



**3.4.6. Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceeding per teacher during the last five years.**

**e-copies of Books and  
Chapters**

### 3.4.6 Number of books and chapters in edited volumes published per teacher during the last five years (15)

#### 3.4.6.1: Total number of books and chapters in edited volumes / books published, and papers in national/international conference-proceedings year wise during the last five year

S. N.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
<b>Year-1:2021-22</b>										
1	Poonam Verma, Mridul Shakya, N KumarSwamy, Sardul SinghSandhu2	Microbial Resource Technologies for Sustainable Development	Microbial consortium: a innovative steps in environmental protection	Not Applicable	Not Applicable	International	2021-22	ISBN: 978-0-323-90590-9	Rani Durgavati University, Jabalpur	Elsevier
2	Mridul Shakya, Poonam Verma, Sardul Singh Sandhu	Advances in Dairy Microbial Products	Recent advances in microbial diversity usage in fermented dairy microbial products	Not Applicable	Not Applicable	International	2021-22	ISBN: 978-0-323-85793-2	Rani Durgavati University, Jabalpur	Woodhead Publishing
3	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	Coordination chemistry of chlorophylls/ bacteriochlorophylls and its functional aspects in photosynthesis	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-001">https://doi.org/10.1515/9783110727302-001</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
4	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	Complexes containing nitric oxide: synthesis, reactivity, structure, bonding and therapeutic aspects of nitric oxide-releasing	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-002">https://doi.org/10.1515/9783110727302-002</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
5	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	Complexes containing carbon monoxide: synthesis, reactivity, structure, bonding and therapeutic aspects of carbon	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-003">https://doi.org/10.1515/9783110727302-003</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
6	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	Advantageous role of gaseous signalling molecule, H <sub>2</sub> S: hydrogen sulphide and their respective donors, in ophthalmic diseases and	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-004">https://doi.org/10.1515/9783110727302-004</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
7	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	The International System of Units, fundamental physical constants and conversion factors	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-005">https://doi.org/10.1515/9783110727302-005</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG

8	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	Body mass index (BMI): an indicator of our body fat	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-006">https://doi.org/10.1515/9783110727302-006</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
9	Ram Charitra Maurya	Bioinorganic Chemistry: Some New Facets	Amino acids, the building blocks of proteins: names, symbols, structures, properties and some physical constants	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727302-007">https://doi.org/10.1515/9783110727302-007</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
10	RC Maurya, JM Mir, PK Vishwakarma	A Recent Study on the Synthesis and DFT Collaborated Experimental Characterization of Some Pyrazolone Functionalized Dioxovanadium (V) Schiff Base Complexes	Current Perspectives on Chemical Sciences Vol. 10	Not Applicable	Not Applicable	International	2021-22	ISBN: 978-93-90888-43-6	Rani Durgavati University, Jabalpur	B P International
11	Rishibha Dixit	Handbook of Greener Synthesis of Nanomaterials and Compounds Volume 2: Synthesis At the Macroscale and Nanoscale	Greener synthesis of enzymes from marine microbes using nanomaterials	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1016/B978-0-12-822446-5.00005-8">https://doi.org/10.1016/B978-0-12-822446-5.00005-8</a>	Rani Durgavati University, Jabalpur	Elsevier
12	Ashish Garg	Advanced Drug Delivery Systems in the Management of Cancer	Chapter 12 - Advanced drug delivery systems in blood cancer	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1016/B978-0-323-85503-7.00008-0">https://doi.org/10.1016/B978-0-323-85503-7.00008-0</a>	Rani Durgavati University, Jabalpur	Academic Press.
13	Ashish Garg	Nanomedical Drug Delivery for Neurodegenerative Diseases	Nanoparticle-mediated delivery of AChE inhibitors for the treatment of Alzheimer's disease	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1016/B978-0-323-85544-0.00004-6">https://doi.org/10.1016/B978-0-323-85544-0.00004-6</a>	Rani Durgavati University, Jabalpur	Academic Press
14	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Valence shell electron pair repulsion (VSEPR) theory: principles and applications	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-001">https://doi.org/10.1515/9783110727289-001</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
15	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Delocalized $\pi$ -bonding in polyatomic molecules: molecular orbital approach	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-001">https://doi.org/10.1515/9783110727289-001</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
16	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Chemistry of borane and related compounds: structure, bonding and topology	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-003">https://doi.org/10.1515/9783110727289-003</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
17	RC Maurya	Inorganic Chemistry: Some New Facets	Not Applicable	Not Applicable	Not Applicable	International	2021-22	ISBN: 978-3-11-072728-09	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG

18	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Synthesis and reactivity of metal clusters, and their bonding based on molecular orbital approach	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-004">https://doi.org/10.1515/9783110727289-004</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
19	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Stability constants of metal complexes: some aspects	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-005">https://doi.org/10.1515/9783110727289-005</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
20	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Principles of magnetochemistry and its multiple applications in coordination compounds	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-006">https://doi.org/10.1515/9783110727289-006</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
21	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Mechanism of inorganic reactions: a study of metal complexes in solution	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-007">https://doi.org/10.1515/9783110727289-007</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
22	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Bonding in transition metal complexes: molecular orbital theory approach	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-008">https://doi.org/10.1515/9783110727289-008</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
23	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Bonding in organometallic sandwich compounds: molecular orbital theory approach	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-009">https://doi.org/10.1515/9783110727289-009</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
24	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Nomenclature of inorganic compounds: the rules	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-013">https://doi.org/10.1515/9783110727289-013</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
25	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Some aspects of safe and economical inorganic experiments at UG and PG levels	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-010">https://doi.org/10.1515/9783110727289-010</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
26	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Some aspects of modern periodic table	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-011">https://doi.org/10.1515/9783110727289-011</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
27	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Units, fundamental physical constants and conversions	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-012">https://doi.org/10.1515/9783110727289-012</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG



28	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Symmetry operations and point groups in molecules	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-014">https://doi.org/10.1515/9783110727289-014</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
29	Ram Charitra Maurya	Inorganic Chemistry: Some New Facets	Prediction of infrared and Raman active modes in molecules belonging to icosahedral (Ih) point group	Not Applicable	Not Applicable	International	2021-22	<a href="https://doi.org/10.1515/9783110727289-015">https://doi.org/10.1515/9783110727289-015</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
30	Kamlesh Mishra and Brahmanand Tripathi	Madhya Pradesh ke Loksanskriti ka Pradeshik Bhugol (Hindi)		Not Applicable	Not Applicable	National	2021-22	ISBN: 9789352081943	Rani Durgavati University, Jabalpur	Om Publications
31	Jaya Shukla	Sudhakar Shukla ki Kratio Me Sanskratik Chetna	Not Applicable	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-81-7854-3888-8	Rani Durgavati University, Jabalpur	Estern Book Linkers
32	Jaya Shukla	Swami Charitchintamani Mahakavya me Darshanik Tatwa	Not Applicable	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-81-7854-389-5	Rani Durgavati University, Jabalpur	Estern Book Linkers
33	Harish Chandra	Vivekanand aur Rastra Nirman	Not Applicable	Not Applicable	Not Applicable	National	2021-22	ISBN: 10: 939158019X	Rani Durgavati University, Jabalpur	R.P. Publication, New Delhi
34	S.P. Gautam	Shri Ramcharitmanas me Adhyatm avam Vigyan	Not Applicable	Not Applicable	Not Applicable	National	2021-22	Not Applicable	Rani Durgavati University, Jabalpur	Prakash Printers, Bhopal
35	Vipula Singh	संत साहित्य एवं मानसिक स्वास्थ्य	कबीर के साहित्य में मानसिक स्वास्थ्य	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-81-951646-0-8	Rani Durgavati University, Jabalpur	संकल्प प्रकाशन, कागपुर
36	Vipula Singh	समकालीन भारतीय परिदृश्य : युद्ध एवं चुनौतियाँ	सिनेमा और स्त्री उत्पीड़न	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-9381247-63-1	Rani Durgavati University, Jabalpur	श्रीवांशी प्रकाशन, आगरा
37	Tej Ram Pal	Ghandhi-Drasti ki Sarthakata	Not Applicable	Not Applicable	Not Applicable	National	2021-22	ISBN: 0974-8849	Rani Durgavati University, Jabalpur	Akhil Bharteey Darshan Parishad

38	Tribhuvannath Shukla	Arthvigyan ki Bharatiya evam Pashchatya parampara ka Arthi sidhanta	Bhasha	Not Applicable	Not Applicable	National	2021-22	ISSN 0523-1418	Rani Durgavati University, Jabalpur	Kendriya Hindi Nideshalaya, Govt. of India
39	Asha Rani	आधुनिक हिंदी कविता में राष्ट्रीय चेतना	'मैथिलीशरण युक्त की कविताओं में राष्ट्रीय चेतना'	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-93-90868-03-2	Rani Durgavati University, Jabalpur	नमन् प्रकाशन नई दिल्ली
40	Rani Baidya	Covid-19 and Teacher Education	Korona kal me Prabhavi Toli Communication Pranali Ka Udghos	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-93-91903-55-8	Rani Durgavati University, Jabalpur	RFI Publication
41	Leena Haldkar	New Education Policy and Libraries	Not Applicable	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-93-93913-10-4	Rani Durgavati University, Jabalpur	Government College, Barghat, Seoni (MP)
42	Nidhi Darbari	MICRO TEACHING & TEACHING SKILLS	Not Applicable	Not Applicable	Not Applicable	national	2021-22	ISBN: 978-93-90897-35-3	Rani Durgavati University, Jabalpur	Neelkamal Publications Pvt. Ltd.
43	Asha Rani	रामचरितमानस में नारी	'नारी संघर्ष का प्रमाणिक ग्रंथ रामचरितमानस'	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-93-91018-23-8	Rani Durgavati University, Jabalpur	नालंदा प्रकाशन, दिल्ली।
44	Amrisha Deshmukh	Shodh Unayan	Study of the interest of students in pursuing higher education through ODI Mode in covid period and their interest in involving themselves in adult education	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-93-5493-5763	Rani Durgavati University, Jabalpur	Janmat power research foundation and publication , Bhopal (M.P.)
45	Amrisha Deshmukh	Sarthi	Guru brahma guru vishnu guru devo maheshwara	Not Applicable	Not Applicable	National	2021-22	Not Applicable	Rani Durgavati University, Jabalpur	
46	Vipula Singh	Bhartvanshi avm Pravasi Sahitya ke Bibidhi Sopan	Not Applicable	Not Applicable	Not Applicable	National	2021-22	978-93-91777-08-01	Rani Durgavati University, Jabalpur	Rajpublishing Housh Jaipur

47	Satya Prakash Tripathi	Role of Digital Libraries in Distance Education	Not Applicable	Not Applicable	Not Applicable	National	2021-22	ISBN: 978-93-93913-10-4	Rani Durgavati University, Jabalpur	Government College, Barghat, Seoni (MP)
Year-2:2020-21										
1	Pravesh Kumar Pandey	Dr. Bheem Rao Ambedkar Ke Vichar	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN-978-81-941938-5-2	Rani Durgavati University, Jabalpur	University Publication, New Delhi, . Page-1-143.
2	Nitin Swamy, Sardul Singh Sandhu	Fungi Bio-Prospects in Sustainable Agriculture, Environment and Nano-Technology	Fungal endophytes: Entry, establishment, diversity, future prospects in agriculture	Not Applicable	Not Applicable	International	2020-21	ISBN-978-0-12-821394-0	Rani Durgavati University, Jabalpur	Academic Press
3	Poonam Verma, Suneel Kumar, Mridul Shakya, Sardul Singh Sandhu	Microbial Rejuvenation of Polluted Environment	VAM: An Alternate Strategy for Bioremediation of Polluted Environment	Not Applicable	Not Applicable	International	2020-21	ISBN-978-981-15-7446-7	Rani Durgavati University, Jabalpur	Springer, Singapore
4	Mridul Shakya, Poonam Verma, Sunil Kumar, Sardul Singh Sandhu	Microbial Rejuvenation of Polluted Environment	Microbes: A Novel Source of Bioremediation for Degradation of Hydrocarbons	Not Applicable	Not Applicable	International	2020-21	ISBN-978-981-15-7446-7	Rani Durgavati University, Jabalpur	Springer, Singapore
5	Poonam Verma, Mridul Shakya, Suneel Kumar, Sardul Singh Sandhu	Microbial metabolites: as sources of green dye	Not Applicable	Not Applicable	Not Applicable	International	2020-21	ISBN-978-0-12-821734-4	Rani Durgavati University, Jabalpur	Academic Press
6	Loknath Deshmukh, Rajendra Singh, Sardul Singh Sandhu	Broad Efficacy of Scavenging Free Radicals: Cordyceps sp	Not Applicable	Not Applicable	Not Applicable	International	2020-21	ISBN-978-1-83968-864-5	Rani Durgavati University, Jabalpur	IntechOpen

7	Divya Singh	Microbes as Biocontrol Agents	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN-978-81-949205-1-9	Rani Durgavati University, Jabalpur	Krishna Publication House
8	Renu Pathak	Probiotics	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN-978-81-949205-1-9	Rani Durgavati University, Jabalpur	Krishna Publication House
9	A.K Pandey	Waste to Energy : Prospects and Applications.	Not Applicable	Not Applicable	Not Applicable	International	2020-21	ISBN-978-981-33-4346-7	Rani Durgavati University, Jabalpur	Springer
10	Dheerendra Kumar	Mathematical Modeling on Micro-Circulation”	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN-978-81-945263-1-5.	Rani Durgavati University, Jabalpur	MACKHINGEE PUBLISHER New Delhi
11	Satya Prakash Tripathi	Not Applicable	Human Library : A New way of Tacit knowledge sharing	Proceedings of National Seminar on Repositioning of Public Libraries in Changing Society : Problems and Prospects	Proceedings of National Seminar on Repositioning of Public Libraries in Changing Society : Problems and Prospects	National	2020-21	ISBN-978-81-941218-2-4	Rani Durgavati University, Jabalpur	Government Public Library, Prayagraj (UP)
12	Subhash Chandra Sharma	Edited Commemoration Volume, Sangharshsheel jeevan yatra ke swarnim hastakshar: Dr. Bajjnath Sharma Abhinandan Granth',	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN-978-81-942012-2-9	Rani Durgavati University, Jabalpur	Godfather Print Systems, Jabalpur
13	Satya Prakash Tripathi	Impact of Big Data in Library Management	Empowering Libraries with Emerging Technologies for Common Sustainable Future	Not Applicable	Not Applicable	National	2020-21	ISBN-978-03-81156-69-8	Rani Durgavati University, Jabalpur	Variesty Books Publishers Distributors, New Delhi

14	Reena Mishra	Sanskrit Ratnakar	Yoga Nidra: A Meditative Technique Of Relaxing Body And mind	Not Applicable	Not Applicable	National	2020-21	ISBN: 2395-3055	Rani Durgavati University, Jabalpur	Akhil Bhartiya Sanskrit Sathya Sammelan
15	Ashish Sharma	LIFE WITH PANDEMIC: A GLOBAL PERSPECTIVE		Not Applicable	Not Applicable	National	2020-21	ISBN-10 8194929202	Rani Durgavati University, Jabalpur	EXCELLENT PUBLISHING HOUSE
16	Ranjna Pandey Mishra	GLOBAL WARMING AND SUSTAINABLE DEVELOPMENT	Clean Development Mechanism: A strategy towards Sustainable Development	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-81-946216-4-5	Rani Durgavati University, Jabalpur	ISSMWA Publisher
17	Ranjna Pandey Mishra	SOCIO-ECONOMIC CHALLENGES AND POSSIBILITIES	Social Sustainability through Women Empowerment: An Integrated approach towards Management of Domestic Violence	Not Applicable	Not Applicable	National	2020-21	ISBN:978-81-946098	Rani Durgavati University, Jabalpur	ISSMWA Publisher
18	Deepti Jain	Mechanics	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN-978-93-862331-62-9	Rani Durgavati University, Jabalpur	Madhav Prakashan, Agra
19	M. Ramrakhiani	Not Applicable	Quantum size effects on PL decay time and oscillator strength of semiconductor quantum dots	AIP Conference Proceedings	International Conference on Physics and Chemistry of Materials in Novel Engineering Applications	International	2020-21	ISBN: 978-0-7354-3998-6	Rani Durgavati University, Jabalpur	AIP Publishing
20	Rakesh Bajpai	Not Applicable	Poly (vinyl alcohol) supported flexible films of graphene oxide and reduced graphene oxide and their structural study	AIP Conference Proceedings	International Conference on Physics and Chemistry of Materials in Novel Engineering Applications: PCMNEA20 20_KCT	International	2020-21	<a href="https://doi.org/10.1063/5.0025343">https://doi.org/10.1063/5.0025343</a>	Rani Durgavati University, Jabalpur	AIP Publishing

21	Rakesh Bajpai	Not Applicable	Absorption and crystalline studies on reduced graphene oxide:poly(vinyl alcohol) polymer nano composites films	AIP Conference Proceedings	International Conference on Physics and Chemistry of Materials in Novel Engineering Applications: PCMNEA2020_KCT	International	2020-21	ISBN: 978-0-7354-3998-6	Rani Durgavati University, Jabalpur	AIP Publishing
22	J.M. Keller	Not Applicable	Investigation of Electrical Conduction in Polysulfone Polyvinylidene Fluoride Blends at High Temperature and Field	AIP Conference Proceedings	3rd International Conference on Condensed Matter and Applied Physics (ICC-2019)	International	2020-21	<a href="https://doi.org/10.1063/5.0001242">https://doi.org/10.1063/5.0001242</a>	Rani Durgavati University, Jabalpur	AIP Publishing
23	J.M. Keller	Not Applicable	Evaluation of DC and AC Conducting Properties of Poly (diaminophthalene) Conjugated Polymer Doped in Poly (vinyl alcohol) Films	AIP Conference Proceedings	3rd International Conference on Condensed Matter and Applied Physics (ICC-2019)	International	2020-21	<a href="https://doi.org/10.1063/5.0002212">https://doi.org/10.1063/5.0002212</a>	Rani Durgavati University, Jabalpur	AIP Publishing
24	J.M. Keller and Prof. Rakesh Bajpai	Not Applicable	Microhardness study of binary blend of Polyvinyl Formal and Polyvinylidene Fluoride	AIP Conference Proceedings	3rd International Conference on Condensed Matter and Applied Physics (ICC-2019)	International	2020-21	<a href="https://doi.org/10.1063/5.0001253">https://doi.org/10.1063/5.0001253</a>	Rani Durgavati University, Jabalpur	AIP Publishing
25	J.M. Keller	Not Applicable	Short Circuit Depolarization Behaviour of PVDF and PVAc Blends	AIP Conference Proceedings	3rd International Conference on Condensed Matter and Applied Physics (ICC-2019)	International	2020-21	<a href="https://doi.org/10.1063/5.0002155">https://doi.org/10.1063/5.0002155</a>	Rani Durgavati University, Jabalpur	AIP Publishing
26	J.M. Keller	Not Applicable	Structural –Morphological relative study of Polyphenylene Oxide and Polystyrene (PS: PPO) polymer blends	AIP Conference Proceedings	3rd International Conference on Condensed Matter and Applied Physics (ICC-2019)	International	2020-21	<a href="https://doi.org/10.1063/5.0002547">https://doi.org/10.1063/5.0002547</a>	Rani Durgavati University, Jabalpur	AIP Publishing
27	J.M. Keller	Not Applicable	A study of the optical band gap energy and Urbach energy of fullerene (C60) doped PMMA nano-composites	AIP Conference Proceedings	International Conference on Physics and Chemistry of Materials in Novel Engineering Applications	International	2020-21	<a href="https://doi.org/10.1063/5.0019420">https://doi.org/10.1063/5.0019420</a>	Rani Durgavati University, Jabalpur	AIP Publishing

28	Purnima Beohar	Water quality concepts, sampling and analysis : an experimental approach.	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-620-2-68188-9	Rani Durgavati University, Jabalpur	LAP LAMBERT Academic Publishing
29	Mamta Rao	Constitutional Law + The Constitution of India	Not Applicable	Not Applicable	Not Applicable	International	2020-21	ISBN: 9350289490	Rani Durgavati University, Jabalpur	Estern Book Company (EBC)
30	Ashish Garg, Sweta Garg, Nitin Kumar Swarnakar	Nanoparticles and prostate cancer	Nano Drug Delivery Strategies for the Treatment of Cancers	Not Applicable	Not Applicable	International	2020-21	ISBN: 978-0-12-819793-6	Rani Durgavati University, Jabalpur	Academic Press
31	Trashi Singh , Payal Basu , Tanim Arpit Singh , Siddharth Boudh , Pradeep Shukla	Cyanobacteria as source of novel antimicrobials: a boon to mankind	Microorganisms for Sustainable Environment and Health	Not Applicable	Not Applicable	International	2020-21	ISBN: 9780128190043, 0128190043	Rani Durgavati University, Jabalpur	Elsevier Science
32	Trashi Singh , Payal Basu , Tanim Arpit Singh , Siddharth Boudh <sup>3</sup> , Pradeep Shukla	Understanding and combating the antibiotic resistance crisis	Microorganisms for Sustainable Environment and Health	Not Applicable	Not Applicable	International	2020-21	ISBN: 9780128190043, 0128190043	Rani Durgavati University, Jabalpur	Elsevier Science
33	Vikas Pandey , Rajesh Shukla , Ashish Garg , Mohan Lal Kori , Gopal Rai	Nanoemulsion in cosmetic: from laboratory to market	Not Applicable	Not Applicable	Not Applicable	International	2020-21	ISBN 9780128222850, 0128222859	Rani Durgavati University, Jabalpur	Elsevier Science
34	Tribhuvannath Shukla, Lokesh Shrivastava, Jyoti Shrivastava	Paryavaraniya Adhyayan	Not Applicable	Not Applicable	Not Applicable	National	2020-21	Not Applicable	Rani Durgavati University, Jabalpur	Madhya Pradesh Hindi Granth Academy, Bhopal

