hepta-*O*-benzoyl lactosyl bromide with ammonium aryldithiocarbamates. The identities of these newly synthesized compounds have been established on the basis of usual chemical transformations, IR, <sup>1</sup>H NMR and Mass spectral studies. Antimicrobial activities of these compounds were evaluated.

**Key words:-** Lactosyl bromide, Ammonium aryldithiocarbamates, Lactosyl aryldithiocarbamate.

### Introduction

*S*-lactosides are those compounds in which Lactosyl group or its derivatives are attached to the sulphur of sulphur derivatives exhibiting antifungal<sup>1</sup>, antitumor<sup>2</sup>, anticancer<sup>3</sup>, antiviral<sup>4</sup> and antimalarial activity<sup>5</sup>. Benzoyl derivatives of carbohydrate are interestingly becoming important in medicinal chemistry, industries and in many other ways<sup>6-9</sup>.

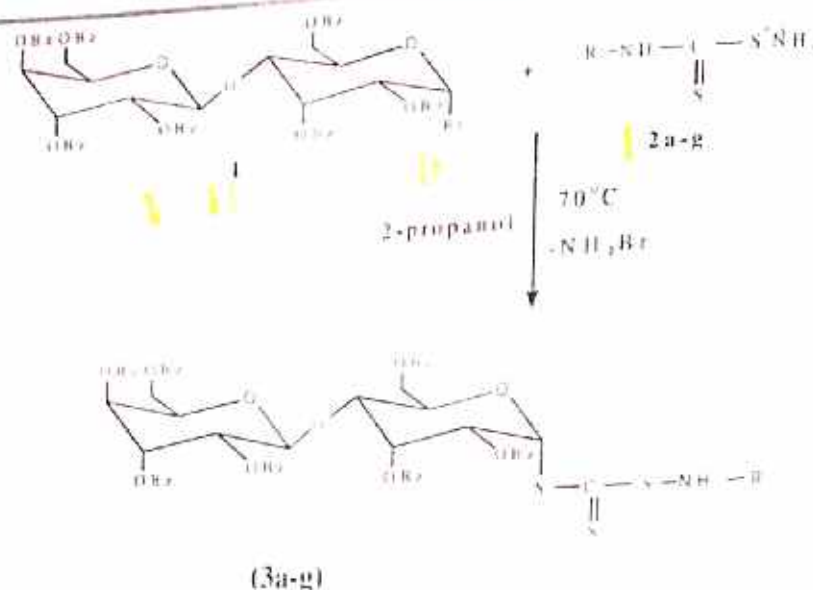
The present work deals with the synthesis of several *S*-hepta-*O*-benzoyl lactosyl aryldithiocarbamates. These were prepared by the interaction of *S*-hepta-*O*-benzoyl lactosyl bromide (1) and ammonium aryldithiocarbamates (2a-g).

### Result and discussion

Isopropanolic (40 ml) suspension of hepta-*O*-benzoyl lactosyl bromide and ammonium phenyldithiocarbamate was heated on water bath at about 70°C and kept at room temperature for 20 hrs, solid thus obtained was identified ammonium hydroxide. Clear filtrate on dilution with distilled water afforded a solid, which was purified by ethanol and water. It gave charring and was desulphurisable with alkaline plumbite. Its specific rotation was found  $[\alpha]_D^{25} -182.28$  (c, 0.980 in CHCl<sub>3</sub>).

The IR, <sup>1</sup>H NMR and mass spectral analysis<sup>10-13</sup> and elemental analysis (Table 1) clearly indicated the product and were assigned the structure as *S*-hepta-*O*-benzoyl lactosyl-1-phenyl dithiocarbamate. (3a).

When the interaction of hepta-*O*-benzoyl lactosyl bromide<sup>12</sup> was extended to other aryldithiocarbamates<sup>14</sup>, the related *S*-hepta-*O*-benzoyl lactosyl-1-aryldithiocarbamates (3b-g) were isolated.



Where, Bz =  $\text{COC}_6\text{H}_5$ .

R = a) phenyl, b) *o*-tolyl, c) *m*-tolyl, d) *p*-tolyl, e) *o*-Cl-phenyl, f) *m*-Cl-phenyl, g) *p*-Cl-phenyl.

### Experimental

All the melting points recorded are found uncorrected. IR Spectra were recorded on Perkin-Elmer spectrum RXI FTIR Spectrometer.  $^1\text{H}$  NMR was obtained on Bruker DRX-300 NMR Spectrometer. Samples were prepared in  $\text{CDCl}_3$  with TMS as an internal reference. The mass spectra were obtained on Thermo Fennigan LCQ Advantage max ion trap mass spectrometer. Optical rotations  $[\alpha]_D^{25}$  were measured on the Equip-Tronics EQ-800 Digital Polarimeter at  $31^\circ\text{C}$  in  $\text{CHCl}_3$ .

### General Procedure

#### Synthesis of S-hepta-O-benzoyl lactosyl-1-phenyldithiocarbamate (3a-g)

Isopropanolic (40 ml) suspension of S-hepta-O-benzoyl lactosyl bromide (0.01M, 11.32g) and ammonium phenyldithiocarbamate (0.01M, 1.73g) was heated on water bath at about  $70^\circ\text{C}$  until the suspension gets cleared. The clear solution was kept at room temperature for 20 hours. The solid formed was filtered off and identified as  $\text{NH}_4\text{Br}$ . The reaction mixture was mixed with 100 mL distilled water. It afforded solid (3a-g). The products were crystallized by ethanol-water. Purity was checked by TLC (Table 2).

#### Spectral data

**3a.** IR (KBr) :  $\nu$  3458  $\text{cm}^{-1}$  (N-H), 1728  $\text{cm}^{-1}$  (C=O), 2973 (C-H Ar-stretching); 1453  $\text{cm}^{-1}$  (C-N), ( characteristic of lactose unit ) and 710  $\text{cm}^{-1}$  (C-S);  $^1\text{HNMR}$  ( $\text{CDCl}_3$ ):  $\delta$  8.05- 7.18 (40 H, m, Ar-H );  $\delta$  5.79 -5.39 ( 14 H, m, lactose ring protons );  $\delta$  7.16 ( 1H, s, N-H ) MS ( $m/z$ ): 1221 ( $\text{M}^+$ ), 1100, 1053, 976, 948, 932, 918, 579. Anal. Found : C, 66.40; H, 4.72; N, 1; S, 5.84 Calcd. For  $\text{C}_{68}\text{H}_{55}\text{O}_{17}\text{NS}_2$  : C, 66.83; H, 4.5; N, 1.1; S, 5.24 %

**3b.** IR (KBr) :  $\nu$  3483  $\text{cm}^{-1}$  (N-H), 2976 (C-H Ar stretching), 1452  $\text{cm}^{-1}$  (C-N), 1271  $\text{cm}^{-1}$  (C-O), 1026 ( characteristic of lactose unit ) and 710  $\text{cm}^{-1}$  (C-S);  $^1\text{HNMR}$  ( $\text{CDCl}_3$ ):  $\delta$  8.07- 7.18 (39 H, m, Ar-H );  $\delta$  5.74 -5.43 ( 14 H, m, lactose ring protons );  $\delta$  6.1 (1H, s, N-H ). MS ( $m/z$ ): 1253 ( $\text{M}^+$ ), 1134, 1053, 976, 932, 579. Anal. Found : C, 64.88; H, 4.01; N, 1 S, 5 Calcd. for  $\text{C}_{68}\text{H}_{54}\text{O}_{17}\text{NS}_2\text{Cl}$  : C, 65.01; H, 4.37; N, 1.1; S, 5.09 %

3c. IR (KBr) :  $\nu$ 3481  $\text{cm}^{-1}$  (N-H), 2972 (C-H Ar stretching); 1452  $\text{cm}^{-1}$  (C-N), 1271  $\text{cm}^{-1}$  (C-O), 1068 (characteristic of lactose unit) and 710  $\text{cm}^{-1}$  (C-S);  $^1\text{H}$ NMR ( $\text{CDCl}_3$ ):  $\delta$  8.05- 7.18 (39 H, m, Ar-H);  $\delta$  5.79 -5.39; (14 H, m, lactose ring protons);  $\delta$  2.9 (3H, s, Ar-CH<sub>3</sub>)  $\delta$  6.8-6.7 (1H, s, N-H). MS ( $m/z$ ): 1235 ( $M^+$ ), 1114, 1053, 976, 948, 932, 918, 579. Anal. Found: C, 66.88; H, 4.2; N, 1.1 S, 5.1 Calcd. For  $\text{C}_{66}\text{H}_{57}\text{O}_{17}\text{NS}_2$ : C, 67; H, 4.6; N, 1.13; S, 5.1 %

**Table 2:- Characterization data of S-hepta-O-benzoyl lactosyl-1-aryldithiocarbamate (3a-g)**

Reactants: - 1) Hepta-O-benzoyl lactosyl bromide (1) [0.01M].  
2) Ammonium aryldithiocarbamate (2a-g) [0.01M].

| Sr. No. | Product | Yield (%) | m. p. ( $^{\circ}\text{C}$ ) | $[\alpha]_D^{31}$ (c in $\text{CHCl}_3$ ) | Analysis (%)<br>Found(Required) |                |
|---------|---------|-----------|------------------------------|-------------------------------------------|---------------------------------|----------------|
|         |         |           |                              |                                           | N                               | S              |
| 1.      | 3a      | 70        | 124                          | -182.28 $^{\circ}$<br>(c, 0.980)          | 1<br>(1.1)                      | 5.84<br>(5.24) |
| 2.      | 3b      | 64        | 118                          | -188 $^{\circ}$<br>(c, 0.693)             | 1<br>(1.1)                      | 5.0<br>(5.9)   |
| 3.      | 3c      | 76        | 98                           | -190 $^{\circ}$<br>(c, 0.986)             | 1<br>(1.1)                      | 5.0<br>(5.9)   |
| 4.      | 3d      | 71        | 137                          | -202 $^{\circ}$<br>(c, 0.786)             | 1<br>(1.1)                      | 5.0<br>(5.9)   |
| 5.      | 3e      | 67        | 150                          | -218 $^{\circ}$<br>(c, 0.966)             | 1.1<br>(1.13)                   | 5.1<br>(5.0)   |
| 6.      | 3f      | 62        | 176                          | -136 $^{\circ}$<br>(c, 1.006)             | 1.1<br>(1.13)                   | 5.1<br>(5.0)   |
| 7.      | 3g      | 72        | 120                          | -169 $^{\circ}$<br>(c, 1.040)             | 1.1<br>(1.13)                   | 5.1<br>(5.0)   |

## ACKNOWLEDGEMENT

Authors are thankful to Principal and Head of Department of Chemistry, Shri. D.M Burungale Science and Arts College, Shegaon, Dist- Buldhana.

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## Studies Of Interaction Of Lightwith Different Concentration Of Ligands In Various Media By Refractometry.

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## ABSTRACT

The additive properties such as Refractive index, Molar polarizability and molar refraction of some heterocyclic drugs such as Chlorothalidon- (2-chloro-5-(1-hydroxy-3-oxo-1,2-dihydroindol-1-yl)-benzenesulphonamide), Doxycycline (9,10-dimethyl-6,8,11,12a-tetrahydro-3,6,10,12,12a-pentahydroxy-1,4-dioxo- naphthalene-2-carboxamide) have been studied in DMSO, DMF and THF media at 27±0.1°C temperature and concentration.

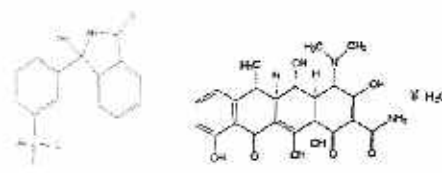
The values of molar refraction(R<sub>m</sub>) and molar polarizability (α) are found to be decreased with decreasing the concentration of solute.

**Key words:** Additive property, Doxycycline.

## INTRODUCTION:

Refractive index is one of the important additive properties of liquid. When a ray of light passes from one medium to another, it suffers in refraction, that is a change of direction. If it passes from less dense to more dense medium, it is reflected towards the normal to (from angle of refraction (r), which is less than angle incidence (i)). The refractive index is the ratio of the velocity of light in vacuum to that in the medium and it depends upon the temperature and wave length of light. The properties of liquid such as refractive index, viscosity and ultrasonic velocity of binary mixtures are studied by many workers<sup>1,2</sup>. Mahajan<sup>3</sup> has studied molar refraction and polarizability constant of 2-amino-5-thio-benzene sulphonic acid in different percentages of dioxane-water mixture. Bhargava<sup>4</sup> and Agrawal<sup>5</sup> studied the refractive indices in mixed solvents. Gonsales<sup>6,7</sup> have studied dielectric constants and refractive indices of binary mixtures. Lira<sup>8</sup> has studied molar refraction and polarizability constant of pyrazoles and isoxazoles in different percentages of dioxane-water mixtures. Mehra et al.<sup>9</sup> studied the molar refraction and polarizability constant of Al(III), Cr(III) and Fe(III) complex with some substituted isoxazoles, pyrazole and pyrazolines. Chakravarti<sup>10</sup> has

However, study of molar refractivity and molar polarizability constant of novel compounds such as Chlorothalidon- (2-chloro-5-(1-hydroxy-3-oxo-1,2-dihydroindol-1-yl)-benzenesulphonamide) and Doxycycline (2,7-di-methyl-9,10-quinolone) in aqueous solvent such as THF, DMF and DMSO under identical set of experimental conditions which could cover inter field aspect of solute-solvent interaction is scanty.



**Chlorothalidon, Doxycycline:** Therefore the present work is undertaken to make the systematic study of above novel compounds refractometrically at 27°C temperature.

## EXPERIMENTAL:

Above novel compounds are extensively used as drugs in pharmaceutical. These compounds provide the pharmacologic material with good storage stability even at high temperature and high humidity. The compounds are synthesized by standard method and purity checked by M.P, TLC, IR and NMR etc.

The solution of the compounds are prepared in different solvents (THF, DMF, DMSO etc.) by dissolving an appropriate amount by weight. All the weighing are made on Mechanical Analytical Precise weighing. Goldsch balance made in Poland (±0.001 gms). The accuracy of density measurements is within 0.001 g/cm<sup>3</sup>.

The refractive index of solvent and solutions are measured at different concentrations by Abbe's refractometer having accuracy within 0.0001 unit. The temperature of prism box maintained constant by circulating water from thermostat at 27±0.1°C. Refractometer is usually calibrated with glass piece (n=1.5120) provided with the instrument.

The molar refraction of solvent and solution mixtures are determined from

$$R_m = \left( \frac{n^2 - 1}{n^2 + 2} \right) \frac{M}{d}$$

$$R_{m(solutn)} = X_1 R_{m1} + X_2 R_{m2}$$

$R_m$  → molar refraction,  $n$  → refractive index,  $d$  → density of solution.

$N_A$  → Avogadro's number,  $\alpha$  → polarizability constant.

$R_{m1}$  &  $R_{m2}$  → molar refractivity of solvent and solute and

$X_1$  &  $X_2$  → mole fraction of solvent and solute in solution.

The molar refractive represents sum of the volume of the substances molecules in mole.

The molar refraction of solute can be calculated as:

$$R_m(solute) = R_{m(solutn)} - X_1 R_{m1}$$

The refractive index of solvent and solution at different concentration are measured from Abbe's refractometer and the values of molar refraction and polarizability constants are evaluated and presented in tables I to 4 for different systems.

Table

Molar refraction and polarizability constant for Ligand 1 (Chlorothalidon) in DMF

| Molarity (M) | R.L    | Rm (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|--------|------------------------------------------|------------------------------------------|
| 0.01         | 1.417  | 0.06509                                  | 0.002582                                 |
| 0.05         | 1.416  | 0.052591                                 | 0.001388                                 |
| 0.025        | 1.414  | 0.056390                                 | 0.0006533                                |
| 0.0125       | 1.4135 | 0.06870                                  | 0.000252                                 |
| 0.00625      | 1.413  | 0.06408                                  | 0.0001618                                |

Molar refraction and polarizability constant for Ligand 1 (Chlorothalidon) in THF

| Molarity (M) | R.L   | Rm (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|-------|------------------------------------------|------------------------------------------|
| 0.01         | 1.418 | 0.0599                                   | 0.004241                                 |
| 0.05         | 1.414 | 0.0539                                   | 0.002138                                 |
| 0.0125       | 1.413 | 0.0270                                   | 0.001071                                 |
| 0.00125      | 1.412 | 0.0545                                   | 0.000534                                 |
| 0.000625     | 1.411 | 0.0682                                   | 0.000270                                 |

Molar refraction and polarizability constant for Ligand 1 (Chlorothalidon) in DMSO

| Molarity (M) | R.L    | Rm (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|--------|------------------------------------------|------------------------------------------|
| 0.01         | 1.415  | 0.05800                                  | 0.002695                                 |
| 0.05         | 1.413  | 0.03427                                  | 0.001359                                 |
| 0.0025       | 1.4135 | 0.01918                                  | 0.000657                                 |
| 0.00125      | 1.412  | 0.0561                                   | 0.000331                                 |
| 0.000625     | 1.411  | 0.0431                                   | 0.000171                                 |