35	Ashish Sharma	Small Prescription big doze	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN 978-164783-4846	Rani Durgavati University, Jabalpur	Norton Press
36	Ashish Sharma	Not Applicable	Consumer Behaviors Status During Coivid19 On Product Planning And Product Life Cycle	Consumer Behaviors Status During Coivid19 On Product Planning And Product Life Cycle	Proceedings of the 12th international conference on the theme "Digitalization as a vehicle for innovation , organizationa l growth and effectiveness"	National	2020-21	eISBN 978-93-5408-778-3	Rani Durgavati University, Jabalpur	Prestige Institute of Management, Gwalior
37	Hitendra Bargal, Vinod Kumar Patel, Ashish Sharma	Life with pandemic: A global perspective	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-8194929208	Rani Durgavati University, Jabalpur	Excellent Publishing House
38	Ranjana Pandey Mishra	Social sustainability through women empowerment an integrated approach towards management of domestic violence	Life with pandemic: A global perspective	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-8194929208	Rani Durgavati University, Jabalpur	Excellent Publishing House
39	Balkrishna Bhardwaj and Ramdev Bhardwaj	Jeevan aur Darshan	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 9390700914	Rani Durgavati University, Jabalpur	Indra Publishing House
40	Ramdev Bhardwaj	Antah : Samvad (Kavita Sangrah)	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ASIN: B08F5F66M9	Rani Durgavati University, Jabalpur	Space Publishing House; First edition
41	Ramdev Bhardwaj	Corona Kendrit Vishva Aur Bharat	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 8194648785	Rani Durgavati University, Jabalpur	Indra Publishing House



42	Ramdev Bhardwaj	ADHUNIK CHEEN : SANSKRITI, SAHITYA, RAJNITI AUR RAJNAYA		Not Applicable	Not Applicable	National	2020-21	ISBN: 9382695052	Rani Durgavati University, Jabalpur	HINDI BOOK CENTRE
43	Vijaya Sunder	Social Philosophy and Yoga for Environmental Harmony	Yoga for Wellness : Health & Harmony	Social Philosophy and Yoga for Environmenta l Harmony		International	2020-21	ISBN: 978-81- 942149-5-3	Rani Durgavati University, Jabalpur	Siddhaprakashana, Siddharudhanagar, Karnatka
44	Tribhuvannath Shukla	Vidyapati	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 81-85957- 42-8	Rani Durgavati University, Jabalpur	Jaybharati Prakashan, Allahabad
45	Tribhuvannath Shukla	Bharatiya bal Sahitya Ka Itikas	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-93- 82422-42-6	Rani Durgavati University, Jabalpur	R.K. Offset, Delhi
46	Tribhuvannath Shukla	Awadhi Sahitya Ka Alochnatmak Itihas	Not Applicable	Not Applicable	Not Applicable	National	2020-21	Not Applicable	Rani Durgavati University, Jabalpur	Hindi Book Center
47	Tribhuvannath Shukla	Bharatiya bal Sahitya Ka Itihaas	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-93- 82422-42-6	Rani Durgavati University, Jabalpur	Kashyap Publications, Gaziabad
48	Reena Mishra	Bharteey Tatva Chintan Ke Kalash Purus	Yoga Nidra: A Meditative Technique Of Relaxing Body And mind	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-93- 85446-93-1	Rani Durgavati University, Jabalpur	Twenty First Century Publication Patala

49	Reena Mishra	Yog Tatva(Swami Vivekanand Paramhans Yoganand ke Sandarbhb me)	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-81-931674-8-9	Rani Durgavati University, Jabalpur	Bookman Delhi
50	Reena Mishra	Rajyog The Holistic Approach for Human Conciousness	Not Applicable	Not Applicable	Not Applicable	National	2020-21	ISBN: 978-03-83292-43-1	Rani Durgavati University, Jabalpur	Alfa Publication New Delhi

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1	Pravesh Kumar Pandey	Environmental Sustainability and Human Health	Covid-19 or Samajik Parivartan	Not Applicable	Not Applicable	National	2019-20	ISBN- 978-93-88336-38-3	Rani Durgavati University, Jabalpur	ISSMWA Publisher
2	Pravesh Kumar Pandey, Dr.Ashish Yadav	Bharat Pakistan Sambandh	Not Applicable	Not Applicable	Not Applicable	National	2019-20	ISBN – 978-81-920322-2-1.	Rani Durgavati University, Jabalpur	Vikash Publishers and Distributers, New Delhi – Page-1-173.
3	Tejram Pal	Gandhi Darshan	Not Applicable	Not Applicable	Not Applicable	National	2019-20	ISBN: 978-81-947936-0-1	Rani Durgavati University, Jabalpur	Akhand Publishing House, New Delhi
4	S. S. Pandey	Elements_of Wiener Amalgams	Not Applicable	Not Applicable	Not Applicable	International	2019-20	ISBN: 978-3659961008	Rani Durgavati University, Jabalpur	LAP LAMBERT Academic Publishing
5	Poonam Verma, Suneel Kumar, Mridul Shakya, Sardul Singh Sandhu	Panpatte, Deepak G., Jhala, Yogeshvari K. (Eds.) Microbial Rejuvenation of Polluted Environment	VAM: An alternative strategy for bioremediation of polluted environment. Microbial rejuvenation of	Not Applicable	Not Applicable	International	2019-20	ISBN 978-981-15-7447-4	Rani Durgavati University, Jabalpur	Springer Nature
6	Juhi Sharma, Divakar Sharma, Anjana Sharma, Vaishali Vishwakarma, Anshul Dubey, Himesh Namdeo.	Singh, J., Vyas, A., Wang, S., Prasad, R. (Eds.) Microbial Biotechnology: Basic Research and Applications	The Contribution of Microbial Biotechnology for Achieving Sustainable Development. In: Microbial Biotechnology.	Not Applicable	Not Applicable	International	2019-20	ISBN 978-981-15-2817-0	Rani Durgavati University, Jabalpur	Springer Nature, Singapore pp.1-18
7	Mridul Shakya, Poonam Verma, Suneel Kumar, Sardul Singh Sandhu	Panpatte, Deepak G., Jhala, Yogeshvari K. (Eds.) Microbial Rejuvenation of Polluted Environment	Microbes: A novel source of Bioremediation for degradation of Hydrocarbon.	Not Applicable	Not Applicable	International	2019-20	ISBN 978-981-15-7447-4	Rani Durgavati University, Jabalpur	Springer Nature

8	RC Maurya, JM Mir	NO-, CO-, and H2S-Based Metallopharmaceuticals	Advances in Metallo drugs: Preparation and Applications in Medicinal Chemistry	Not Applicable	Not Applicable	International	2019-20	ISBN:9781119640424 <a href="https://doi.org/10.1002/9781119640868.ch6">https://doi.org/10.1002/9781119640868.ch6</a>	Rani Durgavati University, Jabalpur	Scrivener Publishing LLC
9	Jain, A., Verma, K.K.	Single-drop microextraction	Liquid-Phase Extraction, pp. 439-472.	Not Applicable	Not Applicable	International	2019-20	<a href="https://doi.org/10.1016/B978-0-12-816911-7.00015-3">https://doi.org/10.1016/B978-0-12-816911-7.00015-3</a>	Rani Durgavati University, Jabalpur	Elsevier Inc.
10	Ahirwal L, Singh D and Verma NK	Mahobiya P(ed.) An overview of toxicant.	Dioxins 'Ahirwal L, Singh D and Verma NK	Not Applicable	Not Applicable	National	2019-20	ISBN: 9789383837977	Rani Durgavati University, Jabalpur	Global Books Organization, pp. 43-66
11	Singh D and Ahirwal L	Mahobiya P(ed.) An overview of toxicant.	Cyanotoxin' Singh D and Ahirwal L	Not Applicable	Not Applicable	National	2019-20	ISBN: 9789383837977	Rani Durgavati University, Jabalpur	Global Books Organization, pp 1-23
12	Satya Prakash Tripathi	Academic Libraries-Collection to Connectivity	Libraries and Crowdsourcing	Not Applicable	Not Applicable	National	2019-20	ISBN: 978-81-8329-948-0	Rani Durgavati University, Jabalpur	Shree Publishers and Distributors, New Delhi
13	RC Maurya	Molecular Symmetry and Group Theory Approaches in Spectroscopy and Chemical Reactions	Not Applicable	Not Applicable	Not Applicable	International	2019-20	<a href="https://doi.org/10.1515/9783110635034">https://doi.org/10.1515/9783110635034</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
14	RC Maurya	Molecular symmetry and group theoretical approach of chemical bonding	Not Applicable	Not Applicable	Not Applicable	International	2019-20	ISBN: 9783110635126	Rani Durgavati University, Jabalpur	Lambert academic publishing
15	Asha Rani	श्रीदिया विमर्श विविध आयाम.	ehM:k dh Hkk"kk vkSj lkekftd ifjorZu*	Not Applicable	Not Applicable	National	2019-20	ISBN: 978-93-86439-81-9	Rani Durgavati University, Jabalpur	jk/kk ifCyds'ku] ubZ fnYyh
16	Deepti Jain	Academic Orientation and Academic Staff College	Not Applicable	Not Applicable	Not Applicable	National	2019-20	ISBN-978-81-8329-969-5	Rani Durgavati University, Jabalpur	Shree publishers and Distributors, New Delhi,
17	P.K. Khare	Not Applicable	Study of dielectric relaxation and persistence of polarization in polysulfone foils sensitized with malachite green using transient	AIP Conference Proceedings	Advances in Basic Science (ICABS 2019)	International	2019-20	ISBN: 978-0-7354-1885-1	Rani Durgavati University, Jabalpur	AIP Publishing

18	M. Ramrakhiani	Not Applicable	Synthesis and Electroluminescence in CdSe nanocrystals	AIP Conference Proceedings	Advances in Basic Science (ICABS 2019)	International	2019-20	ISBN: 978-0-7354-1885-1	Rani Durgavati University, Jabalpur	AIP Publishing
19	Rakesh Bajpai	Not Applicable	Crystalline and absorption studies on cadmium sulphide doped polycarbonate composite	AIP Conference Proceedings	Prof. Dinesh Varshney memorial National Conference on Physics and Chemistry of	International	2019-20	ISBN: 978-0-7354-1830-1	Rani Durgavati University, Jabalpur	AIP Publishing
20	J.M. Keller	Not Applicable	Variation of micro-hardness of titanium oxide doped poly (methyl methacrylate) composite samples with	AIP Conference Proceedings	Prof. Dinesh Varshney memorial National Conference on Physics and Chemistry of	International	2019-20	<a href="https://doi.org/10.1063/1.5098706">https://doi.org/10.1063/1.5098706</a>	Rani Durgavati University, Jabalpur	AIP Publishing
21	Dr. R. Bhatt	Encyclopedia of Polymer Applications, First Edition	Sensors: Advanced Aptasensors Design	Not Applicable	Not Applicable	National	2019-20	10.1201/9781351019422-140000460	Rani Durgavati University, Jabalpur	Taylor & Francis Publishing
22	R. C. Maurya and J.M. Mir	Symmetry elements and symmetry operations: molecular symmetry	Molecular Symmetry and Group Theory: Approaches in Spectroscopy and Chemical Reactions	Not Applicable	Not Applicable	International	2019-20	<a href="https://doi.org/10.1515/9783110635034-001">https://doi.org/10.1515/9783110635034-001</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
23	R. C. Maurya and J.M. Mir	Application of group theory to electronic spectroscopy	Molecular Symmetry and Group Theory: Approaches in Spectroscopy and Chemical Reactions	Not Applicable	Not Applicable	International	2019-20	<a href="https://doi.org/10.1515/9783110635034-002">https://doi.org/10.1515/9783110635034-002</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
24	Tribhuvannath Shukla	Vani Hindi Angraji Kosh	Not Applicable	Not Applicable	Not Applicable	National	2019-20	ISBN:978-93-88434-10-2	Rani Durgavati University, Jabalpur	Vani Prakashan, New Delhi
25	Tribhuvannath Shukla	Hindi Bhili Adhyeta Kosh	Not Applicable	Not Applicable	Not Applicable	National	2019-20	ISBN: 978-93-88039-03-1	Rani Durgavati University, Jabalpur	Kendriya Hindi Sansthan, Agra
26	R. C. Maurya and J.M. Mir	Molecular symmetry and group theory to vibrational spectroscopy	Molecular Symmetry and Group Theory: Approaches in Spectroscopy and Chemical Reactions	Not Applicable	Not Applicable	International	2019-20	<a href="https://doi.org/10.1515/9783110635034-003">https://doi.org/10.1515/9783110635034-003</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
27	R. C. Maurya and J.M. Mir	Chemical reactions: orbital symmetry rules	Molecular Symmetry and Group Theory: Approaches in Spectroscopy and Chemical Reactions	Not Applicable	Not Applicable	International	2019-20	<a href="https://doi.org/10.1515/9783110635034-004">https://doi.org/10.1515/9783110635034-004</a>	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG

28	R. C. Maurya, J.M. Mir	Molecular Symmetry and Group Theory: Approaches in Spectroscopy and Chemical Reactions	Not Applicable	Not Applicable	Not Applicable	International	2019-20	ISBN: 9783110635126, 3110635127	Rani Durgavati University, Jabalpur	Walter de Gruyter GmbH & Co KG
29	Taruna Rathaur	Brics Constitutional Framework	Not Applicable	Not Applicable	Not Applicable	National		ISBN 978-93-89499-82-7	Rani Durgavati University, Jabalpur	BPAE-143 -IGNOU
30	Taruna Rathaur	Brics Legislature	Not Applicable	Not Applicable	Not Applicable	National		ISBN: 978-93-89499-82-7	Rani Durgavati University, Jabalpur	BPAE-143 -IGNOU
31	Taruna Rathaur	Brics Excutive	Not Applicable	Not Applicable	Not Applicable	National		ISBN: 978-93-89499-82-7	Rani Durgavati University, Jabalpur	BPAE-143 -IGNOU
32	Ramdev Bhardwaj	राजनय एवं मानवधिकार, (सातकोत्तर)	Not Applicable	Not Applicable	Not Applicable	National	2019-20	Not Applicable	Rani Durgavati University, Jabalpur	Hindi Granth Academy, Bhopal
33	Ramdev Bhardwaj	अंतर्राष्ट्रीय राजनीति और समसामयिक राजनीतिक मुद्दे (सातकोत्तर)	Not Applicable	Not Applicable	Not Applicable	National	2019-20	Not Applicable	Rani Durgavati University, Jabalpur	Hindi Granth Academy, Bhopal
34	D.J. Bagyaraj, Jamaluddin	Microbes for Plant Stress Management	Not Applicable	Not Applicable	Not Applicable	International	2019-20	ISBN: 9780367140717	Rani Durgavati University, Jabalpur	CRC Press

**Year-4:2018-19**

1	Dr Mamata Rao	Law Relating to Women and Children	Not Applicable	Not Applicable	Not Applicable	International	2018-19	ISBN: 97893888225	Rani Durgavati University, Jabalpur	EBC Explorer
2	Indu Thakur	Janjatiya samaj me Prajnan swasthya	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN-978-81-7555-801-0	Rani Durgavati University, Jabalpur	University Publication, New Delhi 11003

3	C.S.S Thakur	Janjatiya samaj me Prajnan swasthya	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN-978-81-7555-801-0	Rani Durgavati University, Jabalpur	University Publication, New Delhi 11003
4	Tripti Majhi and other	Janjatiya samaj me Prajnan swasthya	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN-978-81-7555-801-0	Rani Durgavati University, Jabalpur	University Publication, New Delhi 11003
5	Vijaya Sunder	Global Philosophy and Yoga for A New World Order	Love of my Life : Health	Global Philosophy and Yoga for A New World Order	Not Applicable	International	2018-19	ISBN-978-81-924572-6-0	Rani Durgavati University, Jabalpur	Siddhaprakashana, Siddharudhanagar, Karnatka
6	Bharat Kumar Tiwari	Paryavarniya Naitikta evm Manviya Mulya	Paryavaran Sanrakshan me Naitik Mulyon ki Upyogita	Not Applicable	Not Applicable	National	2018-19	ISBN-978-93-81022-87-0	Rani Durgavati University, Jabalpur	Aasha Prakashan, Kanpur
7	Bagchi SN and Singh P	T. Satyanarayana et al. (eds.), Microbial Diversity in Ecosystem Sustainability and Biotechnological Applications	Importance of Cyanobacterial Taxonomy in Biotechnological Applications	Not Applicable	Not Applicable	International	2018-19	ISBN: 97898113831	Rani Durgavati University, Jabalpur	Springer Nature Singapore Pte Ltd. 2019. <a href="https://doi.org/10.1007/978-981-13-8315-1_13">https://doi.org/10.1007/978-981-13-8315-1_13</a> .
8	Loknath Deshmukh, B Sen R., Mukherjee S., B		Far Ranging Antim	Not Applicable	Not Applicable	National	2018-19	ISBN: 97810030016	Rani Durgavati Unive	CRC Press London
9	Loknath Deshmukh, Diva Gupta , Sardul Singh Sandhu	Rita Kundu; Rajiv Narula eds. Advances in Plant & Microbial Biotechnology	Development of Marker in the Soft Gold Mushroom Cordyceps spp. for Strain Improvement	Not Applicable	Not Applicable	International	2018-19	ISBN: 9789811363214 9811363218	Rani Durgavati University, Jabalpur	Springer Singapore
10	Tribhuvannath Shukla	Awadhi Lok Sahitya - B	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-8868	Rani Durgavati University, Jabalpur	Vani Prakashan, New De
11	Tribhuvannath Shukla	Brihat Hindi Kosh	Not Applicable	Not Applicable	Not Applicable	National	2018-19	Not Applicable	Rani Durgavati University, Jabalpur	Kendriya Hindi Sikshan N

12	Tribhuvannath Shukla	Madhya Kaleen Kavita ka Path	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN:81-85957-33-	Rani Durgavati University, Jabalpur	Jaybharti Prakashan, All
13	Tribhuvannath Shukla	Hindi Limboo Learner Dictionary	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-8803	Rani Durgavati University, Jabalpur	Kendriya Hindi Sansthan,
14	Tribhuvannath Shukla	Veli Kisan Rukmani Ri -Bhag I	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-8868	Rani Durgavati University, Jabalpur	Vani Prakashan, New De
15	Tribhuvannath Shukla	Veli Kisan Rukmani Ri -Bhag II	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-8868	Rani Durgavati University, Jabalpur	Vani Prakashan, New De
16	Tribhuvannath Shukla	Veli Kisan Rukmani Ri -Bhag III	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-8868	Rani Durgavati University, Jabalpur	Vani Prakashan, New De
17	R.C.Maurya and J M Mir	Molecular Symmetry and Group Theory	Not Applicable	Not Applicable	Not Applicable	International	2018-19	ISBN: 9783110635034	Rani Durgavati University, Jabalpur	De Gruyter
18	Bhatt, Rinkesh ; Bagri, Laxmi P, Bajpai, Anil Kumar	Sensors: Advanced Aptasensors Design	Encyclopedia of Polymer Applications	Not Applicable	Not Applicable	International	2018-19	10.1201/9781351019422-140000460	Rani Durgavati University, Jabalpur	CRC Press
19	Himangini Singh	Biological Diversity Conservation and its legal paradigms	Biodiversity Monitoring Management and Utilization	Not Applicable	Not Applicable	National	2018-19	ISBN 10:9351249271	Rani Durgavati University, Jabalpur	Daya Publishing House 2018
20	Mohd. Washid Khan	Atomic orbital geometry stereochemistry and hybridisation of carbon c	Not Applicable	Not Applicable	Not Applicable	International	2018-19	ISBN: 9786202527149	Rani Durgavati University, Jabalpur	Lambert academic publishing

21	R. C. Maurya and P. K. Vishwakarma and P. S. Jaget	Sulpha Drugs, Sulpha Drug Based Ligands and Their Coordination Chemistry	Not Applicable	Not Applicable	Not Applicable	International	2018-19	ISBN: 97893881700	Rani Durgavati University, Jabalpur	Avid Science
22	Abhishek Kumar Awasthi, Jinhui Li, Akhilesh Kumar Pandey & Jamaluddin Khan	An overview of the potential of bioremediation for contaminated soil from municipal solid waste site	Emerging and Eco-Friendly Approaches for Waste Management pp 59-68	Not Applicable	Not Applicable	International	2018-19	<a href="https://link.springer.com/chapter/10.1007/978-981-10-8669-4_3">https://link.springer.com/chapter/10.1007/978-981-10-8669-4_3</a>	Rani Durgavati University, Jabalpur	Springer Singapore
23	Washid Khan	Anthelmintic activity of curcuma carsiarox rhizome in indian adult earthworm	Smart Materials of Medicinal and Industrial Relevance	Not Applicable	Not Applicable	National	2018-19	ISBN: 97893881700	Rani Durgavati University, Jabalpur	avidscience monograph series
24	Deepti Jain	Recent Trends in Teacher Education	Innovative Practices in Teaching"	Not Applicable	Not Applicable	National	2018-19	ISBN-978-81-935942-7-8.	Rani Durgavati Vishwavidyalaya (Department of Education), Jabalpur	SRF Research Journal & Book Publication House, Jabalpur, Page No. 23-27,
25	Nidhi Darbari	Modern Trends in Education	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-85304-45-3	Rani Durgavati University, Jabalpur	Jabalpur Management Association
26	Nidhi Darbari	Recent Trends in Teacher Education	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-81-935942-7-8	Rani Durgavati University, Jabalpur	SRF Research Journal & Book Publication House
27	Amrisha Deshmukh	Examination Reform : Quality issues	Provisions given in examination scheme to learning disabled children	Not Applicable	Not Applicable	National	2018-19	Not Applicable	Rani Durgavati University, Jabalpur	ISSMWA Publisher
28	Prof. M. Ramrakhiani Prof. P.K. Khare	Not Applicable	Electroluminescence in CdSe/PVA nanocomposites	AIP Conference Proceedings	2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)	International	2018-19	ISBN: 978-0-7354-1648-2	Rani Durgavati University, Jabalpur	AIP Publishing
29	Ramrakhiani, M. ; Dubey, Swati ; Waxar, H; Kushwaha, KKSingh, Pranav	Basic principles and theory of the photovoltaic effect	Industrial Applications of Green Solvents: Volume 1	Not Applicable	Not Applicable	International	2018-19	ISBN 978-1-64490-022-2	Rani Durgavati University, Jabalpur	Materials Research Forum LLC



30	Gour, Kavita ; Pathak, Preeti ; Ramrakhiani, M Mor, P.	Photoelectrochemical solar cells using nanocrystalline copper selenide photo electrode	Industrial Applications of Green Solvents, Vol I	Not Applicable	Not Applicable	International	2018-19	ISBN 978-1-64490-022-2	Rani Durgavati University, Jabalpur	Materials Research Forum LLC
31	Pathak, Preeti ; Gour, Kavita ; Mor, P	Photovoltaic response of nanocrystalline cadmium telluride in photoelectrochemical cells	Industrial Applications of Green Solvents, Vol I	Not Applicable	Not Applicable	International	2018-19	ISBN 978-1-64490-022-2	Rani Durgavati University, Jabalpur	Materials Research Forum LLC
32	Waxar, Hemraj ; Ramrakhiani, M.; Singh, P.	Studies on the photovoltaic effect of CdSe based nanocrystalline multilayered photoelectrodes in photoelectrochemical solar cells	Industrial Applications of Green Solvents, Vol I	Not Applicable	Not Applicable	International	2018-19	ISBN 978-1-64490-022-2	Rani Durgavati University, Jabalpur	Materials Research Forum LLC
33	Chandrashekhkar Meshram, Mohammad S. Obaidat, Kuei-Fang Hsiao	An efficient EUF-ID-CMA secure identity-based short signature scheme using discrete logarithm		Proceeding of the 2019 International Conference on Computer, Information and Telecommunication	Not Applicable	International	2018-19	DOI:10.1109/CITS.2019.8862145	Rani Durgavati University, Jabalpur	International Conference on Computer, Information and Telecommunication Systems
34	C.S.S Thakur, Indu T	Prajnan evam Bal swast	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN-978-81-7555-	Rani Durgavati Univer	University Publication, New Delhi 11002
35	S. P. Gautam	Ramcharitmanas Ocean	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 97893803174	Rani Durgavati Univer	Gaurav Book Centre Pvt
36	C.S.S Thakur, Indu Thakur and Tripti Majhi	Janjatiya samaj me Prajnan swasthya	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN-978-81-7555-	Rani Durgavati Univer	University Publication, New Delhi 11003
37	Taruna Rathaur	Beurocratic Approach	Not Applicable	Not Applicable	Not Applicable	National	2018-19	ISBN: 978-93-8949-	Rani Durgavati University, Jabalpur	BPAC 131 -IGNOU
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1	M. Ramrakhiani	Not Applicable	Optical studies of CdSe/PVA nanocomposite films	AIP Conference Proceedings	2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)	International	2017-18	ISBN: 978-0-7354-1648-2	Rani Durgavati University, Jabalpur	AIP Publishing
2	Rakesh Bajpai	Not Applicable	Synthesis and crystalline properties of CdS incorporated polyvinylidene fluoride (PVDF) composite film	AIP Conference Proceedings	2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)	International	2017-18	ISBN: 978-0-7354-1648-2	Rani Durgavati University, Jabalpur	AIP Publishing
3	J.M. Keller	Not Applicable	Polarization behaviour of polyvinylidene fluoride-polysulfone (PVDF: PSE) blends under high field and high temperature condition	AIP Conference Proceedings	2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)	International	2017-18	<a href="https://doi.org/10.1063/1.5032690">https://doi.org/10.1063/1.5032690</a>	Rani Durgavati University, Jabalpur	AIP Publishing
4	J.M. Keller	Not Applicable	Dielectric relaxation behaviour of (poly (vinyl formal)) (PVFO) and polyvinylidene fluoride (PVDF) blends	AIP Conference Proceedings	2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)	International	2017-18	<a href="https://doi.org/10.1063/1.5032689">https://doi.org/10.1063/1.5032689</a>	Rani Durgavati University, Jabalpur	AIP Publishing

5	J.M. Keller	Not Applicable	Study of observed broad dielectric relaxation and compatibility of polysulfone - Polyvinylidene fluoride blends	AIP Conference Proceedings	2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)	International	2017-18	<a href="https://doi.org/10.1063/1.5032688">https://doi.org/10.1063/1.5032688</a>	Rani Durgavati University, Jabalpur	AIP Publishing
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8	Himangini Singh	Biodiversity Monitoring Management and Utilization	Biological Diversity Conservation and its legal paradigms	Not Applicable	Not Applicable	International	2017-18	ISBN 10:9351249271/ISBN 12: 9789351249276	Rani Durgavati University, Jabalpur	Daya Publishing House
9	Indu Thakur	Prajnan evam Bal swasthya (Janjatiyo ke sandarbh me)	Not Applicable	Not Applicable	Not Applicable	National	2017-18	ISBN-978-81-7555-804-3	Rani Durgavati University, Jabalpur	University Publication, New Delhi 11002
10	C.S.S Thakur	Prajnan evam Bal swasthya (Janjatiyo ke sandarbh me)	Not Applicable	Not Applicable	Not Applicable	National	2017-18	ISBN-978-81-7555-804-3	Rani Durgavati University, Jabalpur	University Publication, New Delhi 11002

11	Tripti Majhi and other	Prajnan evam Bal swasthya (Janjatiyo ke sandarbham)	Not Applicable	Not Applicable	Not Applicable	National	2017-18	ISBN-978-81-7555-804-3	Rani Durgavati University, Jabalpur	University Publication, New Delhi 11002
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14	Asha Rani	Lkedkyhu foe'kZ ds vk'ke	folaxfr:kSa vkSj nckoksa ds chp esa L=h vfLerk vkSj foe'kZ*	Not Applicable	Not Applicable	National	2017-18	ISBN : 978-93-82329-28-2	Rani Durgavati University, Jabalpur	:qpkarj izdk'ku] fnYyh
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17	Deepti Jain	fyax] folky; .oa lekt(Gender, School and society)	Not Applicable	Not Applicable	Not Applicable	National	2017-18	ISBN-978-93-86213-31-0	Rani Durgavati University, Jabalpur	Rakhi Prakashan Pvt. Ltd., Agra
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31	Surendra Singh	Biological Diversity, Conservation and its Legal Paradigm	Chapter I - Biodiversity Monitoring Management and Utilization	Not Applicable	Not Applicable	National	2017-18	ISBN: 9387057550, 9789387057555	Rani Durgavati University, Jabalpur	Daya Publishing House
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34	Prakash Singh Bisen, Anjana Sharma	Introduction to Instrumentation in Life Sciences	Not Applicable	Not Applicable	Not Applicable	International	2017-18	ISBN: 9781138440708, 1138440701	Rani Durgavati University, Jabalpur	CRC Press

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38	S. P. Gautam	Shri Ramcharitmanas ki Vaigyanic Tika	Not Applicable	Not Applicable	Not Applicable	National	2017-18	ISBN 978-93-5258-301-0	Rani Durgavati University, Jabalpur	Ayodhya Shodh Sansthan, Ayodhya





**3.4.6. Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceeding per teacher during the last five years.**

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# Microbial Resource Technologies for Sustainable Development



Edited by  
Joginder Singh  
Deepamh Sharma



Microbial Resource Technologies for Sustainable  
Development  
2022, Pages 23–46

## Chapter 2 - Microbial consortium: a innovative steps in environmental protection

[Poonam Verma](#)<sup>1</sup>, [Mridul Shakya](#)<sup>2</sup>, [N Kumar Swamy](#)<sup>1</sup>, [Sardul Singh Sandhu](#)<sup>2</sup>

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### Abstract

Nowadays, microorganisms are capable of resolving many crises. Microbial consortia are the mixture of specific microorganisms that help us solve any particular problem. It includes bioremediation and degradation of any toxic compounds like polyethylene, hydrocarbon, chemical dyes, as well as crafting a microenvironment and boosting plant growth, secondary metabolite production, antibiotic production, etc. This chapter is a summarized form for the uses of microbial consortia. This study could help further enhance the application of microbial consortium in various fields of life sciences like agriculture, biotechnology, and microbiology.

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### Keywords

Agriculture; Biofertilizer; Bioremediation; Biotechnology; Degradation; Hydrocarbon; Life sciences; Microorganisms

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# ADVANCES IN DAIRY MICROBIAL PRODUCTS

Edited by  
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## Chapter 2 - Recent advances in microbial diversity usage in fermented dairy microbial products

[Mridul Shakya](#)<sup>1</sup>, [Poonam Verma](#)<sup>2</sup>, [Sardul Singh Sandhu](#)<sup>1</sup>

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### Abstract

Biotechnology is a newest branch of biology, but **food** fermentation is the oldest biotechnological techniques. In the fermentation process, a wide range of microbial enzymes play a key role to achieve required characteristics in food material. Globally, different types of food material like milk, cereals, vegetable, meat, etc. are fermented. **Fermented milk** products are classified on the basis of the microorganism's nature (fungi and bacteria) and by-product. In this paper we mainly focus on dominant microorganisms in dairy **fermented foods** as well as the role of biotechnology in development of **probiotic** culture.

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# Chapter I

## Coordination chemistry of chlorophylls/ bacteriochlorophylls and its functional aspects in photosynthesis

### 1.1 Introduction

Organisms that have persisted over millions of years could do so by making use of one or both of the two choices for energy requirements of living cells.

#### (a) Heterotrophs/chemotrophs

Heterotrophs, including animals, fungi and most types of bacteria, also called chemotrophs, use the chemical option to meet cellular energy needs. They ingest other plants and animals and oxidize organic compounds (carbohydrates and fats). The final stage of energy metabolism, the oxidative phosphorylation, generates ATP (adenosine triphosphate) using energy from electron transport. In other words, heterotrophic organisms survive by degrading complex organic molecules provided by other organisms.

#### (b) Phototrophs

The other way to generate cellular energy is the photosynthetic option, used by phototrophs. They absorb energy from solar radiation and divert the energy through electron transport chains to synthesize ATP and generate reducing power in the form of NADPH. These energetic products of photosynthesis (ATP and NADPH) are used to make carbohydrates (glucose) from two molecules of  $\text{CO}_2$  and  $\text{H}_2\text{O}$  and release  $\text{O}_2$  molecules as by-products into the atmosphere. This released  $\text{O}_2$  of the atmosphere is now

## Chapter II

# Complexes containing nitric oxide: synthesis, reactivity, structure, bonding and therapeutic aspects of nitric oxide–releasing molecules (NORMs) in human beings and plants

### 2.1 Introduction

#### 2.1.1 Discovery of nitric oxide (NO)

Nitric oxide (NO), which is a colourless gas, was known during the thirteenth century when it was first time prepared from nitric acid. Its first synthetic recognition was credited to Johann Glauber who identified its formation when potassium nitrate was added with sulphuric acid. Its immediate transformation to brown fumes of  $\text{NO}_2$  in the presence of  $\text{O}_2$  was observed from its beginning. It was first time characterized as a distinct chemical species by Joseph Priestley (1733–1804). He also described its disproportionation to  $\text{N}_2\text{O}$  and  $\text{NO}_2$  when  $\text{NO}_2$  when heated over iron powder. The formation of iron–NO complex by the reaction of NO with  $\text{FeSO}_4$  as a black solution was first time reported by Joseph Priestley. This black colouration formed the basis of the brown ring test used by so many chemists for the qualitative test of nitrate ion. It was later on characterized as  $[\text{Fe}(\text{NO})(\text{H}_2\text{O})_5]^{2+}$ . The accepted chemical formula of nitric oxide as NO, wherein nitrogen and oxygen are present in equal proportions, was established by Henry Cavendish (1731–1810) and Sir Humphrey Davy (1778–1829).



## Chapter III

# Complexes containing carbon monoxide: synthesis, reactivity, structure, bonding and therapeutic aspects of carbon monoxide–releasing molecules (CORMs) in human beings and plants

### 3.1 Introduction

Since its toxicity was revealed by Claude Bernard in 1857, carbon monoxide (CO) has been recognized as a hazardous gas to mammals extensively. Definitely, owing to its toxicity, colourless, odourless and tasteless nature, the gas is generally known as “the silent killer”. Its toxicity to some extent initiates from the high affinity of CO for the iron of haemoglobin. It strongly interacts with haemoglobin and forms *carboxyhaemoglobin* (COHb). The formation of COHb reduces the protein’s ability to shuttle and transfer oxygen into tissues producing tissue hypoxia. CO poisoning results in more than 50,000 emergency department visits annually and is the second foremost basis of death from non-medicinal poisoning.

Two highly original and influential findings caused a new understanding of CO. Firstly, in 1949, Sjostrand reported that CO was produced endogenously and an oxidative metabolism of haeme was the source of CO in humans [1]. Secondly, the two CO-generating metabolic enzymes, HO-1 (haeme oxygenase-1) and HO-2 (haeme oxygenase-2) [2], were isolated and characterized in 1968. As a gasotransmitter, small amounts of endogenous CO are continuously produced and together with endogenously produced nitric oxide (NO) and dihydrogen sulphide (H<sub>2</sub>S) are important for multiple physiologic functions. CO is now known to have a critical role in

## **Chapter IV**

# **Advantageous role of gaseous signalling molecule, H<sub>2</sub>S: hydrogen sulphide and their respective donors, in ophthalmic diseases and physiological implications in plants**

### **4.1 Introduction**

Three gaseous molecules of leading effect in biology are NO, CO and H<sub>2</sub>S. Irrespective of their toxicity, these three gaseous molecules have prominent effects on mammalian physiology and key involvements in therapeutics. At very low concentrations, they participate in key signalling and regulatory functions in human biology, and so are now termed as “gasotransmitters”.

Just after the discovery of the role of nitric oxide (NO) as a crucial endogenous signalling mediator in 1987, research on this molecule has rapidly prospered and expanded in many directions. With the knowledge that NO and its second messenger cyclic guanosine monophosphate (cGMP) are distributed in most tissues with a varied range of biological effects, it has become evident that the NO pathway is also important for multiple functions in the eye. Glaucoma is a progressive optic neuropathy caused by degeneration of the retinal ganglion cells (RGCs) and is the leading cause of irreparable blindness worldwide. Numerous risk factors for the disease have been detected, but elevated intraocular pressure (IOP) remains the primary risk factor accountable to treatment. There is increasing evidence that NO-releasing molecules is a direct regulator of IOP and that dysfunction of the NO–guanylate cy-

# The International System of Units, fundamental physical constants and conversion factors

## (a) The International System of Units

In order to represent quantities at entire range of scales and within every area of science and technology, the International System of Units (SI) is the globally accepted foundation. This system has two groups of units. The first one is called as “base or basic units” and the second one is known as “derived units”. In this system, there are seven base units and their basic quantities. These provide the process of mentioning used to express all the measurements of this system.

## (i) Basic/base units and physical quantities

The seven fundamental basic units are given in Table I.1.

**Table I.1:** Some physical quantities and their respective base SI units with symbols.

Physical quantity	Designating symbol	Unit (SI)	Designating symbol
Time	$t$	Second	s
Length	$l$	Metre	m
Mass	$m$	Kilogram	kg
Amount of substance	$lv$	Mole	mol
Electric current	$l$	Ampere	A
Luminous intensity	$n$	Candela	cd
Thermodynamic temperature	$T$	Kelvin	K

# Body mass index (BMI): an indicator of our body fat

## Introduction

BMI (body mass index) is a scientific measurement which is used to determine a person's risk for weight-related health problem. Although the term may be new, the method has been used for many years by physicians and researchers who study obesity, one of the main causes of diabetes and other health-related problems.

We are familiar with the use of "weight-for-height table" on the walls of hospitals and doctors' clinics. There are many versions of these tables, but they are not especially effective because they do not take into account a person's frame size when considering an ideal weight. Although BMI is not a perfect system, it provides a useful general guideline for judging a healthy weight and an appropriate amount of body fat.

## Calculation of BMI

The calculation of BMI makes use of a mathematical formula that accounts for a person's weight and body area (or "bulk"), both to indicate the extent of fat storage. The formula uses "mks" system of units:

$$\text{BMI} = \frac{\text{Weight in kilograms}}{(\text{Height in metres})^2}$$

The following conversion factors will be helpful in calculation of BMI:

1 lb = 0.454 kg      1 m = 39.37 in      1 in = 2.54 cm

## Amino acids, the building blocks of proteins: names, symbols, structures, properties and some physical constants

### Introduction

In the middle of the nineteenth century (1838), the Dutch chemist G. J. Mulder extracted a substance common to animal tissues and the juices of plants, which he believed to be “without doubt the most important of all substances of the organic kingdom, and without it life on the planet would probably not exist”. At the suggestion of the famous Swedish chemist Berzelius, Mulder named this substance protein from the Greek word *proteios*, meaning “of first importance”. He assigned to it a specific chemical formula,  $C_{40}H_{62}N_{10}O_{12}$ . Although he was wrong about the chemistry of proteins, he was right about their being indispensable to living organisms. The term “protein” survives.

Chemists of those times were not aware about proteins that are actually comprised of minor constituents of amino acids. Even though the amino acid was sequestered for the first time long back (1830), for several decades, it was thought that constituents of plants comprising proteins are merged totally within the issues of animals. The misconception was ended when the method of digestion could reveal. After that, it has become known that ingested proteins are split into smaller components comprising amino acids.

Studies carried out experimentally conclude that the amount of amino acids present in a protein decides the nutritional value of the protein in animal diets. For instance, some cereal proteins do not contain lysine (an amino acid). When animals are fed with these cereal proteins, they do not grow well. After determination of the structures of twentieth common amino acids in 1925, the relative nutritional significance of different amino acids in proteins has been systematically recognized.

# Current Perspectives on Chemical Sciences

Vol. 10



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# A Recent Study on the Synthesis and DFT Collaborated Experimental Characterization of Some Pyrazolone Functionalized Dioxovanadium(V) Schiff Base Complexes

R. C. Maurya; J. M. Mir; P. K. Vishwakarma

Current Perspectives on Chemical Sciences Vol. 10, 19 May 2021, Page 42-64

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## Abstract

This paper is concerned with the synthesis and hyphenated DFT-experimental characterization of dioxovanadium(V) complexes of semicarbazone ONO-donor ligands, LH [where, LH = N-(4'-benzoylidene-3'-methyl-1'-phenyl-2'-pyrazolin-5'-one)-semicarbazone (bmphp-semH), N-(4'-butylidene-3'-methyl-1'-phenyl-2'-pyrazolin-5'-one)-semicarbazone (bumphp-semH), N-(4'-iso-butylidene-3'-methyl-1'-phenyl-2'-pyrazolin-5'-one)-semicarbazone (iso-bumphp-semH) or N-(3'-methyl-1'-phenyl-4'-propionylidene-2'-pyrazolin-5'-one)-semicarbazone (mphpp-semH)] and were prepared from ethanol-methanol mixed solvent (1/10) solutions of bis(acetylacetonato) oxovanadium(IV) complexes of the above ligands by oxidizing with atmospheric oxygen (bubbling air) for 2-3 days. The composition and formulae of complexes were confirmed by various physicochemical analysis, viz., percentage of different elements, magnetic susceptibility, conductance, FT-IR, UV-Visible and mass spectrometry. One of the representative complexes, *cis*-[VO<sub>2</sub>(bmphp-sem)(H<sub>2</sub>O)] was investigated at the convergence of DFT and experimental formulation interface. The standard B3LYP/LANL2DZ combinations were used to arrive at the approx of geometry optimization, charge distribution and molecular orbital descriptions. The global reactivity parameters like absolute electronegativity ( $c_{abs}$ ) and absolute hardness ( $h$ ) have also been involved. From the overall studies it has been found that the compounds possess *cis*-octahedral structure.

**Keywords:** DFT; experimental; Dioxovanadium(V); Acylpyrazolone; electrostatics



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of Nanomaterials  
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**VOLUME 2**

**Synthesis at the Macroscale  
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Boris I. Khariuzov  
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## Handbook of Greener Synthesis of Nanomaterials and Compounds

Volume 2: Synthesis At the Macroscale and Nanoscale

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### Chapter 5 - Greener synthesis of enzymes from marine microbes using nanomaterials

[Manoj Kumar Enamala](#)<sup>a</sup>, [Murthy Chavali](#)<sup>b,c</sup> , [Sudhakar Reddy Pamanji](#)<sup>d</sup>, [Amala Tangellapally](#)<sup>a</sup>, [Rishibha Dixit](#)<sup>e</sup>,  
[Meenakshi Singh](#)<sup>f</sup>, [Chandrasekhar Kuppam](#)<sup>g</sup>

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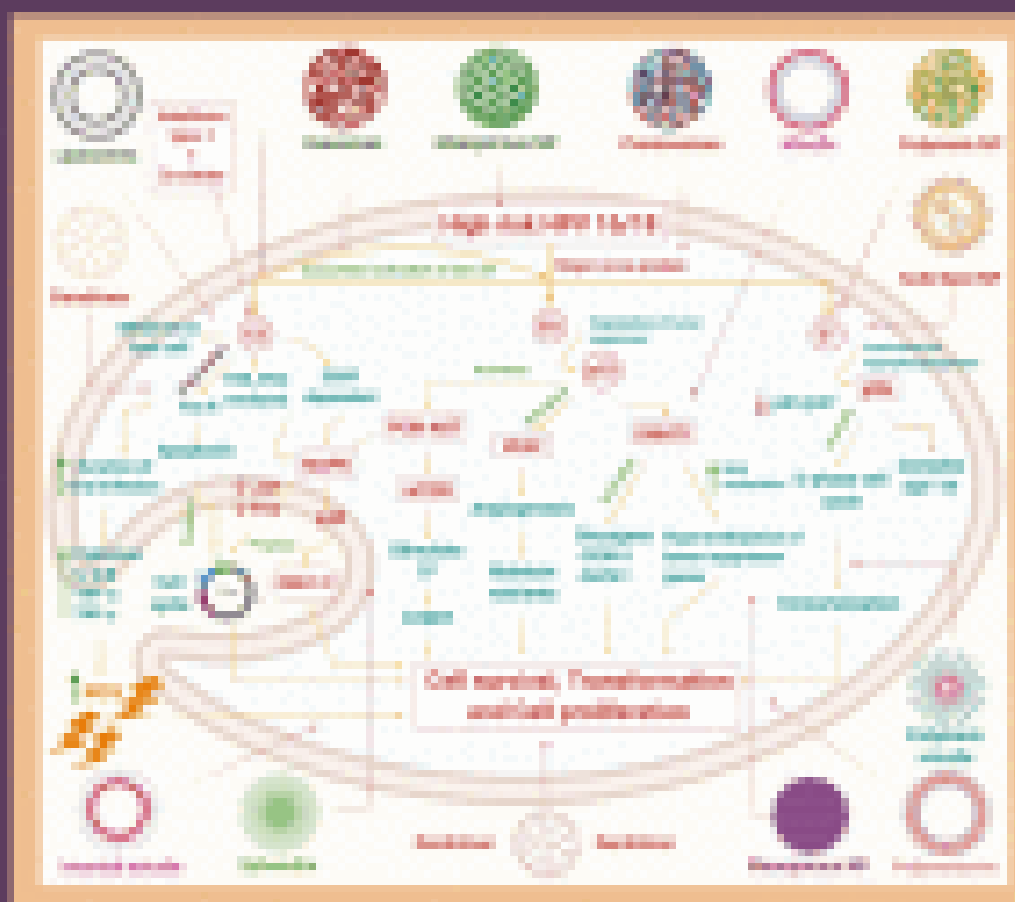
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#### Abstract

The marine ecosystem is a massive source and home for countless microorganisms, several aquatic animals, and even higher plants and animals for many decades. A mutualistic relationship exists between the marine aquatic species as well as the marine microbes, which are mutually benefitted against each other (both *prokaryotic* and *eukaryotic* microbes like bacteria, fungi, viruses, and even marine algae). During their life cycle, these organisms produce several enzymes, which are used in several of the industries for the well-being of humans and other living organisms. A number of enzymes currently available in the market are produced by these microbes in different pathways, possessing a special feature as well as characteristics required by several industries for preparation of materials. Variety of enzymes with special activities have been isolated from marine bacteria, actinomycetes, fungi, and other marine microorganisms by researchers in recent years, and some products already found industrial applications.