Molar refraction and polarizability constant for Ligand 2 (Doxycycline) in DMF

| Molarity (M) | R.L    | Rm (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|--------|------------------------------------------|------------------------------------------|
| 0.01         | 1.415  | 0.06251                                  | 0.002484                                 |
| 0.005        | 1.414  | 0.03140                                  | 0.001245                                 |
| 0.0025       | 1.4135 | 0.01571                                  | 0.000623                                 |
| 0.00125      | 1.413  | 0.00820                                  | 0.000327                                 |
| 0.000625     | 1.412  | 0.00415                                  | 0.000164                                 |

Molar refraction and polarizability constant for Ligand 2 (Doxycycline) in THF

| Molarity (M) | R.L   | Rm (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|-------|------------------------------------------|------------------------------------------|
| 0.01         | 1.468 | 0.08094                                  | 0.003118                                 |
| 0.005        | 1.467 | 0.04058                                  | 0.001563                                 |
| 0.0025       | 1.467 | 0.02003                                  | 0.0007827                                |
| 0.00125      | 1.466 | 0.01018                                  | 0.0003940                                |
| 0.000625     | 1.464 | 0.005201                                 | 0.00016570                               |

Molar refraction and polarizability constant for Ligand 2 (Doxycycline) in DMSO

| Molarity (M) | R.L   | Rm (cm <sup>3</sup> mole <sup>-1</sup> ) | $\alpha \times 10^{-23}$ cm <sup>3</sup> |
|--------------|-------|------------------------------------------|------------------------------------------|
| 0.01         | 1.416 | 0.08177                                  | 0.005321                                 |
| 0.005        | 1.414 | 0.04224                                  | 0.001675                                 |
| 0.0025       | 1.412 | 0.02123                                  | 0.000823                                 |
| 0.00125      | 1.411 | 0.01065                                  | 0.000425                                 |
| 0.000625     | 1.399 | 0.00545                                  | 0.000216                                 |

## Result and discussion:

It could be seen from above tables (1 to 4) that molar refractivity and polarizability constants decrease with decreasing the concentration of solution. It is also observed that the values of  $R_m$  and  $\alpha$  are found to be greater in polar solvents. THF and DMF, polar solvents involve H-bonding, may form complex with solute and non polar solvent does not involve H-bonding and does not associate with solute. This may also be attribute to the fact that the diols in the compound lies perpendicular to the longer axis of the molecules considerable diols association (inter molecular attractions) takes place which would be accompanied by increase in polarizability constants ( $\alpha$ ) as well as molar refractions ( $R_m$ ) with increasing the concentration because of mutual compensation of the dipoles.

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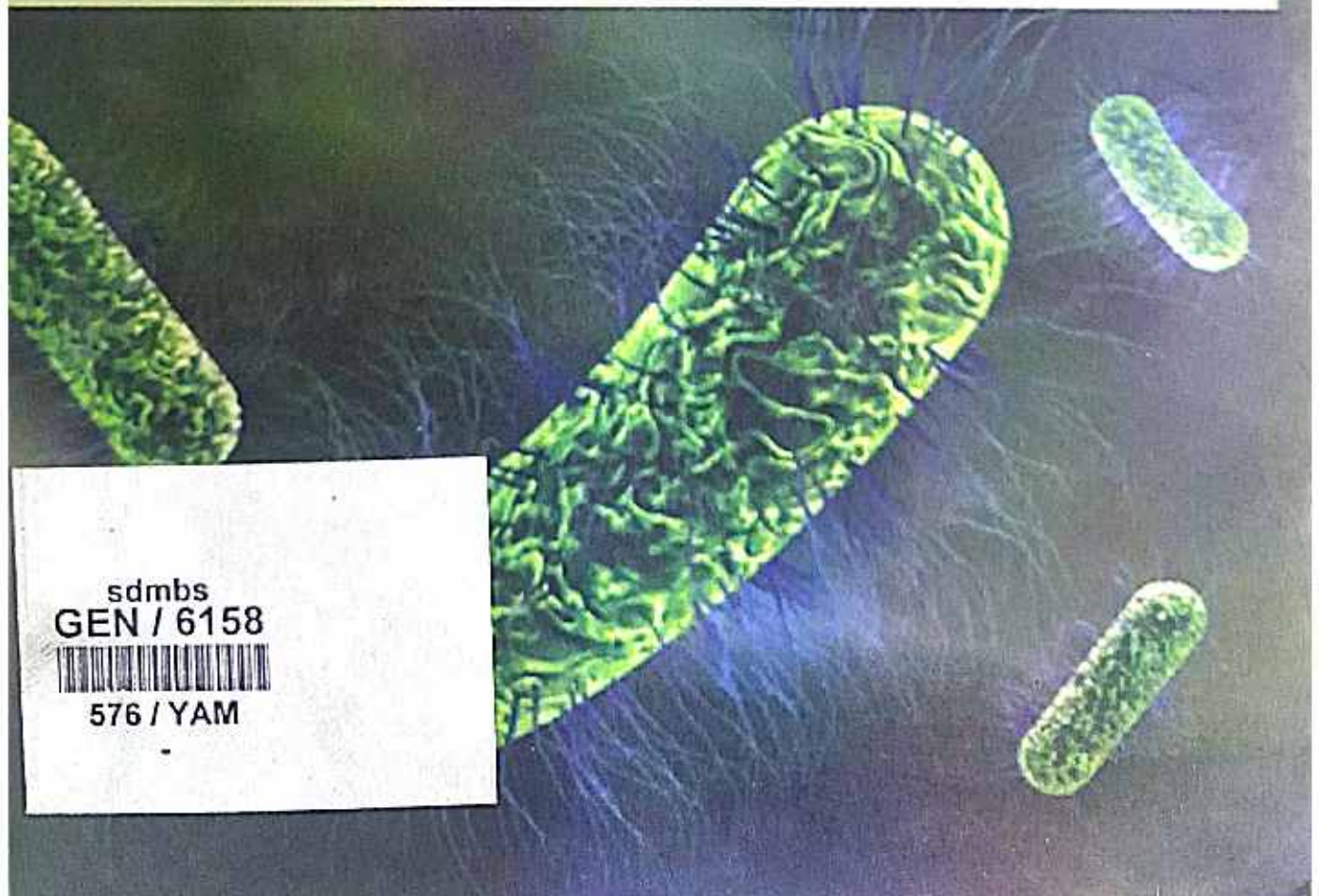
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Dr. Yamini Sadashivrao Patil

# Exploration of *Escherichia coli* in Drinking water of Purna river basin

*Dr. Yamini Sadashivrao Patil*



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# **E**xploration of *Escherichia coli* in Drinking water of Purna river basin

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# Preface

The present book on Exploration of *Escherichia coli* in Drinking water of Purna River basin is based on the drinking water quality in the saline tract. This study was held in the salinity affected area of the Buldana District of Maharashtra. The water and soil quality becomes salty due to Purna River saline water. Saline water of this river is highly salty and beyond the potable limit and water is highly polluted with huge amount of microbial population, one of the well-known microorganism responsible for water pollution is *Escherichia coli* so the present study was held to explore *E. coli* from this Purna river saline tract drinking water sources.

This book is distributed in five different chapters. First chapter is regarding Introduction about origin of Purna River and its existence in different region and *E. coli* pollution in this water, *E. coli* isolated from different region. Second chapter is based on the previous study held in this saline tract to explore *E. coli*. Third chapter consisting of the material and methods used to isolate and identify *E. coli*. The text matter related to experiments in microbiology has adequately supplemented with illustrations. Fourth chapter is based on results by table and graphs for easy understanding. I hope this book will be helpful in time management in practical work, this chapter further extended with discussion and comparison with previous work.

Text book contents of this is presented in a comprehensive way using simple language instead of question and answer form, so that the student should master the concept and then apply it.

The possible care has been taken to present the matter in its pristine form. Nevertheless, human and typographical errors are likely to creep in roguishly. Students and teachers are always welcome for their suggestions.

I want to acknowledge with deep thanks of gratitude to Respected Dr. D.H. Tambekar for his constant support and guidance and also have to extend my thankfulness towards Assistant Professor Mr. R.B. Barabde my husband and my son for their help in publishing journey of this book.

We gratefully and affectionately recognize technical assistance and help of DnyanPath Publications Amravati branch for bringing out the book timely in a nice attire mode.

## **- C O N T E N T -**

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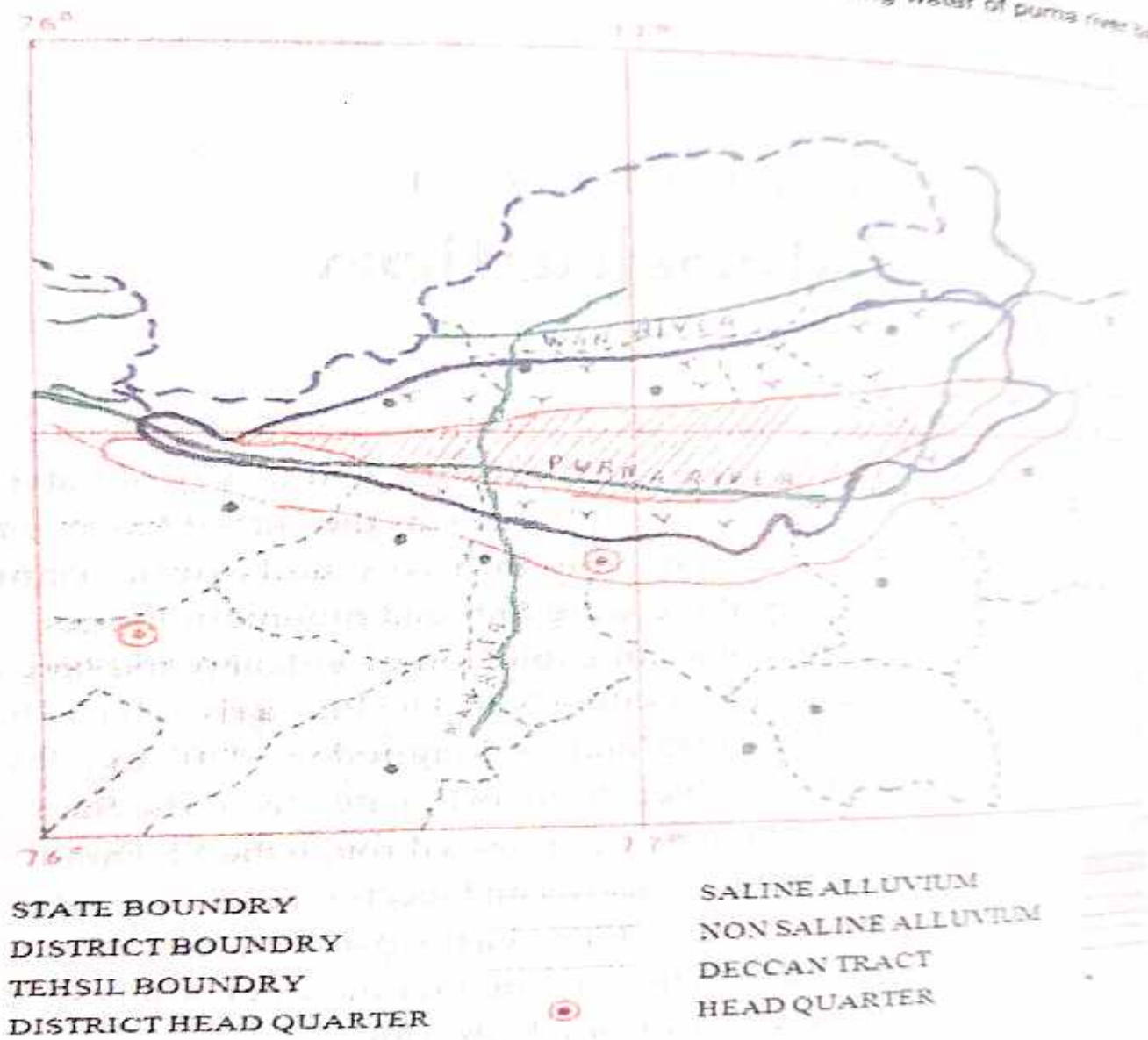
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## CHAPTER - 1

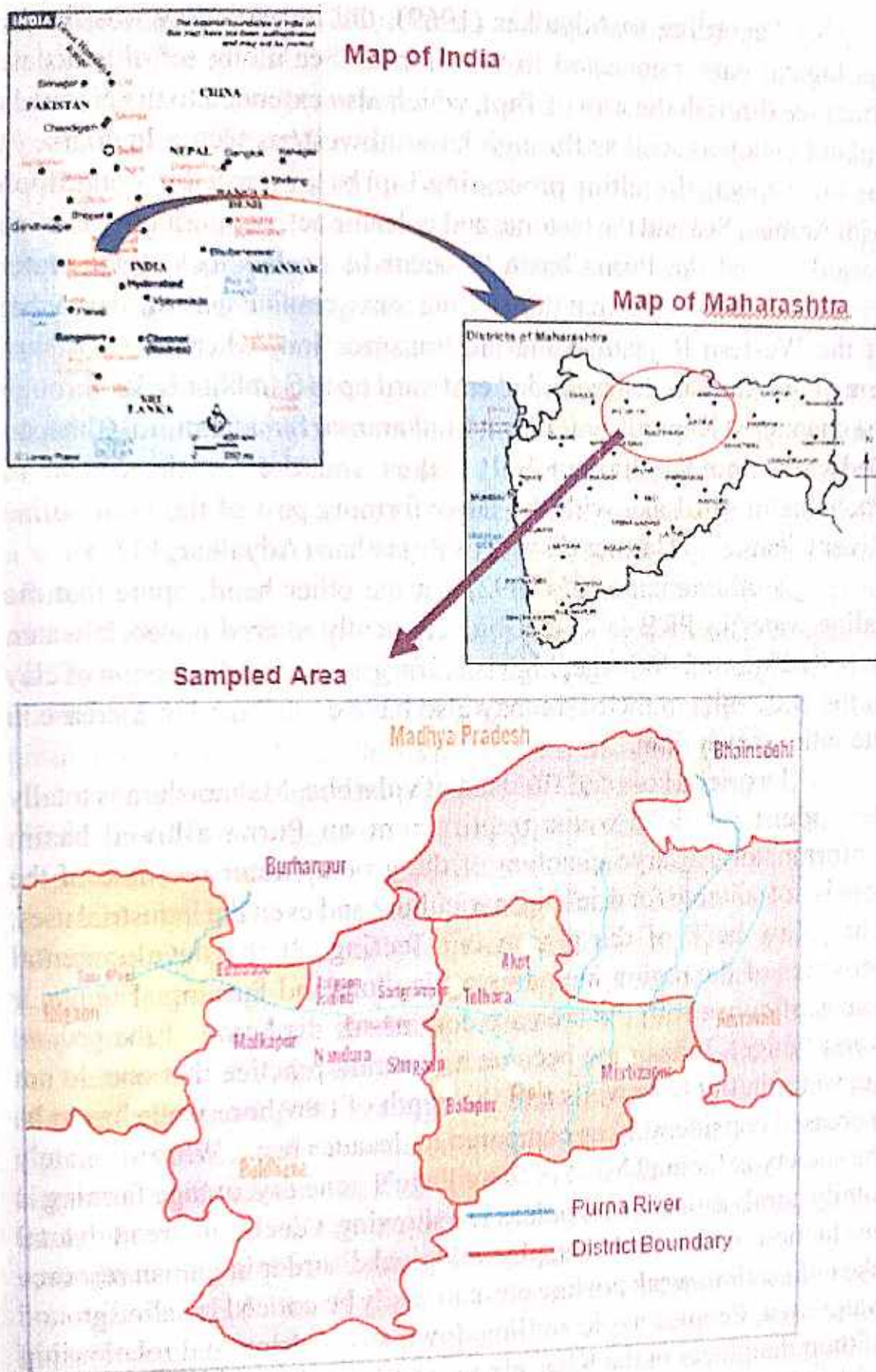
# Introduction

India is an agricultural country and 12 million hectares of agricultural land is under salinity. According to the geological survey of India it was reported that the saline belt of Purna was the part of Payanghat ground towards north Melghat mountain row and south Ajanta Mountain. Beside the valley there were Satpuda mountain ranges, on these mountain ranges there was an explosion of volcano and spread with alluvial of Purna and formed saline belt. The Purna river basin lies between latitude  $20^{\circ}40'$  to  $21^{\circ}45'$  and its longitude  $76^{\circ}20'$  to  $77^{\circ}45'$  (Adyalkar, 1975)(Fig.1). The river Purna originates from the Satpuda ranges in Baitul district of M.P. and then passes through the Maharashtra, through Amravati, Akola, Buldana district and meets river Tapi in Jalgaon district. This Purna valley basin extends east west for a stretch of 170 km. The total area covered is 6200 Sq. km. Out of which 3000 Sq. km is characterized by saline water or brackish water.