In this chapter, we shall discuss various pathways/steps applied in the production of enzymes through a greener approach by using several nanotechnologies available in making the enzyme product more viable and even increase the shelf life of the product so that it can be used for a longer period of time, which include various properties of enzymes like thermotolerance, thermos-stability of an enzyme over an extensive temperature and pH range. Also, with existing [bioreactors](#), these microbes can be cultivated and produce enzymes using greener synthesis. The bacterial marine enzymes are used in different industrial applications beneficial to humans as they can withstand harsh conditions. In this work, authors try to limit over application focus mainly on medicine and biotechnology, energy and biofuels, food, nutrition and agriculture, and others. With the sustenance of nanotechnology, increase the stability of enzymes by the application of existing green



# Advanced Drug Delivery Systems in the Management of Cancer

Edited by

Ramón Quirós, Mónica de la Cruz, Teresa del Pozo, Francisco Pérez

Lina C. Pérez, Cyril A. N. Barros, and Michael J. Reddy





## Advanced Drug Delivery Systems in the Management of Cancer

2021, Pages 141-154

### Chapter 12 - Advanced drug delivery systems in blood cancer

[Ashish Gare<sup>a</sup>](#), [Sweta Gare<sup>b</sup>](#), [Neeraj Mishra<sup>c</sup>](#), [Sreenivas Enaganti<sup>d</sup>](#), [Ajay Shukla<sup>a</sup>](#)

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#### Abstract

Blood cancer is caused by the accumulation of malignant transformations that are originated from the cells of primary or secondary lymphoid organs. The three major blood cancers are multiple myeloma, lymphoma, and leukemia. Blood cancer is possibly treated by chemotherapy, radiotherapy, immunotherapy, and transplantation of bone marrow. Various chemotherapeutic drugs are currently available for treating blood cancer, but still, the use of these clinical drugs is limited due to a lack of tumor cell specificity and dose-related toxicity. In addition, the poor pharmacokinetic profile of these chemotherapeutic agents requires the use of high doses and frequent administration of the drug to assert the threshold therapeutic levels at the site of tumor, thus leading to increased adverse effects in patients. There is an urgent need of developing a suitable and advanced drug delivery system with improved pharmacokinetic properties, safety, and efficacy of conventional therapeutics. The advanced drug delivery systems such as liposomes, nanoparticles, and dendrimer have enhanced pharmacokinetic properties for anticancer therapeutics. For earlier detection of cancer biomarkers in the blood circulation, new advanced drug delivery systems were designed with increased selectivity and sensitivity. They are proved to have enhanced efficacy of anticancer therapeutic drugs compared with conventional chemotherapy. The biocompatibility, biodegradable, and the small submicron-sized particles (20–200nm) help in overcoming multiple drug resistance. The enhanced permeability and retention (EPR) effect of these small-sized particles allow them to get accumulated at the tumor sites resulting in rapid angiogenesis and inflammation. This chapter gives a description of different therapies as well as the advantages and limitations of advanced drug delivery formulations employed for treating various blood cancers. Additionally, recent investigations, formulations of nanomedicine, and their applications in the treatment of blood cancer are discussed in this chapter.

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#### Keywords



NANOMEDICAL  
DRUG DELIVERY FOR  
NEURODEGENERATIVE  
DISEASES

Edited by  
Awresha K. Yadav  
Rahul Shukla  
S.J.S. Flora





## Chapter 14 - Nanoparticle-mediated delivery of AChE inhibitors for the treatment of Alzheimer's disease

Pallav Namdeo, Jinu Mathew, Ashish Garg

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### Abstract

The overall incidental rate for neurodegenerative illnesses has risen in conjunction with the aging population nowadays. Defects in beta-amyloid (Ab) and cholinergic system deposition with the amyloid plaques and neurofibrillary tangles characterize Alzheimer's disease (AD), a progressive **neurodegenerative disease**. The cholinergic system was targeted for developing anti-Alzheimer's medications because it plays a crucial part in controlling memory and learning activities. By blocking enzyme **acetylcholinesterase (AChE)**, which hydrolyzes **acetylcholine**, **cholinesterase** inhibitors can improve **cholinergic transmission** directly. Moreover, both acetylcholinesterase and butyrylcholinesterase (BuChE) have played a role in Ab-aggregation during the early phase development of **senile plaque**. As a result, AChE and BuChE inhibitors were identified as essential strategies for efficient therapy of Alzheimer's disease by increasing the availability of acetylcholine in **brain** areas and decreasing Ab accumulation. Alzheimer's disease is a neurological condition that causes cognitive and behavioral dysfunction. Such as **acetylcholinesterase inhibitor** medications, traditional therapeutic approaches always failed due to poor solubility and bioavailability. This results from the insufficient ability to pass the blood-brain barrier (BBB). Therapies were enhanced by nanotechnological treatments such as the design, testing, manufacture, and application of nanometer drug delivery devices. The examples of nanotechnologies were liquid crystals, solid lipid nanoparticles, nanoemulsions, polymeric nanoparticles, microemulsions, and nanostructured lipid carriers. These were intriguing techniques for delivering therapeutic devices to the brain through various pathways, especially the intranasal pathway. We highlight a few newly updated nano drug delivery technologies implemented in Alzheimer's disease therapies and prospects for the future regarding potential molecular mechanisms of nano drug delivery methods.

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### Keywords

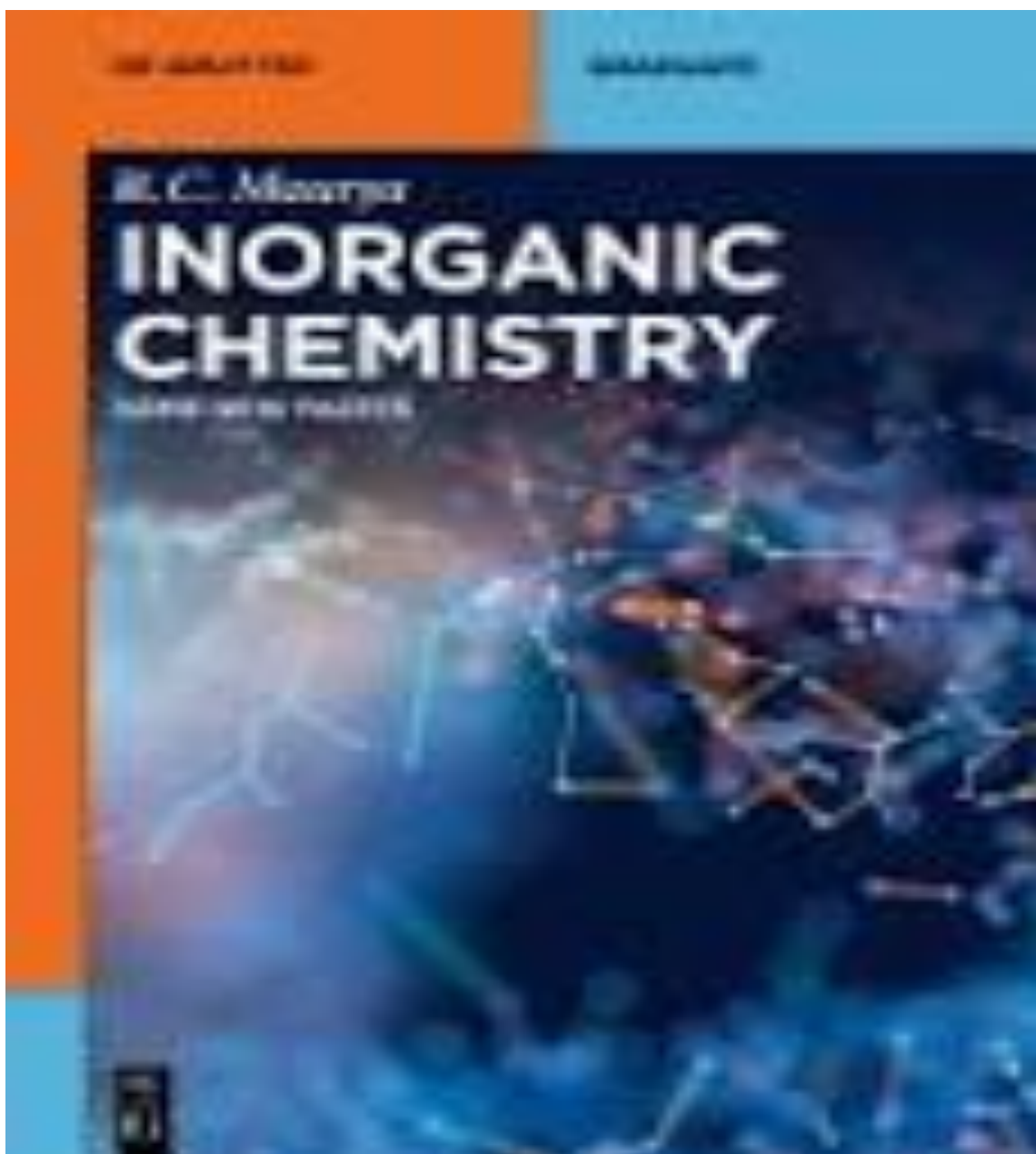
Drug delivery; Neurodegenerative disease; Nanoparticles; AChE inhibitors; Alzheimer's disease (AD)



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# Chapter I

## Valence shell electron pair repulsion (VSEPR) theory: principles and applications

### 1.1 Introduction

This theory was first formulated by Sidgwick and Powell (1940) based on the repulsions between electron pairs, known as *valence shell electron pair repulsion* (VSEPR) *theory* to explain molecular shapes and bond angles of molecules of **non-transition elements**. Later on Gillespie and Nyholm (1957) developed an extensive rationale (basis/underlying principle) called VSEPR model of molecular geometry.

According to this theory, the shape of a given species (molecule or ion) depends on the number and nature of electron pairs surrounding the central atom of the species.

### 1.2 Postulates of VSEPR theory: Sidgwick and Powell

The various postulates of this theory are as follows:

- (i) The unpaired electrons in the valence shell of central atom form bond pairs (bps) with surrounding atoms while paired electrons remain as lone pairs (lps).
- (ii) The electron pairs surrounding the central atom repel each other. Consequently, they stay as far apart as possible in space to attain stability.
- (iii) The geometry and shape of the molecule depend upon the number of electron pairs (bond pair as well as lone pair) around the central atom.
- (iv) The geometrical arrangements of electron pairs with different number of electron pairs around central atom are given in Table 1.1.

## Chapter II

# Delocalized $\pi$ -bonding in polyatomic molecules: molecular orbital approach

### 2.1 Localized and delocalized bonds

#### 2.1.1 Localized $\sigma$ - and $\pi$ -bonds

A number of molecules contain  $\sigma$ -bonds only as in case of  $\text{NH}_3$  and  $\text{CH}_4$ . For such molecules, the valence bond theory involves the appropriate number of localized two electron bonds. Molecular orbital (MO) approach for such molecules describes the behaviour of electrons by means of orbitals that are localized. When more than two electrons hold two nuclei together, then the orbitals may be divided into localized  $\sigma$ - and  $\pi$ -types depending upon their symmetry. For example, in the  $\text{N}_2$  molecules, bonding involves one  $\sigma$ - and two  $\pi$ -orbitals  $[(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)(\sigma^* 2s)^2 (\pi 2p)^2 = \pi 2pz^2 (\sigma 2px)^2]$ . Similarly, the  $\sigma$ - and  $\pi$ -orbitals for  $\text{CH}_2=\text{CH}_2$  and  $\text{CH}=\text{CH}$  are localized between two carbon atoms. Such molecules involving localized  $\sigma$ - and  $\pi$ -bonds are not of any interest under the purview of this topic.

#### 2.1.2 Delocalized $\pi$ -bond(s)

The formation of polyatomic molecules through delocalized  $\pi$ -bond(s)/bonding means, we can no longer distinguish  $\pi$ -electron pairs and bonding pairs of atoms. Instead, we consider electron pairs as belonging to a group of atoms and holding the molecule together.



## Chapter III

# Chemistry of borane and related compounds: structure, bonding and topology

### 3.1 Introduction

Boranes are hydrides of boron. They are covalent compounds and are called boranes on analogy with alkanes. Borane chemistry began in 1912 with A. Stock's classic investigations and the numerous compounds prepared by his group during the following 20 years. During the past 50 years, the chemistry of boranes and the related carboranes and metalloboranes have been the major growth areas in inorganic chemistry, and interest continues intensified.

### 3.2 Importance of boranes

The importance of boranes stems from the following three factors:

- The completely unsuspected structural principle involved.
- The growing need to extend covalent molecular orbital (MO) bond theory considerably to cope with the unusual stoichiometries.
- The emergence of a versatile and extremely extensive reaction chemistry which parallels but is quite distinct from that of organic and organometallic chemistry.

This growing activity of boranes resulted (in the centenary year of Stock's birth) in the award of the 1976 Nobel Prize in Chemistry to W. N. Lipscomb (Harvard) for his studies of boranes which have illuminated the problems of chemical bonding.

## Chapter IV

# Synthesis and reactivity of metal clusters, and their bonding based on molecular orbital approach

### 4.1 Introduction

Inorganic chemistry encompasses numerous examples of molecular complexes containing metal–metal bonds. Such complexes are called metal clusters. **The name ‘Metal Clusters’ for metal–metal bonded compounds for the first time was coined by F. A. Cotton in 1964.** He defined metal clusters as

‘The molecular complexes containing a finite group of metal atoms which are held together entirely or at least to a significant extent, by bonds between the metal atoms; some non-metal atoms may be associated with the cluster.’ Certain metal clusters having metal–metal bonds are shown here (Figure 4.1).

Quite a few transition metals form metal–metal bonded compounds, and the structure and bonding of such compounds have been the subject of much research over the past several decades.

### 4.2 Metal cluster and catalysis

- (i) A principal reason for the extensive research on cluster compounds is their possible relevance to heterogeneous catalysis.
- (ii) Industrially important syntheses of organic compounds rely on catalysis.
- (iii) Most industrial reactions are catalyzed heterogeneously, usually by transition

## Chapter V

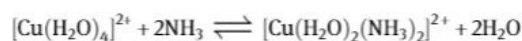
### Stability constants of metal complexes: some aspects

#### 5.1 Introduction

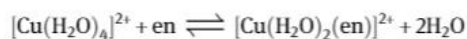
The subject of stability of metal complexes is important in understanding the properties of complexes. Many variables associated with the central metal atom/ion and the ligand greatly complicate the study of this subject. The reasonable approach to the study of stability of complexes is to maintain as many variables as possible constant, and then examine a small area of the whole subject.

In a general sense, the stability of compounds means that the compounds existing under suitable conditions may be stored for a long period of time. However, when the formation of complexes in solution is studied, two types of stabilities, thermodynamic stability and kinetic stability, are considered.

In the language of thermodynamics, the equilibrium constants of a reaction are the measure of the heat released in the reaction and entropy change during reaction. The greater amount of heat evolved in the reaction, the most stable are the reaction products. Secondly, greater the increase in entropy during the reaction, greater is the stability of products. The greater heat evolved and increase in entropy during reaction for a stable complex can be illustrated by the following data:



$$\Delta H = -46 \text{ kJ mol}^{-1}; \Delta S = -8.4 \text{ JK}^{-1} \text{ mol}^{-1}$$



$$\Delta H = -56 \text{ kJ mol}^{-1}; \Delta S = -22 \text{ JK}^{-1} \text{ mol}^{-1}$$

## Chapter VI

# Principles of magnetochemistry and its multiple applications in coordination compounds

### 6.1 Introduction

Measurements of magnetic properties have been used to characterize a wide range of systems from oxygen, metallic alloys, solid state materials and coordination complexes containing metals. Most organic and main group element compounds have all the electrons paired and these are diamagnetic molecules with very small magnetic moments. All of the transition metals have at least one oxidation state with an incomplete d subshell. Magnetic measurements, particularly for the first row transition elements, give information about the number of unpaired electrons. The number of unpaired electrons provides information about the oxidation state and electron configuration. The determination of the magnetic properties of the second and third row transition elements is more complex.

The magnetic properties of metal complexes in terms of unpaired electrons and their magnetic or spin properties are useful in determining structural features in transition metal compounds. Complexes that contain unpaired electrons are paramagnetic and are attracted into magnetic fields. Diamagnetic compounds are those with no unpaired electrons that are repelled by a magnetic field. All compounds, including transition metal complexes, possess some diamagnetic component which results from paired electrons moving in such a way that they generate a magnetic field that opposes an applied field. A compound can still have a net paramagnetic character because of the large paramagnetic susceptibility of the unpaired electrons. The number of unpaired electrons can be determined by the magnitude of

## Chapter VII

# Mechanism of inorganic reactions: a study of metal complexes in solution

### 7.1 Introduction

Reactions in inorganic chemistry are mostly ionic in character. As such, they take place almost instantaneously and so no reaction mechanism is involved. However, reactions of metal complexes are slow and proceed via definite pathways. The mechanism involved in some of the reactions of coordination compounds, particularly substitution reactions and electron transfer reactions, are being described in detail in this chapter.

### 7.2 Substitution reactions in octahedral metal complexes

Substitution reactions in octahedral metal complexes are the reactions in which a ligand present in the coordination sphere of the complex compound is substituted by another ligand (nucleophile) or the metal in a complex compound is replaced by another metal (electrophile).

Depending on whether a ligand is substituted by another ligand or a metal is replaced by another metal, substitution reactions are of two types:

#### (i) Nucleophile or ligand substitution reactions ( $S_N$ reactions)

When a ligand present in the coordination sphere of a complex compound is replaced by another ligand, such substitution reactions are called nucleophilic substitution ( $S_N$ ) reactions as ligands are all nucleophiles. For example:

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## Chapter VIII

# Bonding in transition metal complexes: molecular orbital theory approach

### 8.1 Introduction

In order to explain the nature of bonding between metal atom and ligands in coordination compounds/transition metal complexes, the following theories have been suggested:

- (i) Valence bond theory (VBT) (due to L. Pauling and J. L. Slater)
- (ii) Crystal field theory (CFT) (due to H. Bethe and J. H. Van Vleck)
- (iii) Ligand field theory (LFT) or molecular orbital theory (MOT) (due to J. H. Van Vleck)

According to Werner's theory, it seemed reasonable that ligands donate electron pairs to metal ions or atoms to form coordinate linkage. This approach was first applied to coordination compounds by Linus Pauling and Slater in 1931. Hence, this theory is called *Pauling's theory of complexes* or *valance bond theory (VBT)*. According to VBT, the metal–ligand bonding in complexes is covalent only because it assumes that ligand electrons are partially donated to metal orbitals. It deals with the ground state electronic structure of the central metal atom and is primarily concerned with the kind of bonding, stereochemistry and gross magnetic properties present in complexes. The orbital in the complexes are designated only in terms of central atom orbitals and hybridization of these to produce bonding orbitals. It is somewhat successful in describing and predicting some of the physical and chemical properties of complexes known at that time. But at the end of 1950s, some facts which were not easily explained by this theory became known. At this stage, another theory called



## Chapter IX

# Bonding in organometallic sandwich compounds: molecular orbital theory approach

### 9.1 Introduction

Compounds in which a metal atom is 'sandwiched' between two parallel carbocyclic ring systems are known as sandwich compounds; for example,  $\text{Fe}(\text{C}_5\text{H}_5)_2$ ,  $\text{Cr}(\text{C}_6\text{H}_6)_2$ , etc. The chemistry of this special class of organometallic compounds, called 'sandwich complexes' began in 1950s, when an orange-yellow compound of composition,  $\text{Fe}(\text{C}_5\text{H}_5)_2$ , now known as ferrocene was made from the reaction of  $\text{FeCl}_3$  and  $\text{C}_5\text{H}_5\text{MgBr}$  (cyclopentadienyl magnesium bromide) in diethyl ether (*Landmarks in Organometallic Chemistry: A Personal View* by Helmut Werner (2008)). This new compound eluded many structural propositions and defied all the existing and conventional structural setups and bonding descriptions.

The determination of the crystal structure of Ferrocene in 1956 revealed that it contains an iron atom sandwiched between two identical planar anion  $\text{C}_5\text{H}_5^-$  (cyclopentadienyl anion, abbreviated as  $\text{Cp}^-$ ) species with centre of symmetry. Two structural possibilities were realized with respect to the arrangement of the two planar  $\text{Cp}^-$  rings: (i) staggered (pentagonal anti-prism) ( $D_{5d}$  symmetry in solid state) and (ii) eclipsed (pentagonal prismatic) ( $D_{5h}$  symmetry in gaseous phase) (Figure 9.1).