The catchments area of Purna river basin (PRB) is 17650 sq. km. out of which 7500 sq. km. is of alluvial deposits in which 4682 sq. km. is characterized by underground saline water (brackish water). The population in PRB is 3.92 million. Out of which approximately 350 villages (population 0.35 million), are severely affected and need solution to solve the drinking water problem. Maximum salinity of 19,000 microhms/cm is present in PRB.



**Fig. 1 : Map of Purna River Basin**



**Fig. 2 : Location of Purna River Basin**

According to Adyalkar (1969), the Purna valley was, in the geological past, connected to the Arabian Sea along set of evacuate fractures through the arm of Tapi, which also extended to the Narmada upland valley as well as through its southwestern sector. In course of geologic epoch, the silting processing Tapi basin severed its connection with Arabian Sea and the tectonic and volcanic activity during the Eocene period caused the Purna basin to occur like a landlocked salt-water lake. He hold the view that this marine transgression was similar to that of the Western Rajasthan marine transgression, where the northern arm of the Arabian Sea extended eastward up to Sambhar Lake, through the channel of Kaparda Salt Playa, Lunkaransar Sujangarh, Tal Chhapar, Didwana and Kuchaman Salt Lakes and the Southern arm to Pachbhadra salt Lake with the latter forming past of the Loni Saline River Channel in Barmer district of Rajasthan (Adyalkar, 1971).

Muthuraman *et al* (1992), on the other hand, opine that the saline water in PRB is in fact biogenetically altered meteoric water. Impeded internal drainage, high specific gravity and dispersion of clay in the B.C. soils in the basin may also have contributed to increase in the salinity over time.

District Akola and Buldana of vidarbha, Maharashtra is totally dependent for their water requirement on Purna alluvial basin. Unfortunately, a large quantum of the ground water resource of the area is not suitable for drinking, agriculture and even the industrial uses. This draw back of the region is affecting all the developmental activities of the region including agriculture and farming. The major issues of concern to the area are continuous depletion of the ground water budget. It has now become a common practice that one do not get water in old bore wells and the depth of new bore wells has to be increased considerably as compared to decades back. What ultimately the society is facing? Most of the village's gone dry, orange farming is totally paralyzed. Cotton, pulses are showing a declining trend in total production. Apart from this, physiological disorder in human resource like indigestion, weak posture etc. can easily be noticed in saline ground water area. Peoples avoid settling down any matrimonial relationship of their daughters in the Khartalegaon and near by villages, as it is one of the worst hit areas. The overall activity has gone down.

The Purna valley is a structural valley. The alluvial deposits of Purna valley occur along the extensive of a fault block. The basement of the valley has a slope towards north. The alluvial deposits attain



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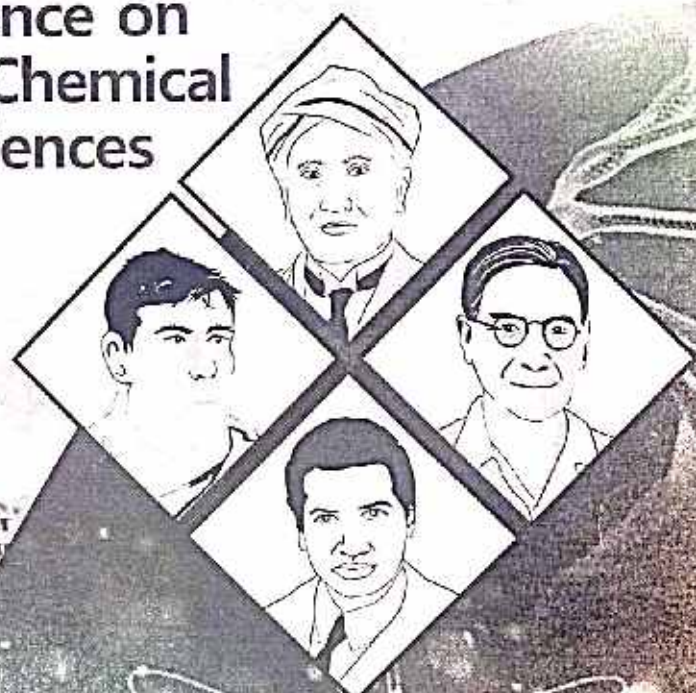
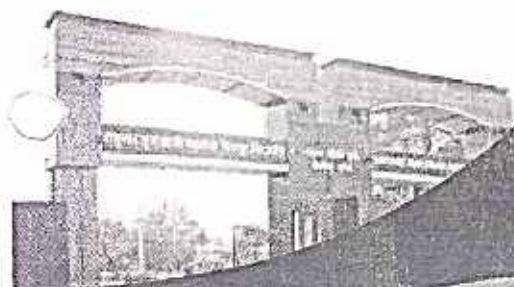
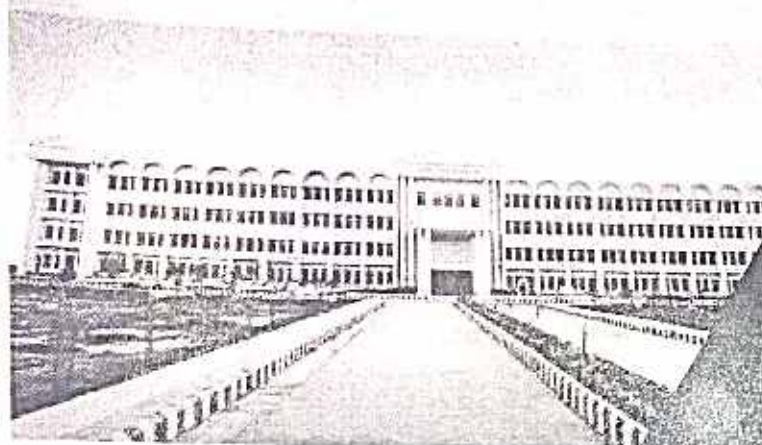


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## SOUVENIR



## An Overview of Techniques used for Information Extraction from Scientific Documents

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### Abstract:

Scientific documents are an important source of information for researchers to carry out qualitative research [1]. These are generally available in semi-structured format like PDF. To understand and analyze scientific documents; readers are interested in particular sections of that documents. Extracting text from these sections is a vital phase of information extraction because research papers do not have a common format i.e. usually every conference or journal has its own format for writing research papers [2]. This paper presents overview of techniques used for information extraction from scientific documents.

Early work in information extraction from research papers is based on machine learning techniques like Hidden Markov models (HMM) with 92.9% accuracy [4], Support Vector Machine (SVM) with 92.9% accuracy [5] and Conditional Random Field (CRF) with 98.3% accuracy [6]. Subsequently other techniques like rule-based metadata extraction system with 90.6% accuracy [8], hybrid approach [2], and rhetorical classifier with 0.51F accuracy [10] are used to extract information. Different information extraction techniques are studied and their comparison based on approaches used, data set used, type of information extracted, and the result of overall accuracy is summarised in a table.

Various researchers extracted metadata information like title, authors, emails, abstract, keywords, and references etc from research papers/ scientific documents with high accuracy. Extraction approaches are based on traditional machine learning techniques, rule based algorithm and some newly applied techniques. Also numbers of automatic information extraction frameworks or tools are very handy to extracts information from scientific documents in PDF format.

**Keywords-** Information extraction, PDF, NLP, metadata

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Sant Gadge Baba Amravati University Computer Science Teachers' Association (SGBAUCSTA) was established in the year 2015 to promote cooperation amongst Computer Science teacher community for betterment of students learning Computer Science at various levels.

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Hope this book will be also useful to our students to grasp the essence of the subject. The suggestions for improvement of this project are highly solicited.

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# Preface

**Sant Gadge Baba Amravati University Computer Science Teachers' Association** is proud to present a text book for computer Science for the students of the **fifth semester** of B.Sc. This book has been designed after considering the syllabus of Sant Gadge Baba Amravati University.

The contents of the book are divided into six units. First Three units are based on **.Net Technology** while the next three units cover the aspects of **Java Programming**. The concepts are illustrated with the help of neat and well labeled diagrams and supported with easy to understand examples. The terminologies are explained with the help of precisely designed algorithms.

The authors have referred many standard books while preparing the contents of this book and we acknowledge our sincere gratitude towards those authors. The authors have also used simple and easy to understand language.

We have taken utmost care to avoid the any kind of typographical mistake in the contents of the book. Mistakes that are overlooked during editing may please be reported so as to remove them in the subsequent edition.

We would like to thank the managing committee of **SGBAUCSTA** who have given this opportunity. We would also like to thank **DnyanPath Publication Amravati** for publishing this book. Our special thanks to **Dr. V.M. Patil** and **P.S. Bodkhe** for sparing their valuable time to edit this book.