The eclipsed conformation of Ferrocene was further confirmed by X-ray crystallographic and electron diffraction studies in 1979. All the C-C bonds are equal and



H



## Chapter X

# Some aspects of safe and economical inorganic experiments at UG and PG levels

### 10.1 Introduction

We are very well aware that the prices of chemicals are increasing day by day. In this situation, the inorganic experiments such as mixture analysis and synthesis of coordination compounds at undergraduate and postgraduate levels are becoming more and more expensive. Taking this serious problem into consideration, particularly, in the colleges where the budgets are meagre, it has now become essential to design some innovative techniques and experiments with the following objectives:

- (i) To reduce the consumption of chemicals with a considerable saving in the laboratory budget
- (ii) The greater speed of analyses with smaller quantities of materials, and thus saving the times in carrying out the tests/experiments
- (iii) To make the experiments/tests safe
- (iv) To increase the visibility of the tests
- (v) To save space on the reagent shelves

### 10.2 Inorganic qualitative analysis

The branch of chemical analysis, which aims to find out the constituents of a mixture or compounds, is known as qualitative analysis. In this analysis, it is to learn the methods used for identification of radicals present in the given salt or the mixture of two or more salts.

## Some aspects of modern periodic table

### (a) Modern periodic table

The periodic table (Table I.1) has undergone extensive changes in the time since it was originally developed by Mendeleev and Moseley. Many new elements have been discovered, while others have been artificially synthesized. Each fits properly into a **group** of elements with similar properties. The periodic table is an arrangement of the elements in order of their atomic numbers so that elements with similar properties appear in the same vertical column or group. The table thus consists of 18 columns or groups.

Table I.1 shows the most commonly used form of the periodic table. Each square shows the chemical symbol of the element along with its atomic number. The name of each element is given in a separate table along with other details because of the compact size of the square in a single page.

A **period** is a horizontal row of the periodic table. There are seven periods in the periodic table, with each one beginning at the far left. When we talk about the periods of a modern periodic table, one should keep in mind that the number of shells present in an atom determines its period number. The elements of period will have only one shell, elements of period 2 will have two shells and so on. In other words, a new period begins when a new principal energy level begins filling with electrons. Period 1 has only two elements (hydrogen and helium), whilst periods 2 and 3 have 8 elements. Periods 4 and 5 have 18 elements. Periods 6 and 7 have 32 elements because the two bottom rows that are separated from the rest of the table belong to those periods. They are pulled out in order to make the table itself fit more easily onto a single page.

A **group** is a vertical column of the periodic table, based on the organization of the outer shell electrons. There are a total of 18 groups. There are two different numbering systems that are commonly used to designate groups and one should be famil-

## Units, fundamental physical constants and conversions

### (a) Base units of the SI

The International System of Units (SI [Système International d'Unités]) is the internationally agreed basis for expressing measurements at all levels and in all areas of science and technology. There are two classes of units in the SI: (i) base or basic units and (ii) derived units. The seven base units of the SI and their base quantities provide the reference used to define all the measurement units of the International System. The seven base units are given in the following table.

#### (i) Base SI units and physical quantities

Physical Quantity	SI unit	Symbol for SI unit
Length	Metre	m
Mass	Kilogram	kg
Time	Second	s
Electric current	Ampere	A
Thermodynamic temperature	Kelvin	K
Luminous intensity	Candela	cd
Amount of substance	Mole	mol

#### (ii) Prefixes used for SI units

# Nomenclature of inorganic compounds: the rules

## Introduction

The standards of nomenclature in chemistry are the rules published by the International Union of Pure and Applied Chemistry (IUPAC) from time to time. Based on these rules, the universal adoption of an agreed chemical nomenclature is a key tool for communication in the chemical sciences, computer-based searching in databases and regulatory purposes, such as those associated with health and safety or commercial activity. The IUPAC provides recommendations on the nature and use of chemical nomenclature which are freely available at <http://www.iupac.org/publications/pac/> and <http://www.chem.qmul.ac.uk/iupac/>. An overall summary of chemical nomenclature can be found in *Principles of Chemical Nomenclature* (Leigh 2011). Further details can be found in *Nomenclature of Inorganic Chemistry*, colloquially known as *The Red Book* (Connelly et al. 2005).

It should be noted that many compounds may have non-systematic or semi-systematic names (some of which are not accepted by IUPAC for several reasons) and IUPAC rules allow more than one systematic name in many cases. IUPAC is working towards identification of single names which are to be preferred for regulatory purposes.

In this appendix, the nomenclature types described are applicable to compounds, molecules and ions that do not contain carbon, and to many structures that do contain carbon.

### (i) Atomic symbols, mass, atomic number and so on of elements

## Some aspects of modern periodic table

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#### (i) Atomic symbols, mass, atomic number and so on of elements

## Symmetry operations and point groups in molecules

### IV.1 Introduction

The collection of all symmetry elements/operation possessed by a molecule constitute a group. Moreover, this group of symmetry elements is also a mathematical group as it also satisfies certain conditions for a mathematical group.

A molecular group is called a **symmetry point group** or simply a **point group** because all the symmetry elements present in the molecule pass through or intersect at a common point (centre of symmetry or in its absence centre of gravity of the molecule) and this point remains unchanged under all the symmetry operations of the molecules (Figure IV.1).

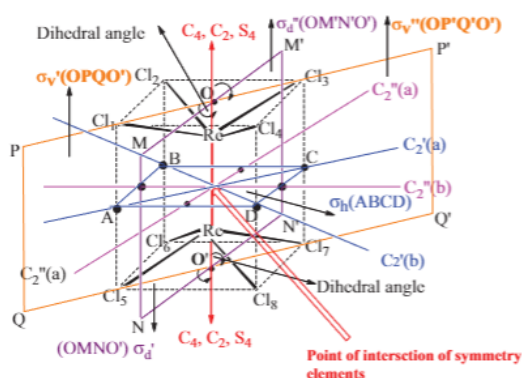


Figure IV.1: Various symmetry elements in  $\text{Re}_2\text{Cl}_8^{2-}$  intersecting at a common point.



## Prediction of infrared and Raman active modes in molecules belonging to icosahedral ( $I_h$ ) point group

### V.1 Introduction

Spectroscopy is concerned with the use of electromagnetic radiations in the study of structures and shapes of molecules. The infrared (IR) and Raman spectroscopy comprise a major part of the spectroscopic techniques. Molecular vibrations can interact with IR radiations and this interaction is the subject matter of IR or vibrational spectroscopy. The use of visible radiations to induce vibrational-rotational transitions in molecules is the basic idea underlying in Raman spectroscopy. Use of IR and Raman spectroscopy, which are complimentary to one another, in conjunction is an extraordinarily efficient tool in the elucidation of molecular structure.

Even though molecular vibrations can interact with radiation in general, these interactions can occur only if the vibrations satisfy certain conditions. Generally molecular vibrations should be associated with a change in dipole moment of the molecule for it to be IR active. Depending on the symmetry of molecules, some vibrations may be IR active and some not. Moreover, the number of normal or fundamental vibrations possible in a molecule depends on the number of atoms present in it.

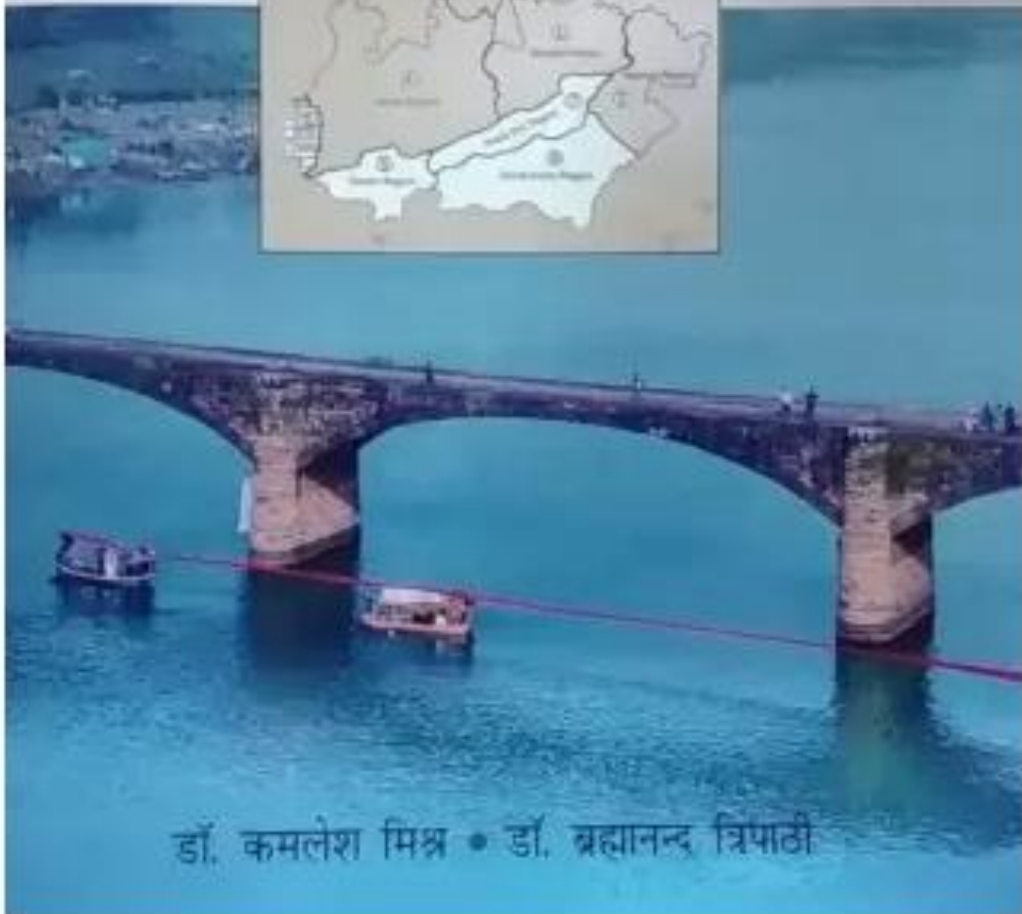
Normally, a molecule containing  $N$  atoms will have  $3N$  degrees of freedom, which involves translational, rotational and vibrational motions. All the molecules, irrespective of linear or non-linear, will have three degrees of translational motion considering whole molecule as a rigid unit. A linear molecule will have 2 degrees of rotational motion because rotation only about the two axes perpendicular to the bond axis (molecular axis) constitute rotations of the system. Thus, the remaining  $3N - (3) - (2) = 3N - 5$  degrees of freedom will be associated with the vibrational motion.

A non-linear molecule can rotate about three mutually perpendicular axes that pass

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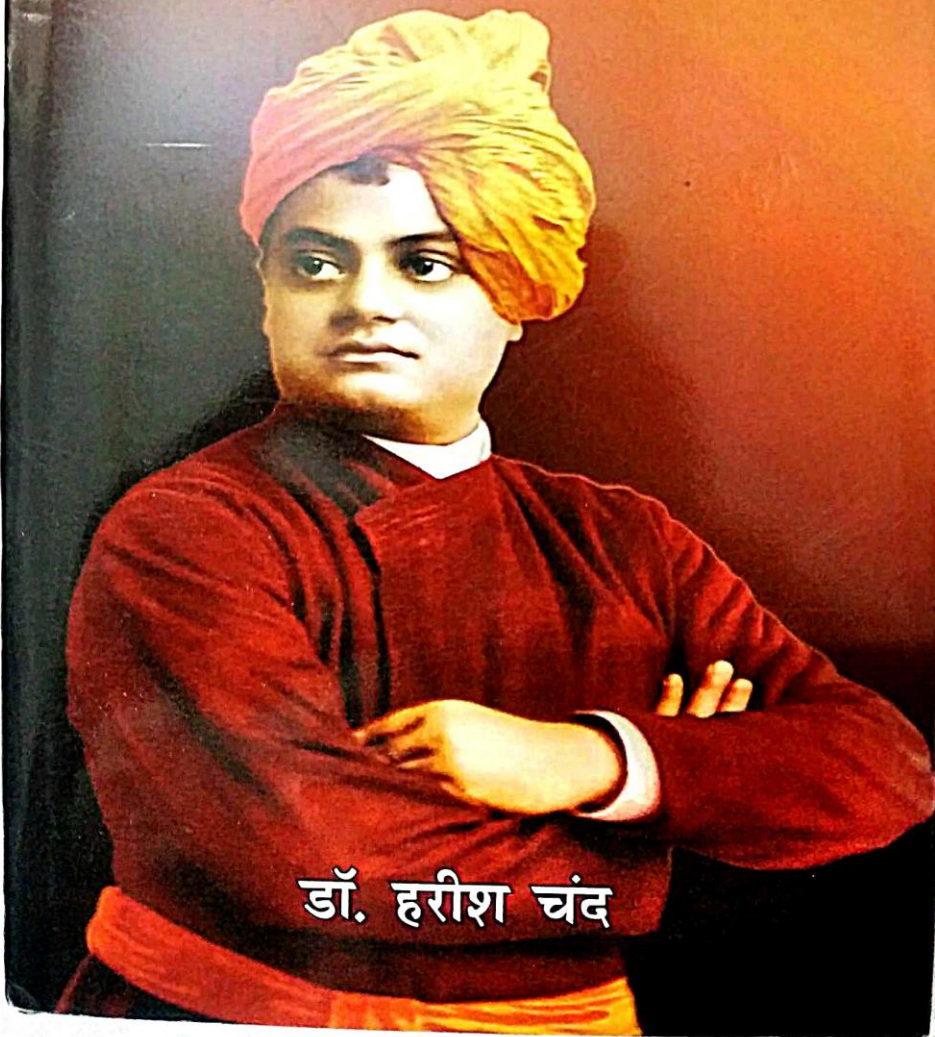
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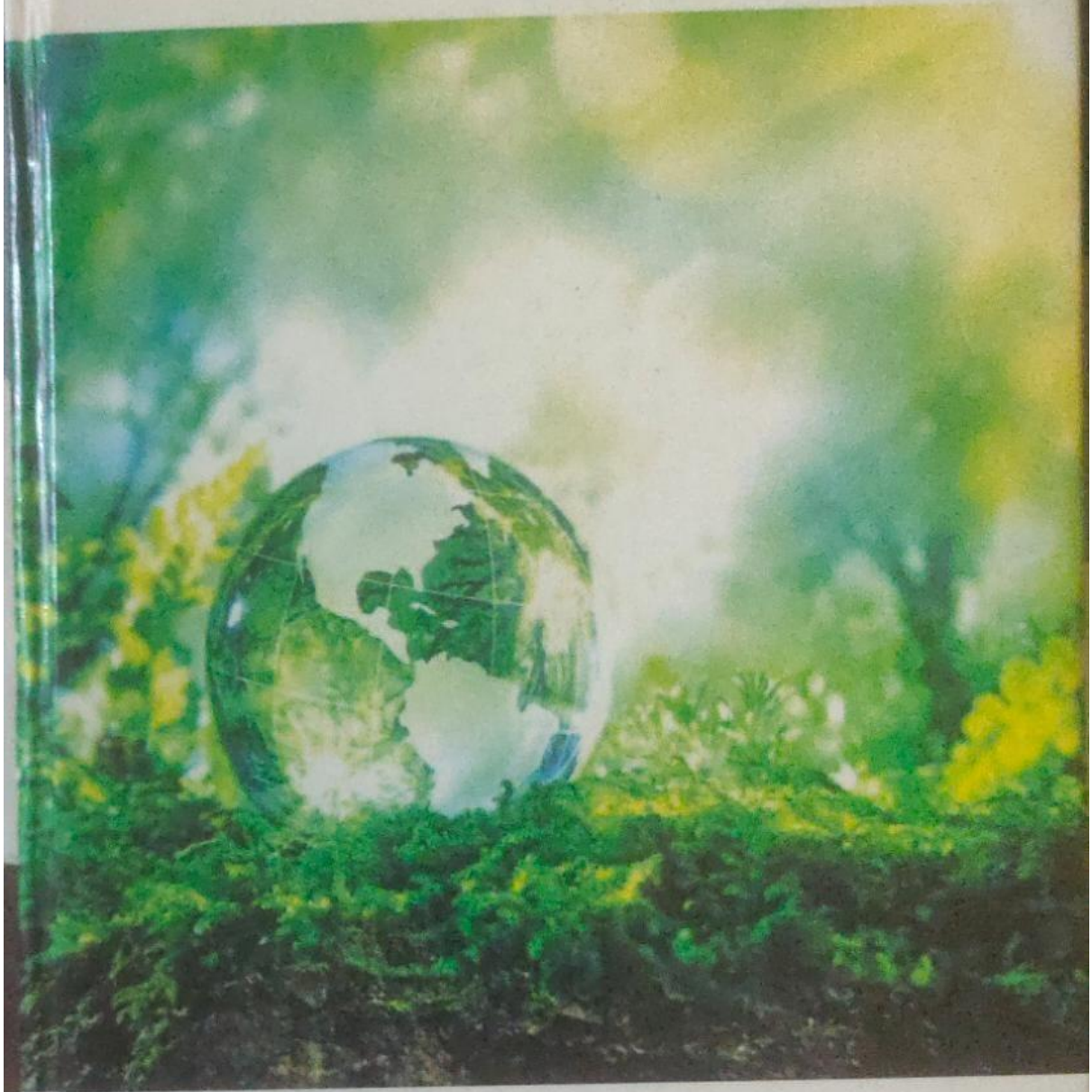
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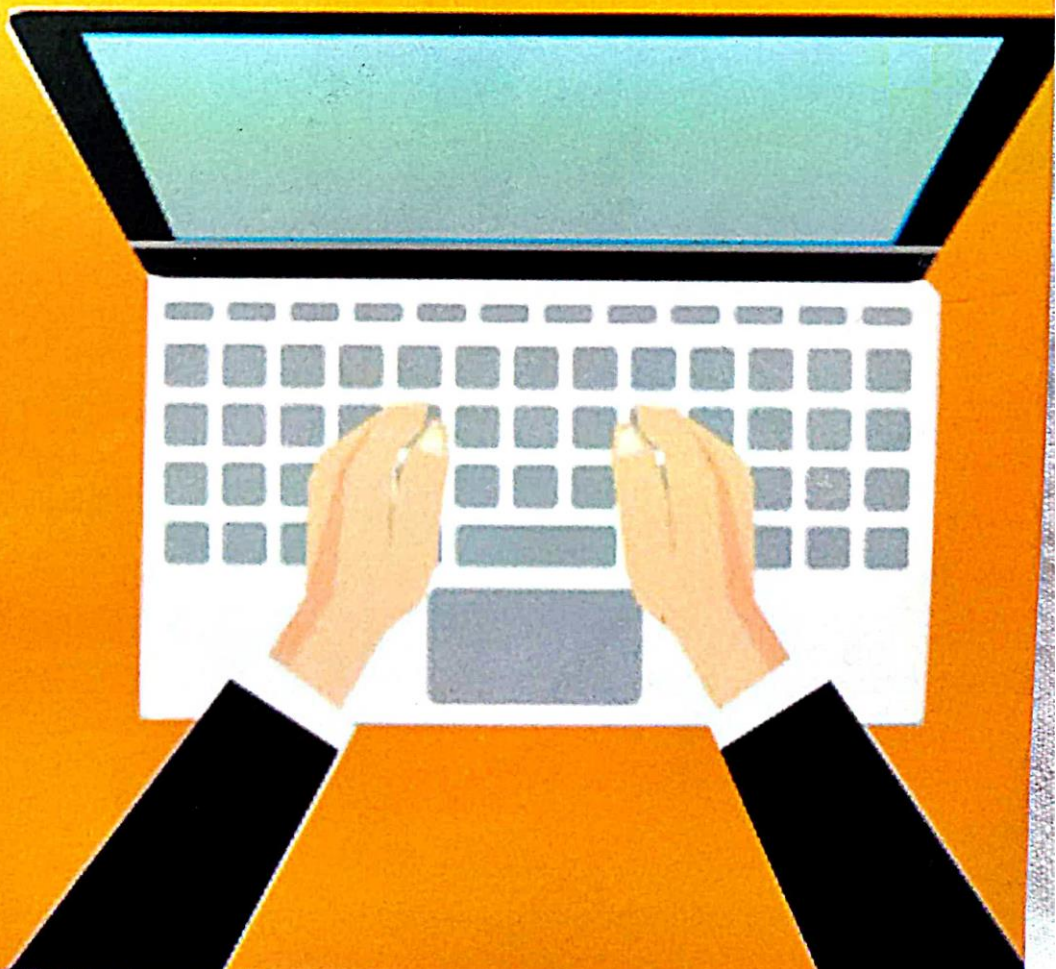
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# MODERN TRENDS IN EDUCATION

Dr. Nidhi Darbari



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डॉ. आशा रानी\*

'प' के त्रिकोण में जीती नारी। पिता के द्वारा पोषित, पति के द्वारा संरक्षित और पुत्र के द्वारा सम्मानित। ये चाहे व्यथा है या अनुशासन पर नारी जीवन की यही परंपरा है। वैदिक काल से लेकर आधुनिक काल तक, निरक्षर से साक्षर तक, पर निर्भर से आत्म निर्भर तक, रामायण की कल्पना से राम के जीवन काल तक, रामचरितमानस रचनाकाल से रामायण प्रसारण काल तक हर नारी जीवन की यही कहानी है।

श्रीराम के जीवन काल में भी नारी के हर रूप सामने आए, उनके संघर्ष, उनकी समस्याएं, उनकी विवशता। चाहे रानी सुनयना, कौशल्या कैकेयी कुनित्रा हों, चाहे जगत जननी सीता। चाहे शिला रूप अहिल्या हो या शापित मुस्ता। चाहे राक्षस पुत्री सुर्पणखा हो या नाग पुत्री सुलोचना। सभी के जीवन की अपनी समस्याएं थीं, परेशानियां थीं, पर भी अपने जीवन को नैतिकता के उच्च स्तर तक पहुंचाया, जो आज भी प्रेरणा और आदर्श की प्रतिमूर्ति हैं।

\*श्रेष्ठि वाङ्मय, हिंदी एवं भाषा विज्ञान विभाग, रानी दुर्गावती विश्वविद्यालय, जबलपुर, (म.प्र.)



**Dr. Sudesh Bala Jain**, an assistant professor (Department of Education, Maharishi Mahesh Yogi Vedic Vishwavidyalaya, Katni, M.P.) has done M.Ed., M.A. (Hindi and History) and was conferred with the Doctor of Philosophy(Ph.D.) in Education in December 2020. She has about fifteen years of teaching experience. There are two books and more than twenty research papers (published in different journals of repute including Scopus) in her name. She has participated and presented papers in many conferences / seminars / workshops etc. She has written poetry for which she has been awarded too. She is also a good anchor and anchored many webinars and workshops.



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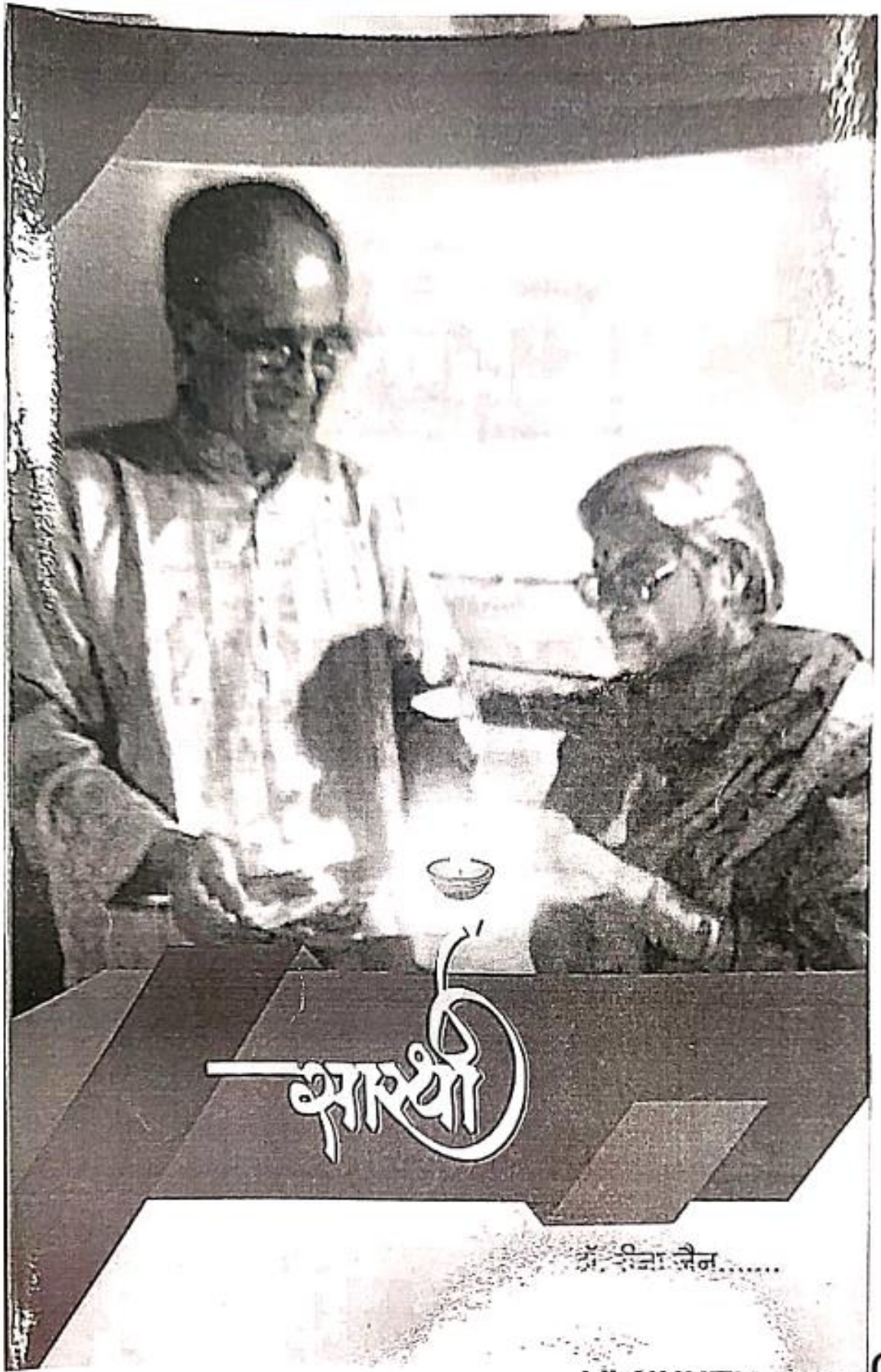
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# COVID-19 AND TEACHER EDUCATION: EXPERIENCES, CHALLENGES AND SOLUTIONS

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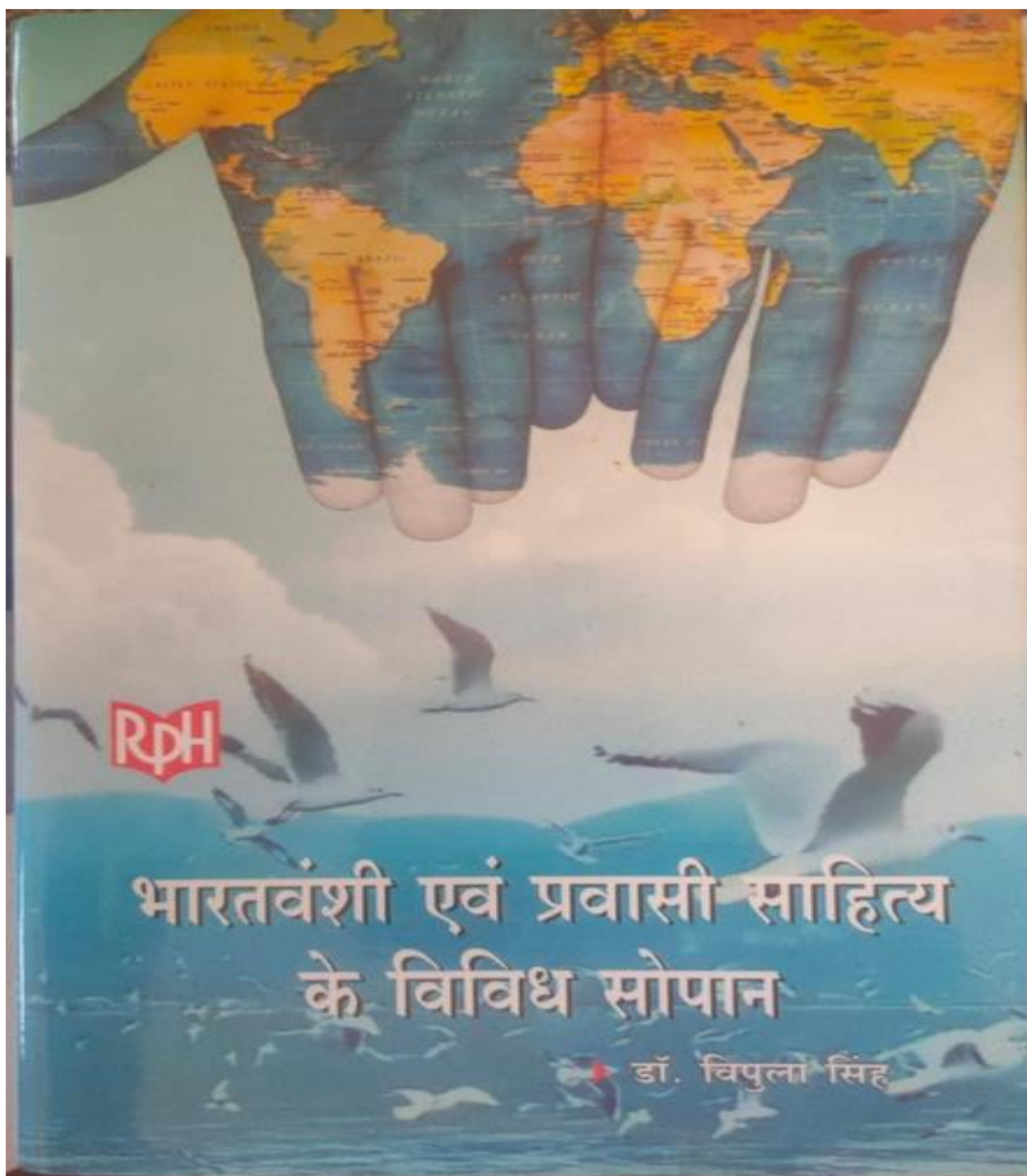
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डॉ. विपुला सिंह

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# FUNGI BIO-PROSPECTS IN SUSTAINABLE AGRICULTURE, ENVIRONMENT AND NANO-TECHNOLOGY

Volume 11 Fungal Diversity of Sustainable Agriculture



Edited by

Wojciech Korcz, University of Wrocław,  
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## Fungi Bio-Prospects in Sustainable Agriculture, Environment and Nano-Technology

Volume 1: Fungal Diversity of Sustainable Agriculture

2021, Pages 97-105

### Chapter 4 - Fungal endophytes: Entry, establishment, diversity, future prospects in agriculture

Nitin Swamy, Sardul Singh Sandhu

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#### Abstract

In the natural ecosystem, plants and fungal endophytes exhibit a vivacious symbiotic relationship. Fungal endophytes constitute an extraordinarily diverse collection of fungi persistent in plants for at least a part of their life cycle. Till now this diverse group of fungal endophytes has not been explored much. Irrespective of its enormous diversity only two classes Clavicipitaceae and Nonclavicipitaceous have been reported prominently. Fungi endophytes contain an incredible range of metabolic pathways enabling them to digest most organic matter and synthesize an array of bioactive natural products. The fungal derivatives play a vibrant part in human life and their compounds are the source of drugs for cancer, microbial and viral diseases. The natural compounds can act as a growth inhibitor of plant pathogenic organisms. Fungal endophytes are abundantly enriched sources of natural products that are used in agriculture, pharmaceutical industries and phytoremediation. The role of endophytes in agriculture can be in a myriad of ways ranging from protection of crops from biotic and abiotic stress factors, improving the quality of soil and providing various nutrients to the plants. These endophytic bacteria by various actions make available necessary nutrients which also reduces the application of chemical fertilizers. Due to the ability of endophytes to make secondary metabolites, these can be used as bioreactors to reduce the pressure on the agriculture field. In nutshell, these fungal endophytes can play a vital role in sustainable agriculture.

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#### Keywords

Endophytes; Bioactive; Metabolic; Phytoremediation

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# Microbial Rejuvenation of Polluted Environment

Volume 3

 Springer



**Microbial Rejuvenation of Polluted Environment** pp 153–184

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## VAM: An Alternate Strategy for Bioremediation of Polluted Environment

[Poonam Verma](#), [Suneel Kumar](#), [Mridul Shakya](#) & [Sardul Singh Sandhu](#)

Chapter | [First Online: 16 January 2021](#)

Part of the [Microorganisms for Sustainability](#) book series (MICRO,volume 25)

### Abstract

Soil remediation is a term that involves a numerous processes designed to get rid of contaminants like hydrocarbons (petroleum and fuel residues), heavy metals, volatile organic compounds (VOCs), or semi-volatile organic compounds (SVOCs). It is required to control the pollutants in soil and air that can cause health problems. Microbial cultivation or for phytoremediation are ubiquitous in nature.

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## Microbes: A Novel Source of Bioremediation for Degradation of Hydrocarbons

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### Abstract

In our daily life, the demand for liquid petroleum products is increasing day by day. Crude oil-derived hydrocarbons, the largest group of environmental pollutants found worldwide, pollute our environments severely. Oil or hydrocarbons cause drastic impacts on living organisms. The many reports about their toxicity

# FUNGI BIO-PROSPECTS IN SUSTAINABLE AGRICULTURE, ENVIRONMENT AND NANO-TECHNOLOGY

Volume 3: Fungal Microbiomes and Nano-Technology



Edited by

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## Fungi Bio-Prospects in Sustainable Agriculture, Environment and Nano-technology

Volume 3: Fungal metabolites and Nano-technology

2021, Pages 231-273

### Chapter 7 - Microbial metabolites: as sources of green dye

Poonam Verma, Mridul Shakya, Suneel Kumar, Sardul Singh Sandhu

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#### Abstract

Globalization is increasingly changing the lifestyle of the people and their aspirations. Colors are desirable and play a large part in human life. The synthetic colors are commonly used in the various food processing, painting, plastics, pharmaceutical, textile, and cosmetics industries, and are more attractive, reliable, and cost-effective compared to natural colors. But the use of different types of artificial colors causes diverse impacts on living beings and their surroundings and these colors are an example of the anthropogenic pollution of Earth. Most of the synthetic colors are prohibited in humans because of their hyperallergenicity, carcinogenicity, and other toxicological issues. After observations of the side effects of synthetic colors, the scientific groups stressed the extraction of isolation and the production of eco-friendly colors from various natural sources, such as plants, fungi, and bacteria. The extraction of natural color or green pigments from the microbes, in particular the fungi, are enormously attractive because they have many advantages over plants and other natural sources in terms of cost-effectiveness, easy accessibility, longevity, labor-efficient, and fast downstream processing.

Because of their healthy and eco-friendly nature, these natural colors offer huge potential. Therefore biopigment use in the various dyes sectors is a promising field with high economic values. Through biotechnology we can achieve the idea of green ecology, but the use of these natural colors or pigments is confronted by high costs and changes in shades as the pH changes, and some of these pigments have toxic effects, so toxicology tests are necessary, particularly for food products, before using these pigments.

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#### Keywords

Biocolor; green technology; globalization; synthetic color



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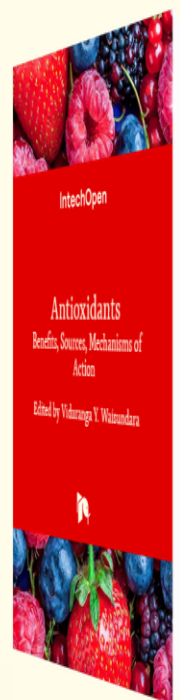
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# Broad Efficacy of Scavenging Free Radicals: *Cordyceps* sp.

Submitted: October 8th, 2020 , Reviewed: July 12th, 2021 , Published: August 7th, 2021

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### WRITTEN BY

Loknath Deshmukh, Rajendra Singh and Sardul Singh Sandhu

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## Antioxidants

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## Abstract

Scavenging free radical potency of cordycepin is the major bioactive segment extricated from *Cordyceps* species. In some new years, *Cordyceps* has gotten growing thought inferable from its distinctive restorative/pharmacological tests. This assessment reviews continuous explores on the counter oxidant impacts and the associated analyses of *Cordyceps* species. The results from our review show that *Cordyceps* of the cordycepin applies protective effects against hostile to oxidant injury for certain, afflictions including constant obstructive pneumonic infection (COPD), hepatitis, asthma, cerebral paralysis, Parkinson's illness (PD), coronary course sickness (CAD), Alzheimer illness, respiratory failure, malignancy infection,

## Sections

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1. Introduction
2. Oxidative stress and damage to nucleic acid, protein and lipids
3. Sources and effects of cordycepin
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OF MICROBES**

**Dr. KAVITA CHAHAL**

Assistant Professor in Department of Botany,  
Government College, Bilhna, Chhindwara, Madhya Pradesh.



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## Chapter – 16

# PROBIOTICS

**Renu Pathak**

Department of Biological Sciences, Rani Durgavati University,  
Jabalpur. Email : 1234pathakrenu@gmail.com

&

**Divya Singh**

Department of Biological Sciences, Rani Durgavati University,  
Jabalpur. Email : divya18979@gmail.com

### Abstract

*The pandemic era 2020 created an immense public awareness for immunity at an individual level. The market is also switching on the track of supplying immune boosters' products to the consumers along with the WHO guidelines and the Ministry of Health, AYUSH Directorate, and several public and private sectors are promoting the potential benefits of the usage of the organics and probiotics. A certain group of microorganisms when consumed as in a food or a dietary supplement maintains or restores commensal microbiota to the digestive tract. In a short span, probiotics have become an integral part of food and nutritional supplements due to their potential of providing health benefits. Though the limitations in the legislative framework and government policies restrict its uses on a wide application. Insight studies in conjunction with advanced technologies are needed to promote the growth and production of Probiotics. Experimental trials in context to its safety usage on a mass scale are also required.*

Dr. Pradyumn Kumar Bhowmik  
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# Waste to Energy: Prospects and Applications

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## Waste to Energy: Prospects and Applications

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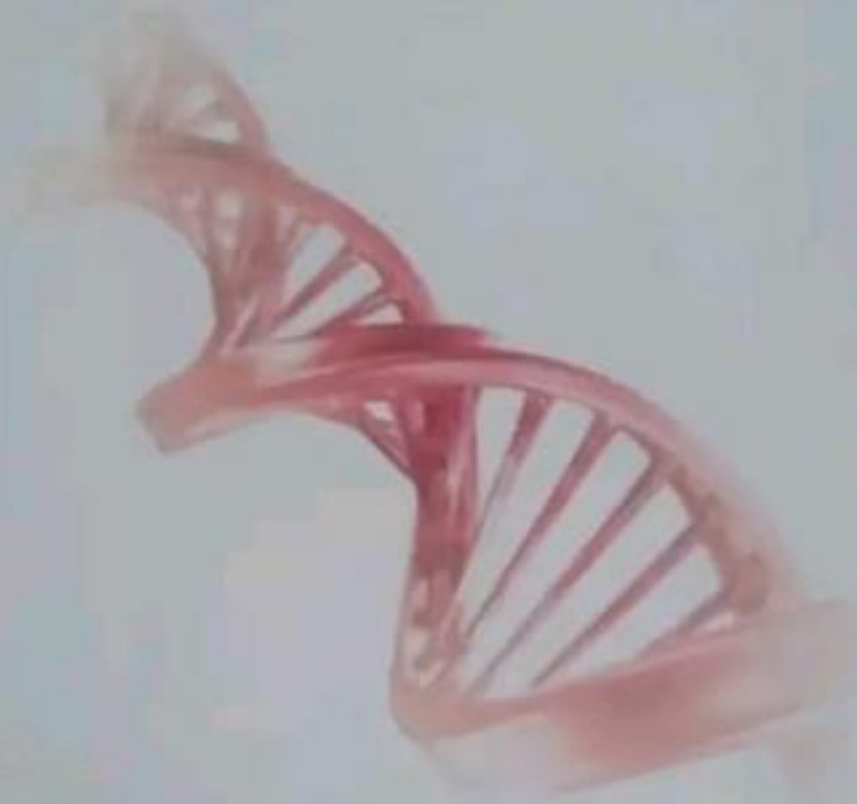




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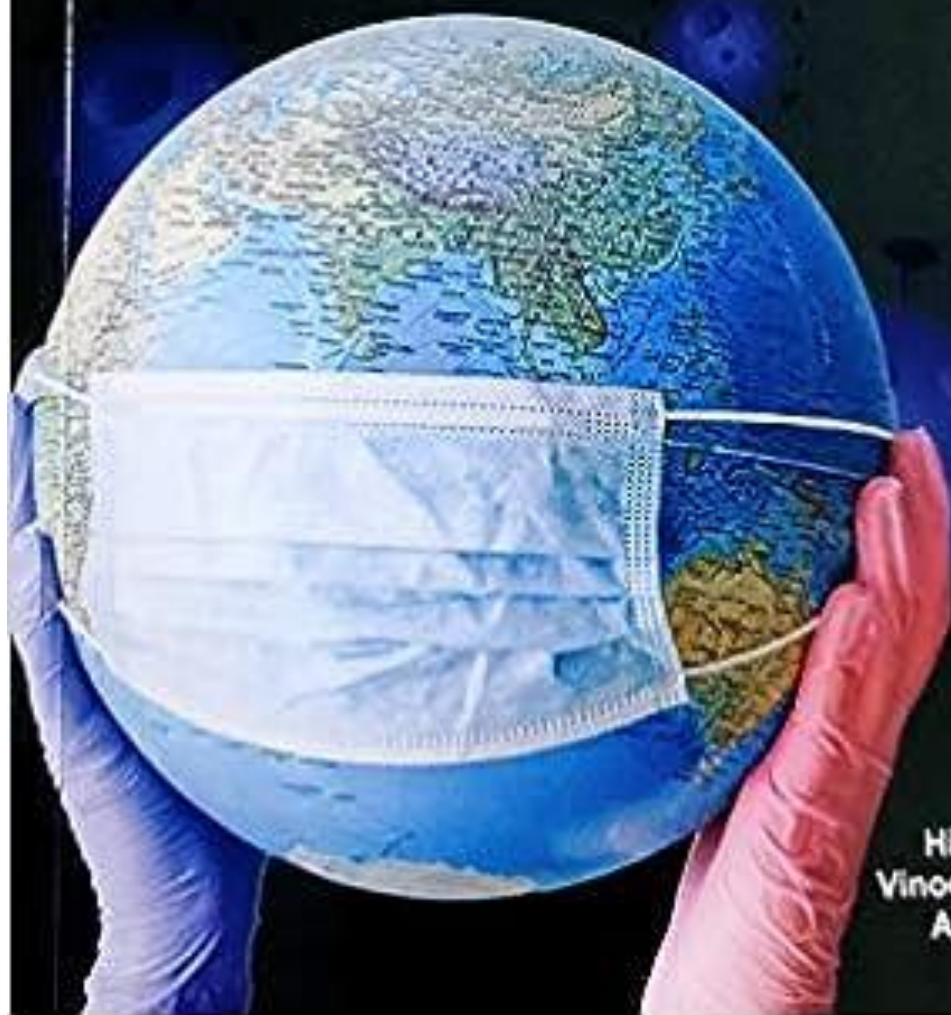
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*Editors*

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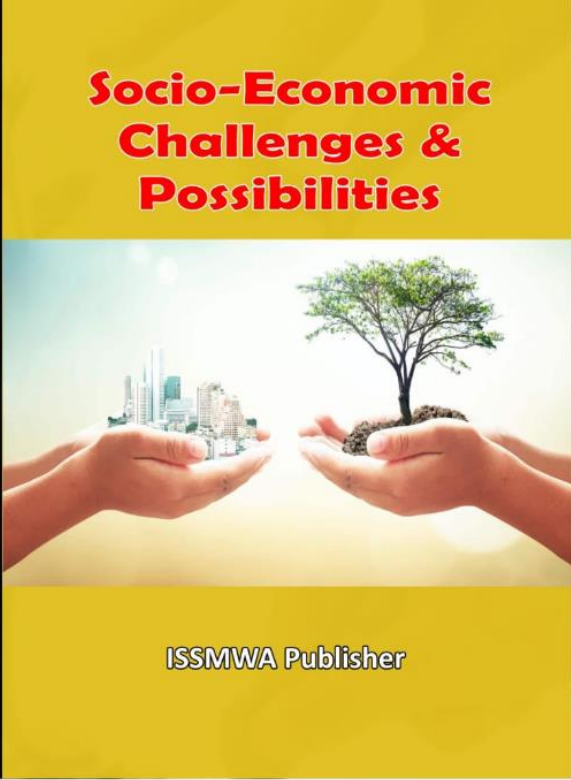
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RESEARCH ARTICLE | NOVEMBER 02 2020

## Quantum size effects on PL decay time and oscillator strength of semiconductor quantum dots

P. Hari Krishna ; Meera Ramrakhiani Check for updates

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*AIP Conference Proceedings* 2270, 110039 (2020)<https://doi.org/10.1063/5.0019456>

Impact of Quantum-size effects of an electron-hole system confined in semiconductors is studied theoretically by computational modeling. Here we proposed a formula to relate particle size with decay time and oscillator strength using the concept of transition probability. The theory modeled is for CdSe and CdS semi-conductor quantum dots in the strong confinement region only where the particle size is less than Bohr's radius and the oscillator strength per volume is expected to increase with  $1/r^3$  for the first excited state,  $r$  being the radius of spherical nano particle. As the experimental data needed to co-relate the modeled theory is available only for CdSe and CdS quantum dots only, therefore the theory is modeled for these two quantum dots only. The decay time for such spherical quantum dots is reduced thereby causing faster decay of luminescence. On the other hand it is also observed from the calculations that for same size of two different spherical quantum dots the decay time as well as oscillator strength varies depending upon the bulk oscillator strength of the material.