We are sure that this book would certainly benefit the students for enhancing their knowledge of the subject and would also help the teachers in their regular teaching.

Comments and suggestions for further improvements are always welcome.

**Authors**

Amravati  
July, 2019

## **- SYLLABUS -**

### **COMPUTER SCIENCE**

**Computer Application/Information Technology to be implemented from the Academic Session 2019-20 and onwards**

#### **Unit I :**

**Introduction to .NET Framework :** NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies The Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell - Managed Execution

#### **Unit II :**

**Introduction to visual programming :** Concept of event driven programming - Introduction to VB.Net environment, The .NET Framework and the Common Language Runtime. Building VB.NET Applications, The Visual Basic Integrated Development - Basic Language - Console application and windows application, Data types, Declaring Variables, scope of variables, operators and statements.

#### **Unit III :**

**Decisions and loop :** Making Decisions with If . . . Else Statements, Using Select Case, Making Selections with Switch and Choose, Loop statements - Do Loop, for, while - The With Statement - Handling Dates and Times - Converting between Data Types - Arrays - declaration and manipulation - Strings & string functions - Sub Procedures and Functions.

#### **Unit IV :**

**Introduction to JAVA :** History and evolution ,Feature, JDK, JVM, Difference between C++ and Java, Structure of Java Program, Keywords, Variable, Data types and Literals, Operators Control of Flow, (Selection Statements, Iteration Statements), Command Line Argument, One dimensional and two dimensional array.

#### **Unit V :**

**Classes and inheritance:** Class, Object, Method, Overloading Method, Constructor, Constructor Overloading, this Keyword.  
**Inheritance:** Introduction to Inheritance, Super, Multilevel Hierarchy, method overriding, Abstract class, Using Final (variables, methods and classes).

#### **Unit VI :**

**String, Package and Interface:** String : String operation, String comparison, Searching and modifying string,

**Package :** Package concept, Defining Package, Finding Package, Java In-built Packages

**Interface :** Interface concept, Defining, and Implementing of Interface.

\*\*\*\*\*

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## CHAPTER - I

# Introduction to .Net Framework

### 1.1 .Net Framework :

The .Net framework is a innovatory platform which helps you to write the following types of applications:

- Windows applications
- Web applications
- Web services

The .Net framework supports multi-platform applications. This framework has been designed in such a way that it can be used from any of the following languages such as Visual Basic, C#, C++, Jscript, and COBOL, etc. The .Net framework consists of an massive library of codes used by the client languages like VB.Net. These languages use object-oriented methodology. .NET is a Software Platform. It is a language-neutral environment for developing rich .NET experiences and building applications that can easily and securely operate within it. The components that make up the .NET platform are collectively called the .NET Framework. The .NET Framework is a managed, type-safe environment for developing and executing applications. The .NET Framework manages all aspects of program execution like allocation of memory for the storage of data and instructions, granting and denying permissions to the application, managing execution of the application and reallocation of memory for resources that are not needed.

The .NET Framework is designed for cross-language compatibility. Cross-language compatibility means, an application written in Visual Basic .NET may reference a DLL file written in C#. A Visual Basic .NET class might be derived from a C# class or vice versa.

**Academic Year 2017-18**



AMRAVATI UNIVERSITY CHEMISTRY  
TEACHER'S ASSOCIATION'S

A TEXT BOOK OF  
**Chemistry**  
FOR B.Sc., THIRD SEMESTER

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• Dr. A. K. Maldhure • Dr. (Mrs.) S. M. Thorat  
• Dr. P. P. Deohate • Mr. A. B. Sahare

**EDITORS** • Dr. P. R. Mandlik  
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(As per Sant Gadge Baba Amravati University's new syllabus)

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## **A TEXT BOOK OF CHEMISTRY SEMESTER - III**

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## Preface

# Preface

**Amravati University Chemistry Teachers' Association** presenting '**A Text Book of Chemistry**' for the students of third semester of B.Sc. This book has been written strictly according to the new syllabus of Sant Gadge Baba Amravati University, Amravati. While writing this book, care has been taken to see that the language is simple so that students will not find any difficulty in understanding the subject. The book incorporates in all six units, first two of Inorganic Chemistry, next two of Organic Chemistry and last two units of Physical Chemistry. The theoretical part is supplemented with number of figures. Numerical have also been included in physical chemistry units which will be definitely useful to our students. At the end of each chapter some questions have been given which will assist the students to assess their knowledge of the topic prepared by them as well as help them for the preparation of examination.

While preparing the book utmost care has been taken to see that there are no typographical mistakes/errors of contents. However if any such

mistakes /errors have crept in may kindly be communicated for rectification edition of the book.

We have referred many well known text books while preparing the matter of this book and we sincerely acknowledge our indebtedness to those authors. We would also like to thank the managing committee of **AUCTA** who have given us the opportunity to undertake this- superficially easy looking but a difficult task- which has ultimately benefitted us. Our sincere thanks to managing committee for consistent moral support and **DnyanPath Publication (INDIA)** for publishing the book. Our special thanks to the Dr. P. R. Mandlik (Secretary, AUCTA), Dr. G.H. Murhekar and Dr. R.M. Jumle for editing the book by spending their valuable time.

We hope that the student community and our teacher fraternity will warmly accept this book. Any critical comments and suggestions will be warmly welcome.

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Amravati University Chemistry Teachers' Association was established in the year 1995 to promote cooperation amongst chemistry teacher community for betterment of students learning chemistry at various levels.

Association publishes a News Letter, organizes student's activities like intercollegiate seminar competitions, chemi quiz, aptitude tests, national/international conference and other academic activities, also extends its collaboration and sponsorships for the organization of such events. Association is also contributing time to time in the revision university curriculum of subject chemistry of under and post graduate classes. In order to have uniformity in the teaching throughout the university, association is publishing books of chemistry for all undergraduate classes. This book is written by the experienced teachers of various colleges as per revised syllabi of semester pattern of Sant Gadge Baba Amravati University, Amravati.

Hope this book will be useful to our students to grasp the essence of the subject. The suggestions for improvement of this project are highly solicited.

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# SYLLABUS

B.Sc. (Semester- III)

Total Lectures: 84

Marks : 80

## Chapter I

### A] Covalent Bonding:

Molecular Orbital Theory. Postulates of MO theory. LCAO approximation. Formation of bonding and antibonding MOs. Rules for LCAO. MO energy level diagram. Concept of bond order. MO structure of homonuclear diatomic molecules of namely  $\text{He}_2$ ,  $\text{H}_2$ ,  $\text{N}_2$  and  $\text{O}_2$ . Stability sequence of species of  $\text{O}_2$  i.e.  $\text{O}_2$ ,  $\text{O}_2^+$ ,  $\text{O}_2^{2+}$ ,  $\text{O}_2^-$  and  $\text{O}_2^{2-}$ . Paramagnetic nature of  $\text{O}_2$ . MO structure of heteronuclear diatomic molecules viz. NO, HF and CO (Coulson's structure). Explanation of important properties of CO viz. - triple bond, almost nonpolar nature, electron donor and acceptor behaviour. Comparison of VB and MO theories. [6]

### B] Metallic Bonding:

Free electron theory and properties of metals such as electrical and thermal conduction, malleability, ductility and metallic lusture. VB theory or Resonance theory of metals. Band theory to explain nature of conductors, insulators and semiconductors (both intrinsic and extrinsic). [3]

### C] VSEPR Theory:

Various rules under VSEPR theory to explain molecular geometry (following examples may be taken to explain various rules-  $\text{BeCl}_2$ ,  $\text{BF}_3$ ,  $\text{CH}_4$ ,  $\text{NH}_4^+$ ,  $\text{PCl}_5$ ,  $\text{SF}_6$ ,  $\text{IF}_7$ ,  $\text{SnCl}_2$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{SF}_4$ ,  $\text{ClF}_3$ ,  $\text{BrF}_3$ ,  $\text{XeF}_6$ ,  $\text{SOF}_4$ ,  $\text{COF}_2$ ,  $\text{PCl}_3$ , ). Limitations of VSEPR theory. [5]

## Chapter II

### Theory of Quantitative Inorganic Analysis

#### A] Volumetric Analysis:

- a) **Introduction:-** Volumetric analysis, titrant, titrate, end point, equivalence point, indicator etc. Requirements of volumetric analysis. Definition of standard solution, primary standard substance. Requirements of primary standard substance. Terms to express concentrations namely- molarity, normality, molality, mole fraction and percentage. (Simple numericals expected).
- b) **Acid-Base titrations:-** Types of acid base titrations. pH variations during acid base titration. Acid base indicators. Modern theory (Quinoniod theory) of acid base indicators. Choice of suitable indicators for different acid base titrations.