---

### Topics

[Quantum size effects](#), [Oscillator strengths](#), [Quantum dots](#) [Stress strain relations](#) [Computational models](#)

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RESEARCH ARTICLE | NOVEMBER 02 2020

## Poly (vinyl alcohol) supported flexible films of graphene oxide and reduced graphene oxide and their structural study

Arti Sharma ; Sunil Kumar; Arunendra Kumar Patel; Anil Kumar Bajpai; Rakesh Bajpai

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 Author & Article Information

*AIP Conference Proceedings* 2270, 070003 (2020)

<https://doi.org/10.1063/1.50025343>

Graphite oxide or graphene has emerged as a promising material for researchers and technological world, because of its amazing mechanical property along with its super electrical property. Therefore, this material has being used in numerous potential utility viz, polymer channels, sensors, energy transformation, and vitality stockpiling gadgets. The synthesis and analysis of PVA Poly( vinyl alcohol) supported GO (graphene-oxide) thin films were described in the performed work. Graphene-oxide was obtained via a facile method which based on the modified Hummers reaction scheme. The morphology and physical properties of graphene oxide were analyzed via Fourier transforms infrared (FTIR), images of SEM and Raman spectroscopy. The spectral outcomes of FTIR analysis showed that the graphite flakes were oxidized, the outcome of this process various functional groups generated which are attached on diametrical ends of structure and basal plane such as C-O-C, C-O, COOH, and C-H, respectively on the surfaces of the graphene- oxide. From the study of Raman spectroscopy, the intensity ratio of G band and 2D band reveals that the obtained materials are monolayer. With the help of SEM analysis morphology of the

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## Absorption and crystalline studies on reduced graphene oxide:poly(vinyl alcohol) polymer nano composites films



Arti Sharma; Arunendra Kumar Patel; Anil Kumar Bajpai; Rakesh Bajpai



+ Author & Article Information

AIP Conf. Proc. 2270, 070001 (2020)

<https://doi.org/10.1063/5.0025866>

Present study deals with the synthesis of reduced Graphene Oxide (rGO) and their nanocomposite films using PVA Polymer. The developed samples have been studied for their absorption and crystalline properties with the help of Uv-Vis Spectroscopy and X-Ray Diffraction techniques. The crystalline study reveals that, as we increase the concentration of rGO into the PVA matrix, the crystalline properties are also enhancing towards stable structure. The absorption study reveals that, as we are increasing the concentration of rGO into the PVA matrix the optical band gap decreases. On the basis of both studies, we can say developed polymer nanocomposite films are more stable beyond 4ml concentration of rGO solution.

---

### Topics

[Band gap](#), [Graphene](#), [Crystalline properties](#), [Polymers](#), [UV-visible spectroscopy](#), [Nanocomposites](#), [Diffraction](#)

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Bikaner, India • 14–15 October 2019

Editors • Manoj Singh Shekhawat, Sudhir Bhardwaj  
and Bhuvneshwer Suthar



RESEARCH ARTICLE | MAY 04 2020

## Investigation of electrical conduction in polysulfone-polyvinylidene fluoride blends at high temperature and field

Swarnim Patel ; Kiran Dawande; R. K. Dubey; J. M. Keller



[+ Author & Article Information](#)

*AIP Conf. Proc.* 2220, 080061 (2020)

<https://doi.org/10.1063/5.0001242>

In the present investigation current-voltage (I-V) characteristics of the blends of Polysulfone –Polyvinylidene Fluoride in different composition (PSF: PVDF:: 80:20; 85:15; 90:10 and 95:05 percent by weight) were investigated at different fields, range 100-250  $\text{kVcm}^{-1}$ , as a function of temperature, range 333-388 K. The results based on these isothermal I-V characteristics indicate thermally activated conduction main in the entire temperature range. This complete absence of Ohmic region is due to the fact that all the measurements has been carried out at high temperature and with high field. To distinguish between Richardson Schottky (R-S) and Pool Frenkel (P-F mechanism), help of  $\beta$  factor obtained from the slope of  $\log I$  versus  $E^{1/2}$  plots is generally taken. In our case  $\beta$  experimental is close to the value of  $\beta$  (P-F) calculated theoretically, Hence Pool Frenkel mechanism seems more favourable in this case. The activation energy values for the different blend sample at various field has been calculated by the slope of  $\log I$  versus  $1000/T$ . Values of Activation energy indicate that the conduction process is due to electronic conduction mechanism.

---

Topics

[Electrical conduction](#), [Current-voltage characteristic](#), [Polymers](#)

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RESEARCH ARTICLE | MAY 04 2020

## Evaluation of DC and AC conducting properties of poly (diaminonaphthalene) conjugated polymer doped in poly (vinyl alcohol) films

Rinkesh Bhatt; Pallavi Shukla; R. Bajpai; J. M. Keller; A. K. Bajpai



[+ Author & Article Information](#)

*AIP Conf. Proc.* 2220, 040023 (2020)

<https://doi.org/10.1063/5.0002212>

Poly (diaminonaphthalene) doped poly (vinyl alcohol) was synthesized by in-situ chemical oxidation polymerization method. The complex conduction mechanism of obtained PDAN doped PVA films were examined by measuring DC and AC conductivity. Non-linear I-V characteristics curve confirming the semiconducting nature of the films at constant temperatures. The DC and AC conductivities of the 0.791g PDAN doped PVA films were  $(2.041 \pm 0.64) \times 10^{-5} \text{ Scm}^{-1}$  and  $(6.28 \pm 0.79) \times 10^{-6} \text{ Scm}^{-1}$ , respectively. The DC conductivity so obtained was six folds larger than earlier reported.

Topics

[Doping](#), [Electrical conductivity](#), [Current-voltage characteristic](#), [Polymers](#)

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RESEARCH ARTICLE | MAY 04 2020

# Microhardness study of binary blend of polyvinyl formal and polyvinylidene fluoride

Kiran Dawande ; Swarnim Patel; Rakesh Bajpai; J. M. Keller



[+ Author & Article Information](#)

*AIP Conf. Proc.* 2220, 080060 (2020)

<https://doi.org/10.1063/5.0001253>

The preparation of polymer blends of Polyvinyl Formal and Polyvinylidene Fluoride in different weight percentages is described. The strength of these blends has been studied by measuring their surface microhardness making use of a Vickers microhardness tester.

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RESEARCH ARTICLE | MAY 04 2020

# Short circuit depolarization behaviour of PVDF and PVAc blends

Nidhi Paroha ; Poojadevi Sahu; J. M. Keller



[+ Author & Article Information](#)

*AIP Conf. Proc.* 2220, 080028 (2020)

<https://doi.org/10.1063/5.0002155>

Depolarization current spectra of PVDF and PVAc has been studied as a function of polarizing field, polarizing temperature and film compositions. Blends samples of PVDF and PVAc with different weight percentage ::80,20; 90,10 and 85,15 were prepared by solvent Cast technique. The sample were bilaterally aluminized. TSDC currents on such bilaterally aluminized samples were recorded by reheating the sample at the rate of 3°C per minute. Depolarization current were recorded by using Kheithely electrometer 610C. The various observed peaks in the thermograms are discussed on the basis of space charge polarization. The Activation energy is evaluated from the Garlick–Gibson plot of initial rise method.

Topics

[Short circuit](#), [Electrometers](#)

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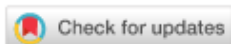
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## Structural – Morphological relative study of polyphenylene oxide and polystyrene (PS: PPO) polymer blends



Beena Rai ; J. M. Keller; Rakesh Bajpai



[+ Author & Article Information](#)

*AIP Conf. Proc.* 2220, 020139 (2020)

<https://doi.org/10.1063/5.0002547>

The objective of this research paper is to compare the structural and morphological characteristic of polymer blends of Poly (Phenylene Oxide) (PPO) and Poly (Styrene) (PS). A polymer blend is a mixture of two or more polymers that have been blended together to generate a new material with different physical properties. PPO and PS have a chance to give complementary properties to each other and hence there is a huge interest in studying the PPO: PS polymer blends. With these objectives, the present work focuses on the synthesis and characterization of polymer blends of polyphenylene oxide (PPO) and Polystyrene (PS). The Polymer blends of Poly (Phenylene Oxide) (PPO) and Poly (Styrene) (PS) has been prepared using solution casting technique. The pure polymeric samples and their blends PS:PPO in the ratio 95:05; 90:10; 85:15; and 80:20 of their weight percentage has been prepared. The prepared polymer blends were characterized by using X-ray diffraction (XRD) techniques for their structural characteristics, Fourier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM) were undertaken for their surface morphological studies. It is found that, the interplanar distance, crystallite size and the order of crystallinity is maximum for 10 wt. % of PPO. The morphology of blends shows that PPO and PS are misc

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RESEARCH ARTICLE | NOVEMBER 02 2020

## A study of the optical band gap energy and Urbach energy of fullerene (C<sub>60</sub>) doped PMMA nanocomposites

A. Dhanaraj ; K. Das; J. M. Keller[+ Author & Article Information](#)

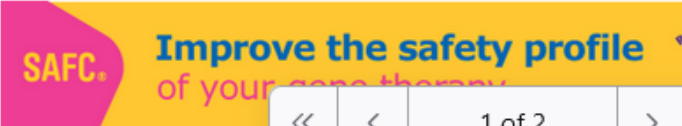
AIP Conf. Proc. 2270, 110040 (2020)

<https://doi.org/10.1063/5.0019420>

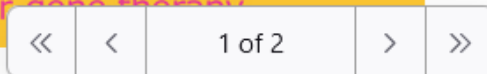
Fullerene dispersion in a polymer matrix alters the values of band gap energy and Urbach energy of the nanocomposite. In the presented work, the influence of fullerene dispersion and polymer-fullerene interactions on the band gap energy and Urbach energy of poly (methyl methacrylate)-fullerene C<sub>60</sub> nanocomposite has been studied by means of UV-Vis absorption spectroscopy. Pure and different doped films of gradually increasing concentrations were fabricated using solvent casting technique. Optical properties of these films were obtained from the UV-VIS absorption spectra, at normal incidence, over 190-1100 nm spectral range. The optical absorption edge was described using the Tauc model. Band gap energy of the thin films was found using Tauc plot. The width of the band tails, known as Urbach tails, were evaluated to quantify the structural disorder. Optical characterization showed that average absorption and band gap energy decreased, while Urbach energy increased with the addition of fullerene C<sub>60</sub>.

Topics

[Doping](#), [Band gap](#), [Absorption spectroscopy](#), [Polymers](#), [Thin films](#), [Absorption band](#), [UV-visible spectroscopy](#), [Fullerenes](#),



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<sup>1</sup> Department of P.G. Studies and Research in Chemistry and Pharmacy, Rani Durgavati University, Jabalpur, India

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<sup>2</sup> Rani Durgavati Vishwavidyalaya, Jabalpur, India

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<sup>1</sup> Guru Ramdas Khalsa Institute of Science and Technology (Pharmacy), Jabalpur, India

<sup>2</sup> Department of Pharmacy, Rani Durgavati Vishwavidyalaya, Jabalpur, India

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## CHAPTER 8

### CONSUMER BEHAVIORS STATUS DURING COVID19 ON PRODUCT PLANNING AND PRODUCT LIFE CYCLE

<sup>1</sup>Dr. Ashish Sharma

#### Abstract

Product Planning is an important factor in product decision companies keep on taking the decision as per available data at both macro and micro level. Companies are having the routine practice of routine product decision. There is not much extra ordinary challenge in normal conditions. The companies already remain with the category of reviews on following aspects of Product Planning; Product mix decision, Product line selection, Product line modification, Product line addition, Product line deletion. Product planning is having an important decision with Product Life Cycle. Product Life Cycle is having following stages; Introduction, Growth, Stability, Decline. Companies are having standard strategies on each stage of Product Life cycle. The Consumer Behavior is one pattern which can't be an avoidable factor in product planning stage. Consumer present particular set of behavioral pattern at each stage of product life cycle. Ceschin (2016) has presented exploration between and sustainability. The companies have no difficulty for analysis of Consumer Behavior during non covid situation because we don't get much shifting in consumer behavior. There are emerging forces for the companies to analyze consumer behavior in covid -19 situations. The important question arises about continuing an existing Consumer Behavior or changing consumer Behavior. The Research plan is to analyze the status of consumer behavioral variable during covid 19 situation for product planning and product life cycle situation al phases. This will be having limitations up to consumer products only. The Researcher will follow both combination of qualitative and quantitative research methods. Researcher will have series of statistical testing on challenge of Hypothesis testing and will have a responsibility of presenting clear findings about consumer behavior al status.

<sup>1</sup>Sr. Asst. Prof. UIM, RDVV, Jabalpur

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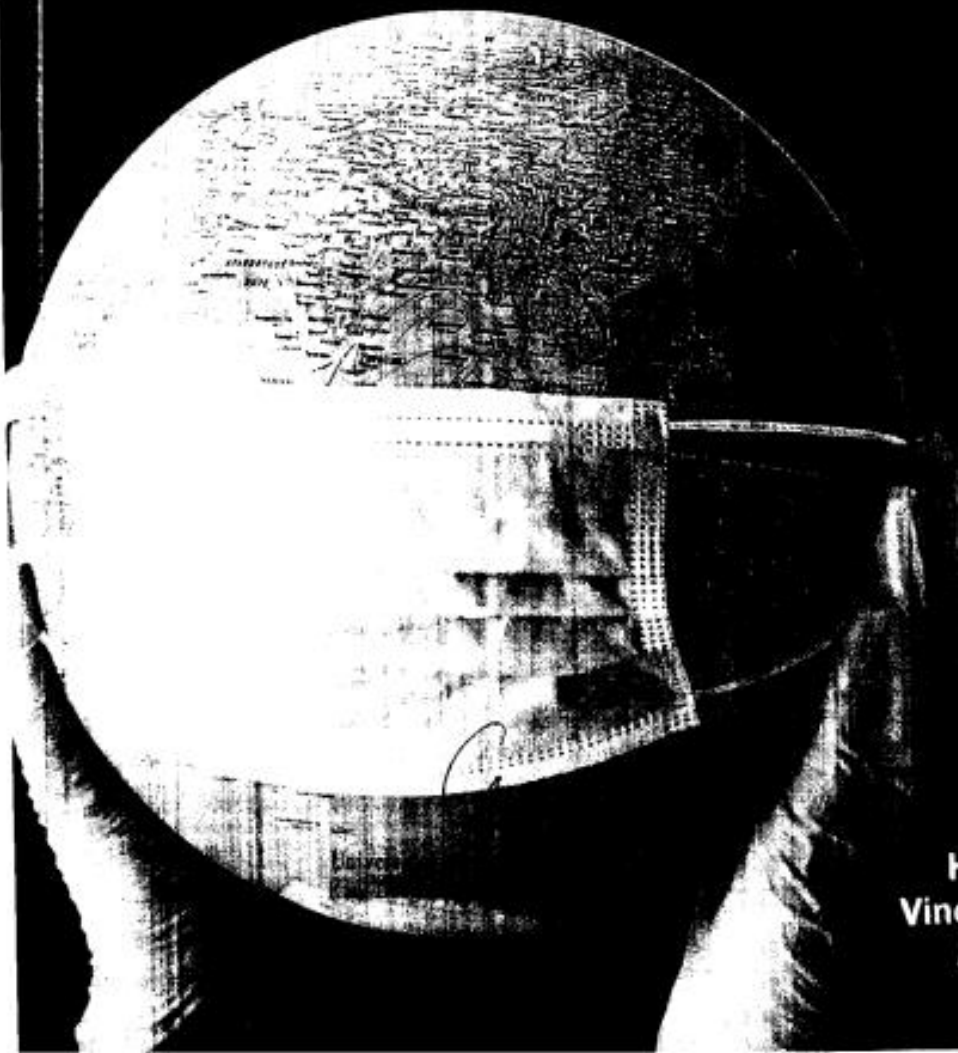
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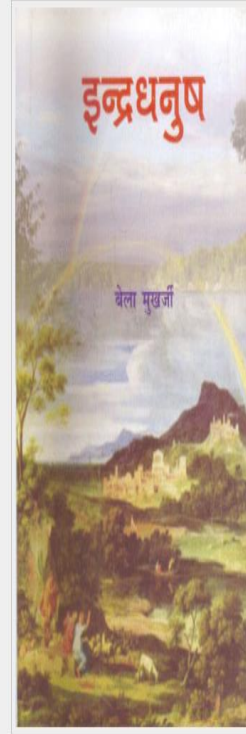
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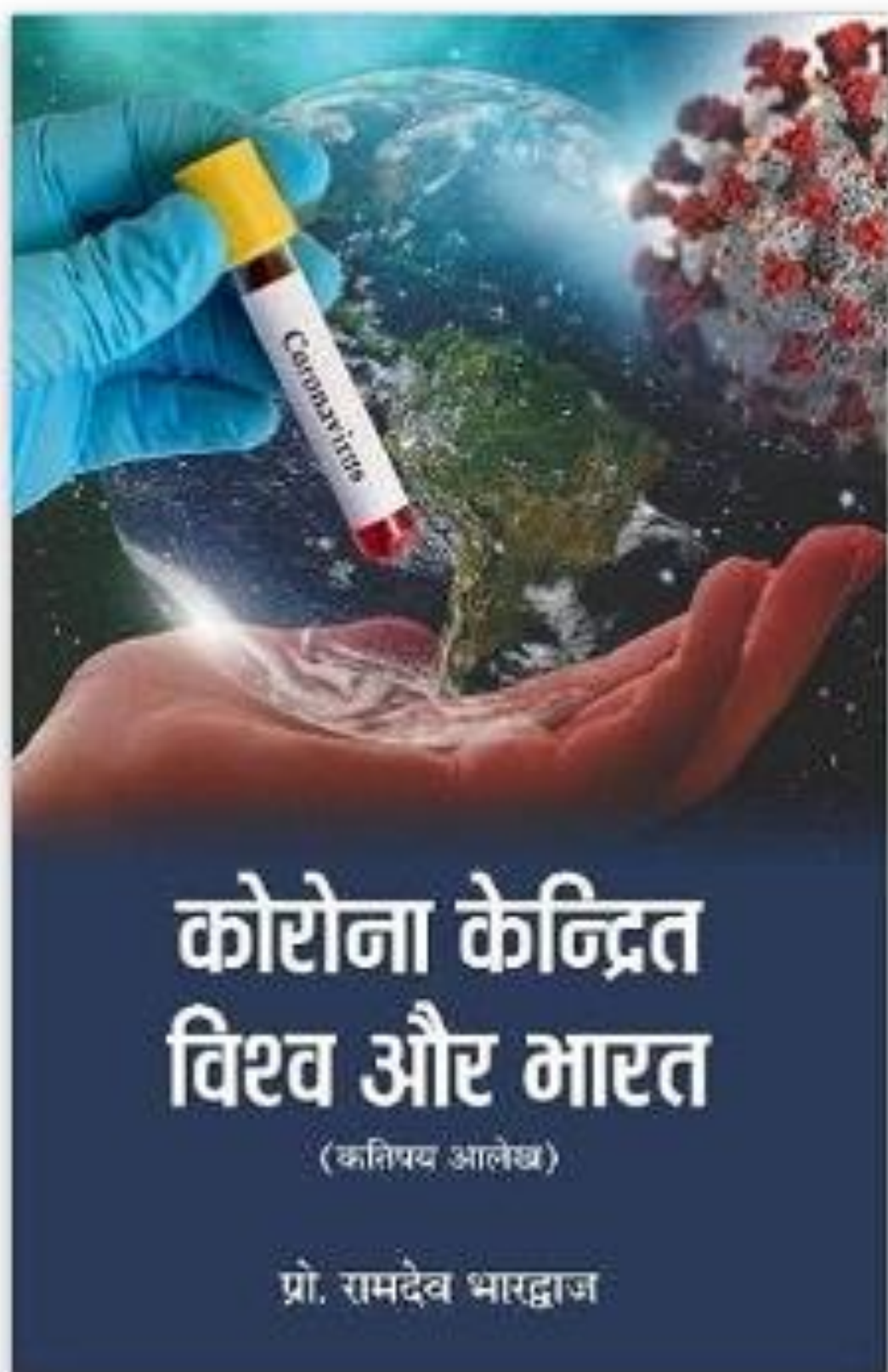
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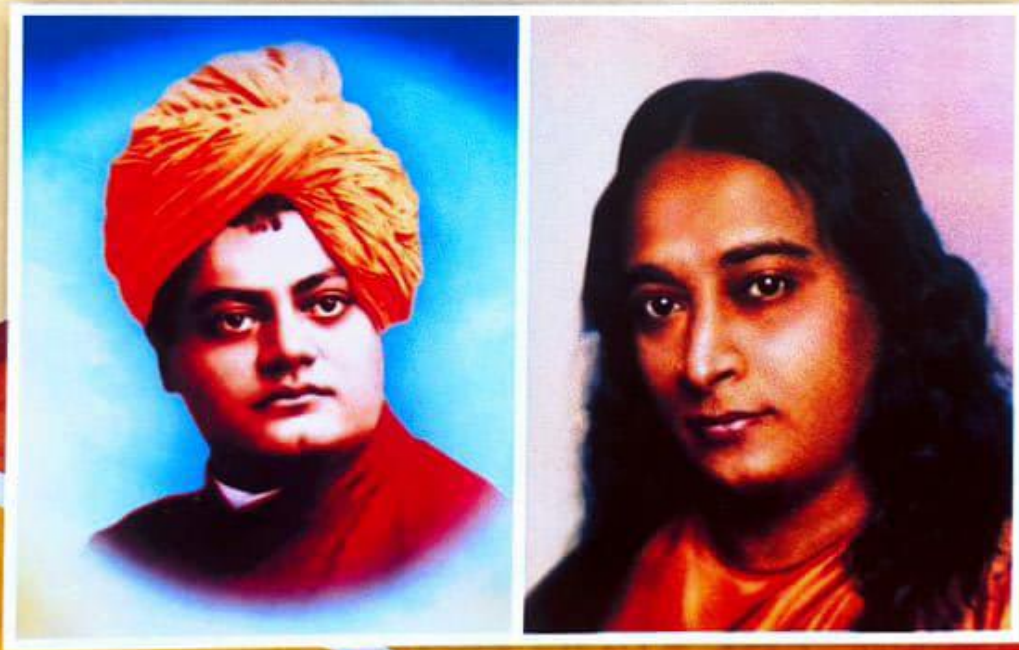
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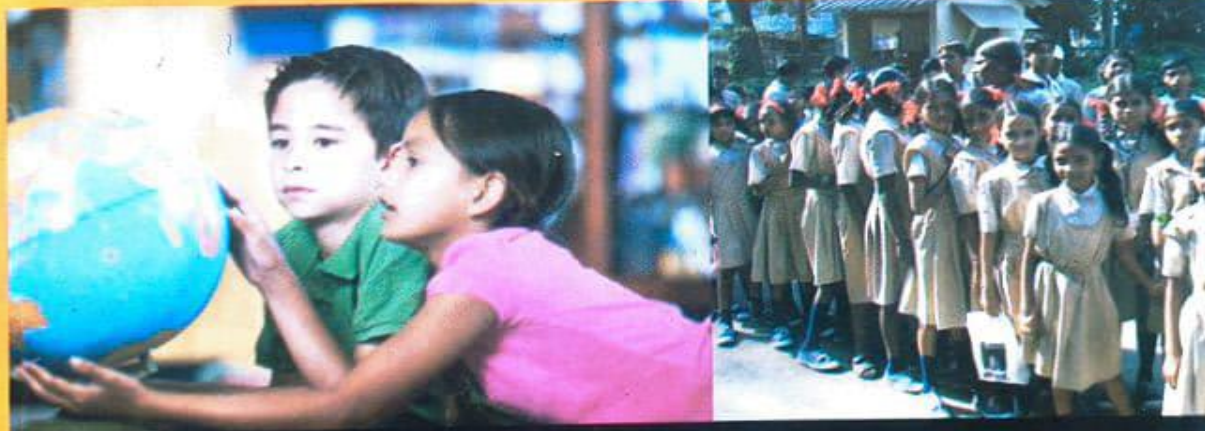