c) **Redox Titrations**:-General principles involved in redox titrations (redox reactions, redox potentials, oxidant, reductant, oxidation number). Brief idea about use of  $\text{KMnO}_4$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$  as oxidants in acidic medium in redox titrations. Use of  $\text{I}_2$  in iodometry and iodimetry. Redox indicators-external and internal indicators. Use of starch as an indicator. Iodometric estimation of  $\text{Cu(II)}$ . [8]

**B) Gravimetric Analysis:**

Definition. Theoretical principles underlying various steps involved in gravimetric analysis with reference to estimation of barium as barium sulphate. Coprecipitation and post precipitation. (Definition, types and factors affecting). [6]

### Chapter III

**A) Aldehydes and Ketones:**

Preparation of acetaldehyde from ethanol, ethylidene chloride and acetylene. Preparation of benzaldehyde from benzene (Gattermann-Koch reaction) and toluene. Preparation of acetone from isopropyl alcohol, isopropylidene chloride and propyne. Preparation of acetophenone from benzene and ethyl benzene. Structure of carbonyl group, acidity of  $\alpha$ -hydrogen in carbonyl compounds. Reactions of aldehydes &/or ketones: Cannizzaro's, Reformatsky, Perkin with mechanism, Mannich reaction, Benzoin and Aldol condensations. Clemmensen, Wolf-Kishner, MPV and  $\text{LiAlH}_4$  reductions. [8]

**B) Carboxylic acids:**

Structure and reactivity of carboxylic groups. Acidity of carboxylic acids, effects of substituents on acids strength. Oxalic acid: Preparation from ethylene glycol and cyanogen. Reactions: Reaction with ethyl alcohol, ammonia, glycerol and action of heat. Lactic acid: Preparation from acetaldehyde and pyruvic acid. Reactions: Reaction with ethanol,  $\text{PCl}_5$ , action of heat, oxidation and reduction. Benzoic acid: Preparation from toluene, benzyl alcohol, phenyl cyanide and benzamide. Reactions: Reaction with ethanol,  $\text{PCl}_5$  and ammonia. Salicylic acid: Preparation by Reimer-Tiemann reaction. Reactions: Reaction with  $\text{CH}_3\text{COCl}$ ,  $\text{CH}_3\text{OH}$  and  $\text{C}_6\text{H}_5\text{OH}$ . [6]

### Chapter IV

**A) Optical isomerism:**

Element of symmetry, chirality, asymmetric carbon atom, enantiomers, diastereoisomers, relative and absolute configurations, DL and RS nomenclature, racemisation and resolution (by chemical method). [4]

**B) Geometrical isomerism:**

Cis-trans & E-Z nomenclature, Methods of structure determination. [3]

### C] Conformational isomerism:

Bayer's Strain theory and its limitations. Stability of cycloalkanes, conformational isomers of ethane, n-butane and cyclohexane, their energy level diagrams. Newman & Sawhorse projection formulae.

## Chapter V

### A] Thermodynamics and Equilibrium:

[10]

(i) Gibb's and Helmholtz's free energy function. Physical significance of Gibb's free energy, Change in free energy as a criteria of spontaneity and equilibrium. Variation of free energy  $G$  with  $P$  &  $T$ . Gibb's-Helmholtz's equation in terms of  $G$  and its application. (ii) Partial molal function, chemical potential, derivations of Gibb's-Duhem equation. Chemical potential of an ideal gas in gaseous mixture. Derivation of vant Hoff's isotherm and its application to equilibrium state. Derivation of vant Hoff's equation and its applications. (iii) Numericals.

### B] Phase Equilibrium:

[4]

(i) Immiscible liquids, Nerst distribution law and its application to association and dissociation of solute in one of the solvent. Process of extraction, derivation of formula for the amount of solute left unextracted after  $n^{\text{th}}$  extraction. (ii) Phase transition - Clausius-Clyperon equation (only qualitative statement). (iii) Partially miscible liquids - Phase diagram of phenol-water, triethyl amine - water and nicotine-water systems. (iv) Numericals.

## Chapter VI

### A] Liquid state:

[4]

(i) Surface tension, determination and its S.I. Unit. Effect of temperature on surface tension, derivation of expression for relative surface tension by Drop number method. Application of surface tension. (ii) Viscosity, determination and its S.I. Unit. Effect of temperature on viscosity, derivation of expression for relative viscosity by Ostwald's viscometer method. Applications of viscosity.

### B] Electrochemistry:

[10]

(i) Conductance of electrolyte solution. Specific, equivalent and molar conductance. Determination of conductance of electrolyte solution, variation of specific and equivalent conductance with dilution for strong electrolyte. Conductometric titrations. Applications of conductometric titration. (ii) Migration of ions under the influence of electric field. Transport number of ions. Determination of transport number by Hottorf's method and Moving boundary method (iii) Kohlrausch's law of independent migration of ions. Determination of  $l_0$  and degree of dissociation  $\alpha$  of a weak electrolyte. Determination of dissociation constant of weak electrolyte. (iv) Numericals.

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\*\*\*\*

## A. COVALENT BONDING

### 1.1 Introduction

**M**ajority of the compound of the universe contain covalent bonds. For example compounds presents in animals and plants such as oils, protein, sugar, woods etc. are covalent compounds. Gases such as nitrogen, oxygen, hydrogen chloride, ammonia are covalent compounds. A covalent bond is formed by the sharing of electron between the two atoms participating in bond formation.

Lewis theory explains covalent bond formation on the basis of tendency of atoms to attain stable noble gas configuration by sharing of electrons. But it could not explain the stability, reactivity and geometry of covalent molecules.

In covalent bond one has to understand what types of forces exist which keep the electron pairs in contact with the two atoms. This idea has been explained on the basis of wave mechanics. Two wave mechanical theories of covalent bond have been formulated to explain the nature of covalent bond these approaches are :

- (A) Valance Bond Theory
- (B) Molecular Orbital Theory

### 1.2 Molecular orbital theory (MOT)

This theory was developed by Hund, Mulliken and Lehnard Jones. In it a molecule is regarded as a system of nuclei and electron in which each electron move in a field of other electrons and all the nuclei.

Molecular orbital theory (MOT) is more modern and more rational. It regards the molecule as a single unit. This theory uses wave function ( $\psi$ ) to describe how electrons are distributed in molecules, in the same way as a quantum mechanics use wave function to describe how electrons are distributed in atoms. The area in which the probability of finding an electron is high is called molecular orbitals. Molecular orbitals can be used quantitatively to calculate geometry, energy levels and other properties of molecules.

#### Postulates or salient features of MOT

- i) Molecular orbitals are formed by combination of atomic orbitals of nearly same energy and symmetry.
- ii) In MO theory all the electrons in molecules are considered to be under the influence of all the nuclei present in a molecule.
- iii) The number of molecular orbitals formed is equal to the number of atomic orbital's undergoing combination. When two atomic orbital combine, two molecular orbitals are formed. One is lower energy is called bonding molecular orbital (BMO) and other is higher energy is called anti-bonding molecular orbital. (ABMO)

# REVAMPING OF ACADEMIC LIBRARIES FOR NEW GENERATION VOL - I

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(I) Library and Library Profession  
(II) Library Services and Utility

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# From Card Catalogue to Web OPAC

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## Abstract

*Due to the development of Information Technology in Libraries, Card catalogue changed the form of web opac. Web OPAC is a library catalogue on the Web or Intranet. Users can search the required information by connecting to Uniform Resource Locator (URL) of Web OPAC anytime during the day and from anywhere in the world.*

**Keyword** - Card Catalogue, opac & web-Opac

## Introduction

Web OPAC is a systematic application and not exploitation of information technology. The concept of Web OPAC is very well established and practiced successfully in developed countries especially in USA and UK. Majority of their libraries are well equipped with it and offer regular service to their members. The development of Web OPAC activities can be seen as evolution of OPAC activities into Web OPAC. Simply stated, a Web OPAC is a library catalogue on the Web or Intranet. Users can search the required information by connecting to Uniform Resource Locator (URL) of Web OPAC anytime during the day and from anywhere in the world. A different definition can be seen on the Internet according to which a 'WEB OPAC is an independent program designed separately from the Library Information technology changed the entire environment of the library including resources, techniques, services, etc. OPAC (Online Public Access Catalogue) changed the traditional card catalogue system. The University Grants Commission (UGC) in India, with the help of the Information and Library Network (INFLIBNET), is playing an important role by providing funds and technical support for implementation of library management systems (LMSs), including OPACs, in university libraries. NIC is also playing an important role by supplying free software to their institutions, after open source technologies many LMSs are came up, most of the library are implementing the open source LMS.

## Card Catalogue

Library fulfils all the information requirements of every human being. Every person is not able to purchase all types of reading materials. So, they are dependent on libraries/ information centers for fulfilling their information needs. Library has organize many documents like books, thesis, manuscripts, periodicals, Pamphlets, maps, motion pictures, tapes and ether printed and non printed materials. We can well imagine as to what will happen if these documents are not prepared systematically. This system should fulfill all the search approaches about the documents like author, title, publisher and call number etc. Such a retrieval system in the context of a library is called library catalogue. According to Clark (2000), "The library catalogue is an essential tool. It is an index or a key to the collection, containing an entry representing each item" The various types of library catalogue are used to find out the desired information of user community in the library. The card catalogue fulfils the various approaches of the users like author, title, subject and call number, etc. Card catalogue was quite useful tool of information retrieval system. Right now, most OPACs provide Author, Title, Author/Title, Subjecton circulation system records or based on simple MARC records, perhaps with a circulation, serials, or acquisitions module. First generation OPACs were little more than poor imitations of print retrieval tools. Access points were limited only to those that were available in the card catalogue, that is, left-anchored searches. First generation OPACs were primarily book finding lists and worked best for known-item search.

## Online Public Access Catalogue (OPAC)

Online Public Access Catalogue (OPAC) contains all the bibliographic information of an information centre or we can say it is a gateway to information centre's collection. OPAC is the modern and flexible form of the catalogue, usually instantaneous and sophisticated access to any recorded information within a computer. Online Dictionary for Library and Information Science (ODLIS) defines OPAC as, "An acronym for online public access catalog, a database composed of bibliographic records describing the books and other Materials owned by a library or library system; accessible those from the developing nations, may choose their library software catalogue data into terms that the library user understands, making books

more easily accessible via OPACs and fostering a sense of community around library collections (Harris, 2008). In 1999, Chrisman, Diller, and Walbridge conducted a usability study of the Washington State University Library OPAC. And he found that most of the OPACs problems were related to subject indexes and article databases; participants could not find and did not understand how to use these features.

### Web OPAC

The concept of Web OPACs is recent origin and it is serving as a gateway to the resources not only held by the respective library but also to the holdings of other participating libraries without to local collection but going, beyond further to regional, national, international levels. It allows users to interact with documents stored on computers all over the world and makes easier access to catalogue data in the form of bibliographic records. It becomes another search engine referred as 'web cat' and as an 'Information gateways'. It can support protocols such as telnet, HTTP, ftp

and Gopher and support the file and document like Portable Document Format (pdf), (HTML), etc. According to Online Dictionary for Library and Information Science defined as: "An Online Public Access public catalogue (OPAC) that uses a graphical user interface (GUI) accessible via the World Wide Web, as opposed to a text based interface accessible via telnet".

### Features of WEB OPAC

The important features of Web OPACs are:

1. It is accessible through internet.
2. It is possible to search independently by Author, Keyword, Title or Year.
3. Displays complete bibliographic information as appeared on reprints.
4. Features of traditional OPACs such as storing bibliographic and sometimes full text databases; providing direct access to a library's bibliographic database by means of terminal or PC; search result in readily understandable form; reference help, etc.
5. It has ability to use hypertext links to facilities navigation through bibliographic records.
6. Linking to full text when available is there.

### Some Past Studies

Even though the number of studies of card catalogue of libraries are limited, studies on use of OPAC are plenty and there exists good number of reviews of OPAC studies (Larson, 1991; Hildreth, 1985; O'Brien, 1994). OPAC appeared in the libraries of developed countries in early 1980s but about 5 to 10 years later in developing countries. The most extensive study of OPAC was by multiple studies instituted by Council on Library Resources (CLR) during 1981-83 covering 16 systems in 29 libraries with about 12000 users and nonusers (Ferguson, et al., 1982).

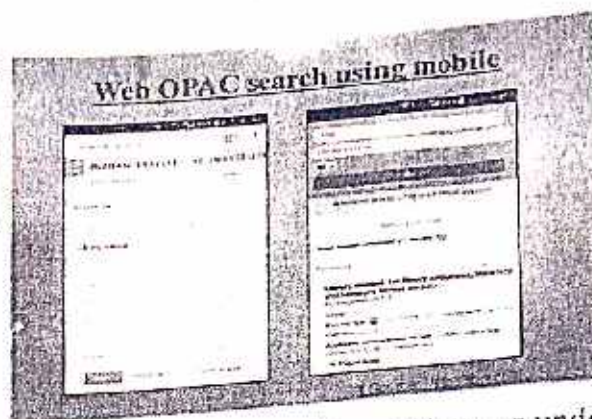
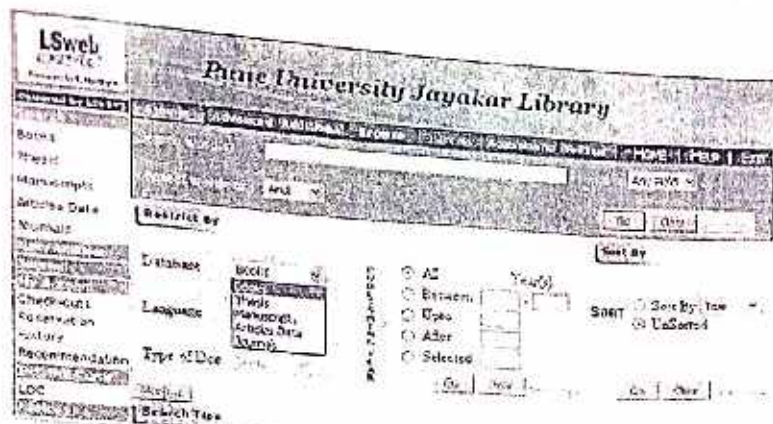
The first generation OPACs which emulated the card catalogue approach (online card catalogue models) lacked authority control over name and subject headings. They did not cover some types of materials, portions of books and information about utility and availability of books. The change from the pre-coordinated search of card catalogue to post-coordinated retrieval in OPACs, improved and remote access, varieties of search features, display and user interface, e-mail delivery, holdings of other libraries, current awareness service, circulation information, ordering and processing files, etc., became common in the second generation OPAC. Yet the extensive cross references of the traditional card catalogue are missing in OPACs. Further, being an automated system, OPACs penalize users heavily for any error in inputting the query. The interactive, intelligent, diagnostic, natural language based third generation OPACs are yet to be widely made operational.

### Types of OPAC currently in use

There are probably now (early 1985) between fifty and a hundred distinct OPAC systems in use. Most of these are in the USA, with a handful in the UK and the rest of Europe. Some are commercially available, increasingly now as part of integrated library systems. Many were developed as in-house systems by academic, national and public libraries. It may be helpful to regard OPACs as falling into three categories, of which the first is, in the main, historically the oldest. These are roughly 12.2. *Online public access catalogues* equivalent to Hildreth's "three generations" of OPAC which he defined in a recent paper [20], but it should be realized that it is not always possible to place a given OPAC firmly in a specific generation. The first and second generations are most readily distinguishable by the types of access key provided.

### Differences Between Card Catalogue And Web-OPAC

There are many big differences between the OPAC and the card catalogue: Almost every single part of the bibliographic record is accessible through keyword searching; this capability helps users find data contained in notes, including contents note



**Features of Web OPAC:** The following significant features of Web OPACs are given as under: Right now, most OPACs provide Author, Title, Author/Title, Subject Heading, Call Numbers, ISBN, ISSN and Keywords, etc., access points. OPACs provide users with many more means of searching and accessing information in various formats than the traditional card catalogues. OPAC and Web OPAC are related to each other in a number of various aspects such as searching, accessing and browsing in both the cases provides pre-coordinated as well as post-coordinated phrases options. OPAC usage is limited, only the persons in LAN/Intranet can use it while Web OPAC usage is worldwide web anyone can access it from anywherean time with the help of internet connection.



OPac

### Conclusion

OPAC is an interactive search module of an automated librarymanagement system. Any record is searched directly from anode within a database of the organization or remotely throughnational and international networks. Members can see thecollection and issue status of each document of the informationcentre. Thus finally we see that a lot of cataloguing work due to availability of various Web OPACs is reduced. Web OPACsimprove the quality, speed and performance of the servicesoffered by the libraries. Web OPACs get improve the quality,speed and performance of the services provided by thelibraries. The interlibrary loan becomes easier with the use ofe-mail and web. They could reserve or request online for thedocument of their interest.

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