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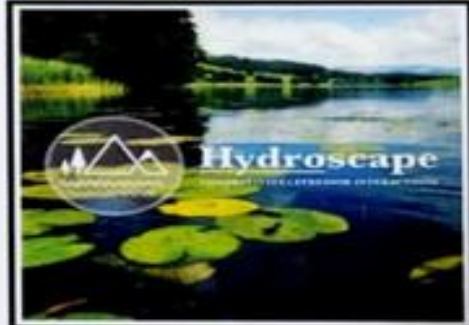


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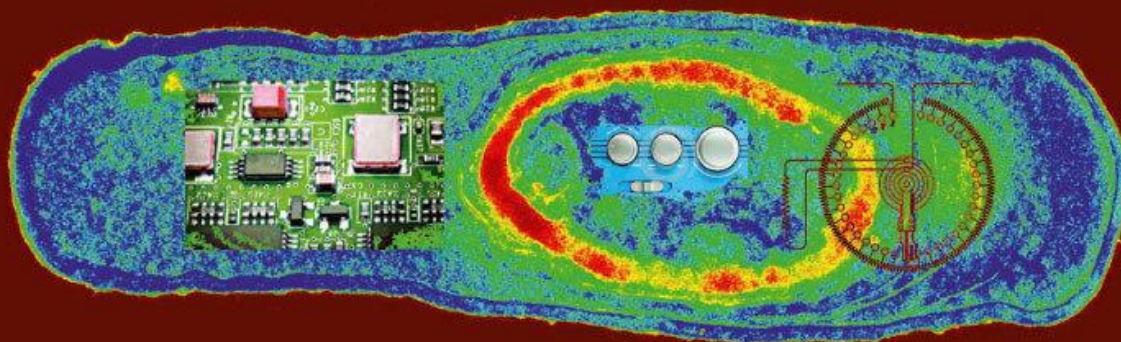
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# microbial biotechnology

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Chapter

## VAM: An Alternate Strategy for Bioremediation of Polluted Environment

January 2021

DOI: [10.1007/978-981-15-7447-4\\_6](https://doi.org/10.1007/978-981-15-7447-4_6)

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**Poonam Verma**  
ISBM University Gariyaband Chhattishgarh



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### Abstract

In our daily life, the demand for liquid petroleum products is increasing day by day. Crude oil-derived hydrocarbons, the largest group of environmental pollutants found worldwide, pollute our environments severely. Oil or hydrocarbons cause drastic impacts on living organisms. The

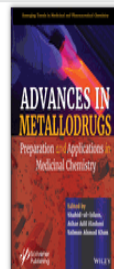
Chapter 6

## NO-, CO-, and H<sub>2</sub>S-Based Metallopharmaceuticals

R. C. Maurya, J. M. Mir

Book Editor(s): Shahid-ul-Islam, Athar Adil Hashmi, Salman Ahmad Khan

First published: 12 June 2020 | <https://doi.org/10.1002/9781119640868.ch6> | Citations: 2



Advances in Metalloodrugs:  
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### Summary

NO, CO, and H<sub>2</sub>S have major implications in therapeutic applications. Despite the known fact of the toxicity of these gaseous molecules, at tiny concentrations within a human body play prominent key signaling and regulatory functions. Researchers have been keen in knowing their mechanism and design of their molecular models. Seek for the metal-based compounds of these molecules are of intense interest nowadays. Herein, we report an overview of therapeutic aspects of the target molecules in connection with synthesis and molecular modeling to find out their successful releasing behavior. Some examples of molecules acting as NO, CO, or H<sub>2</sub>S releasers have been updated in this chapter. From the overall study, it is eminent that a vast field is yet unopened with regard to the exploration of mechanism of action, developing models for these molecules feasible for both *in vivo* and *in vitro* experiments and some other key roles regarding structural aspects are the future quests of this class of biomolecules.

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After the realization of extraction in a microdrop and development of single-drop microextraction as a technique potentially carried out under diverse modes in accordance with the nature of analytes, and the possibility of final analysis by a range of instrumental methods, the whole concept has received wide acceptance. A consolidation of efforts has enhanced the capability of this technique by advancements in configurational flexibilities of devices and control over solvent



## Chapter 15 - Single-Drop Microextraction

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### Abstract

After the realization of extraction in a microdrop and development of single-drop **microextraction** as a technique potentially carried out under diverse modes in accordance with the nature of **analytes**, and the possibility of final analysis by a range of instrumental methods, the whole concept has received wide acceptance. A consolidation of efforts has enhanced the capability of this technique by advancements in configurational flexibilities of devices and control over solvent drop dislodgement. Integration of safe and efficient materials, such as **ionic liquids** and **nanomaterials**, automation and miniaturization, and applications to challenging real-world samples, has increased the importance of this microextraction technique. Many such topics are discussed in this chapter illustrating the significant developments that occurred in the field.

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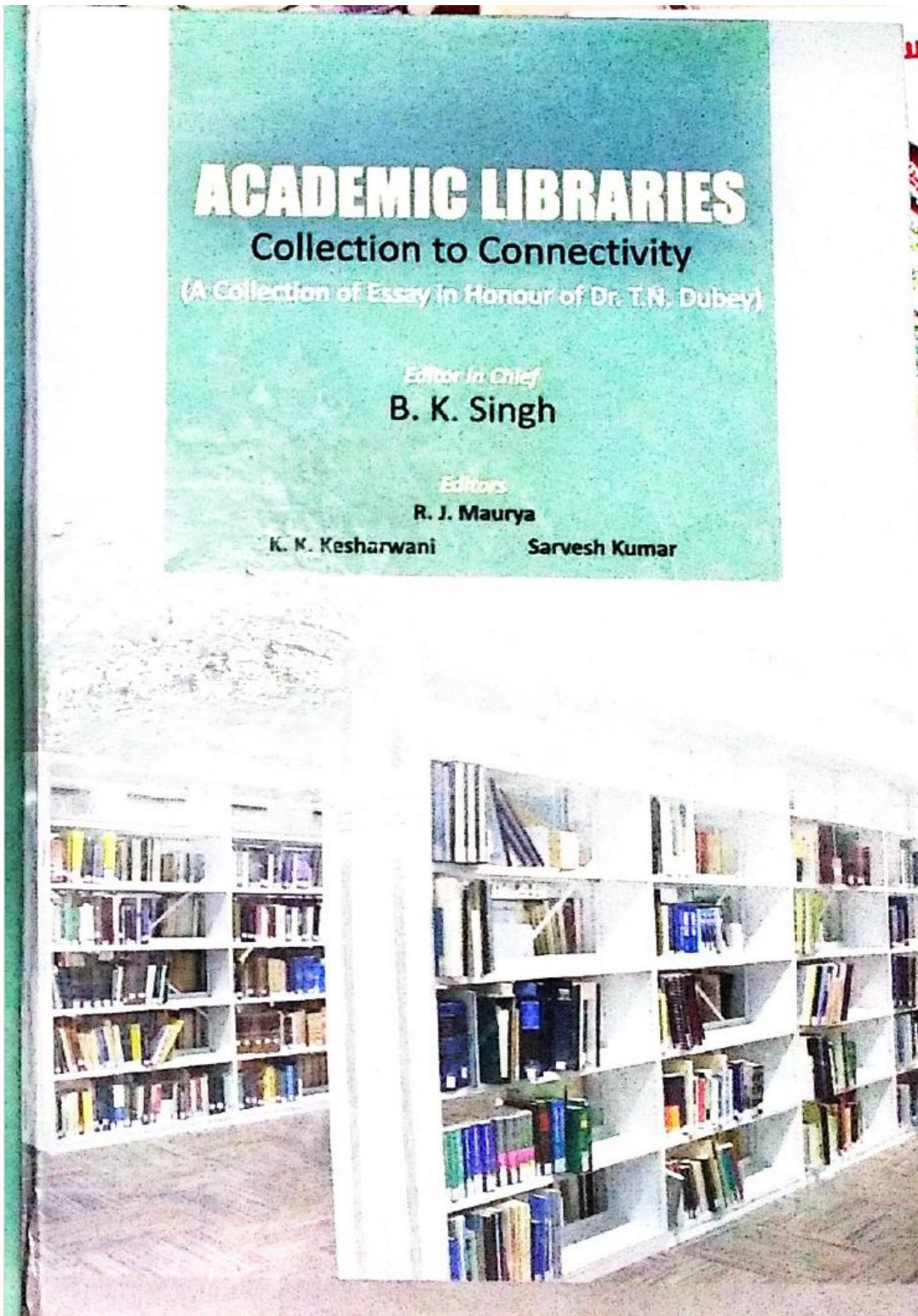
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*Dedicated to*  
**Dr. Tripurari Nath Dubey**



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# Libraries and Crowdsourcing

Satyabrat Shukla\* and Satya Prakash Tripathi\*\*

## Abstract

*Crowdsourcing is becoming a popular way to solve the problems, to fulfill a given task, to design a new logo for an event or to improve the library systems. Crowds have given a new hope to the market. Millions of people, connected with the Internet and Social Media, are contributing to the big or small projects. Crowdsourcing is helping to attract best possible ideas or to promote innovation. And with the right knowledge, tasks are getting easier, contributing to the crowd. This paper aims to explore the various dimensions of the Crowdsourcing and discuss how it could be used to improve the library system and services.*

## INTRODUCTION

Crowdsourcing generally refers to the sharing of ideas, services or sometime funds from a crowd of people, mostly from online community. It is the latest trend for moving individuals towards a common goal. It has long been popular in the field of Marketing but it was only a matter of time that this innovative concept entered into the field of Library system as well. Many organizations around the world, including India, are following the method of crowdsourcing to work.

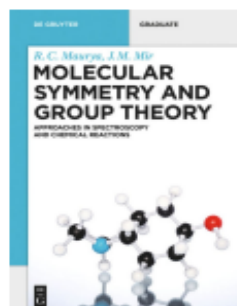
Webster's Dictionary defines Crowdsourcing as "The practice of obtaining needs, service, ideas or content by soliciting contributions from a large group of people and especially from the online community rather than from traditional employees or suppliers".

James Surowiecki (2004) explained the power of Crowd as "Under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them. Groups do not need to be dominated by exceptionally intelligent people in order to be smart. Even if most of the people within a group are not especially well-informed or rational, it can still reach a collectively wise decision. This is a good thing, since human beings are not perfectly designed decision makers."

It was in 2006 when the term *crowdsourcing* was used for the first time by Jeff Howe in his article *The Rise of Crowdsourcing* published in the **Wired** magazine. J. Howe described the use of community engagement, its talent, knowledge and skills to solve problems and to optimize the operating costs of companies. Based on many examples of business field, Howe showed that the phenomenon of

\* Librarian, Iswar Saran PG College, University of Allahabad, Prayagraj.

\*\* Lecturer, Deptt. of Library & Information Science, Rani Durgawati University, Jabalpur.



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# Molecular Symmetry and Group Theory

Approaches in Spectroscopy and Chemical Reactions

R. C. Maurya and J.M. Mir

In the series De Gruyter Textbook

<https://doi.org/10.1515/9783110635034>

Citations 2

**OVERVIEW** CONTENTS

## About this book

The mathematical fundamentals of molecular symmetry and group theory are comprehensibly described in this book. Applications are given in context of electronic and vibrational spectroscopy as well as chemical reactions following orbital symmetry rules. Exercises and examples compile and deepen the content in a lucid manner.

- Provides mathematical details to facilitate comprehension
- Includes several examples and exercises to illustrate the application of group theory



R. C. Morya

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संपादक

डॉ. माधुरी पाण्डेय गर्ग



## मीडिया की भाषा और सामाजिक परिवर्तन

डॉ. जयशंकर

*"नवकल्पना नवरूप से रचना रची जब नार की...  
सत्यम् शिवम् सुंदरम् से शोभा बढ़ी संसार की..."*

स्वतंत्रता पश्चात् भारत वर्ष में अनेक परिवर्तन हुए। आर्थिक रूप से देश को सुदृढ़ बनाने के प्रयास शुरू किए गए। इसी क्रम में संविधान द्वारा स्त्रियों की स्वतंत्रता पर उन्हें आत्मनिर्भर बनाने के प्रयास भी किए गए। छोटे-बड़े स्त्री आंदोलनों से स्त्री-समाज का मार्ग प्रशस्त किया। देश की प्रधानमंत्री के रूप में जब श्रीमती इंदिरा गाँधी ने कार्य प्रारंभ किया तो स्त्री की स्वतंत्रता का वास्तविक अर्थ स्थापित किया गया।

सामाजिक रूप से स्त्रियों के जीवन में बदलाव आया। प्रारंभ में तो भारतीय समाज ने स्त्रियों को उच्च स्थान पर बैठाया लेकिन भारतीय समाज में मध्यकाल की बर्बरता ने नारी को केन्द्र से हटाकर निम्न स्थान में रखा। स्त्रियों पर जुल्म होने लगे। उस समय के ग्रंथों में महिलाओं को उच्च स्थान प्राप्त जरूर था लेकिन येन-केन-प्रकारण महिलाओं को ही दुष्परिणाम भुगतने पड़े या कहा जाए कि हाल हाल में महिलाओं पर ही गाज गिरती थी। जैसे यदि हम रामायण के रामगमन की चर्चा करें तो राम के वनगमन के समय राम पिता की आज्ञा का पालन कर पुरुषोत्तम हो गये, सीता पतिव्रत धर्म का पालन कर पूजनीय हो गईं, लक्ष्मण निष्काम सेवक का प्रतीक बन गए, किंतु वहीं उर्मिला के विरह का क्या मोल लगाया गया? गौतम बुद्ध भगवान बुद्ध हो गये, यशोधरा के विरह एवं त्याग को क्या त्रिपिटक में स्थान दिया गया आदि ऐसे विषय हैं जो विचारणीय हैं एवं उन नारियों को साहित्य एवं मीडिया ने कौन सा स्थान दिलाया है? यशोधरा एवं ।

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Bahal, India • 7–9 February 2019

Editors • Sanjay Gaur, Arindam Ghosh and Vijender Singh





RESEARCH ARTICLE | AUGUST 29 2019

## Study of dielectric relaxation and persistence of polarization in polysulfone foils sensitized with malachite green using transient discharging current

Pooja Devi Sahu ; P. K. Khare; Sarita Kumari; Poonam Pendke Check for updates

+ Author &amp; Article Information

*AIP Conference Proceedings* 2142, 040005 (2019)<https://doi.org/10.1063/1.5122342>

The transient current in the discharging mode in Polysulfone (PSF) and Malachite green (MG) doped PSF foils measured as a function of different pooling field (kV/cm) at different pooling temperature have been found to follow the Curie –Von Schweidler law, characterized by different slopes in the short and long time regions. All measurement were performed on isothermal immersion technique using foils of thickness approximately 35-45 $\mu$ m. Various mechanisms which may be responsible for the time-dependent transient currents of pure and malachite green doped PSF foils are discussed. The effect of doping on the discharge current indicated the formation of molecular aggregates.

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RESEARCH ARTICLE | AUGUST 29 2019

## Synthesis and electroluminescence in CdSe nanocrystals

Sarita Kumari ; Kamal Kumar Kushwaha; Pooja Devi Sahu;  
M. Ramrakhaini



+ Author & Article Information

*AIP Conf. Proc.* 2142, 140021 (2019)

<https://doi.org/10.1083/1.5122534>

Currently there is a great interest in II–VI semiconductor nanoparticles, particularly organically capped soluble particles of cadmium and selenide, for their ready to use application in devices. In this study, CdSe nanocrystals have been synthesized by using starch as a capping agent through a chemical synthesis route at room temperature. Samples have been prepared varying quantity of precursor for Cadmium. It is observed that a turn on voltage is required for light emission and brightness increases exponentially with voltage. Turn on voltage is found to decrease as CdCl<sub>2</sub> concentration is increased. The voltage-current curve represents ohmic nature for all EL cell. The EL spectra also show blue shift with increasing CdSe concentration. This tunability of band gap as well as light emission with size is very important in display applications.

---

Topics

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NCPCM 2018**

Indore, India • 27–28 December 2018

Editors • Netram Kaurav, K. K. Choudhary, R. C. Dixit  
and Ashutosh Mishra



## Crystalline and absorption studies on cadmium sulphide doped polycarbonate composite

Arunendra Kumar Patel ; Keerti Pandey; Sapna Agrawal; Nisha Pandey; Rakesh Bajpai



+ Author & Article Information

*AIP Conf. Proc.* 2100, 020150 (2019)

<https://doi.org/10.1063/1.5098704>

In this paper we have studied the preparation of composites of polycarbonate composite by incorporating Cadmium Sulphide(CdS) particles with different concentration. The prepared samples were characterized by the different techniques used like X-ray diffraction (XRD) techniques and UV-vis spectroscopy(UV-Vis). The X-Ray diffraction technique gives the information on Crystallinity of the Sample, InterplanerDistance (d) and Crystallite Size (D). When the doping concentration is increased the crystallinity of the sample is increases and Crystallite size(D) is also increases. The UV-Vis spectroscopy technique gives information of Optical Band Gap. The energy band gap of pure polycarbonate is 4.437 eV and as we increase the concentration of cadmium sulphide the energy band gap decreases.

---

### Topics

[Doping](#), [Band gap](#), [X-ray diffraction](#), [Diffraction](#), [Polymers](#), [Transition metal chalcogenides](#), [Visible spectroscopy](#).

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# Sensors: Advanced Aptasensors Design

Rinkesh Bhatt

Department of Physics, Global Engineering College, Jabalpur, India

Laxmi P. Bagri, Rajesh Saini, and Anil Kumar Bajpai

Bose Memorial Research Laboratory, Department of Chemistry, Government Autonomous Science College, Jabalpur, India

## Abstract

The emergence of novel synthetic routes in chemical sciences has revolutionized the scenario of material research all over the world. The designing of unique structures with unusual properties originating therefrom has opened up new avenues where materials have demonstrated their huge potential in industry biology and medicine. One such specialty material developed in the last decades is aptamers, which are single-stranded oligonucleotides that offer special affinity for biomolecules such as proteins, drugs, enzymes, and viruses. These aptamers have been judiciously integrated with different materials to design aptasensors for selective molecular recognition and applications. This entry put forward a comprehensive account of advancements made in the area of aptasensors describing various types of aptasensors, involved detection methods, and different kinds of nano- and macromaterials such as quantum dots, graphenes, conducting polymers, and hybrid materials of organic and inorganic nature used in their designing and applications in biomedical, pharmaceutical, clinical, and food technology fields. This entry also reviews the mechanisms involved in sensing target molecules through the changes in the fluorescence, chemiluminescence, and surface-enhanced Raman scattering, and potentiometric, impedimetric, piezoelectric, and magnetoelastic properties of recognition unit. This entry will also highlight the existing challenges in the area of aptasensors research and predict their possible future.

**Keywords:** Aptamers; Aptasensors; Conducting polymers; Detection methods; Graphene; Quantum dots.

## INTRODUCTION

Antibody molecules or based products have recently attracted biopharmaceutical researchers in the clinical field for the treatment of various serious diseases such as cancer, infectious diseases, ophthalmological diseases, autoimmunity and inflammatory diseases, and many more. Nucleic acid compounds in the form of arrays, known as aptamers, are synthetic antibodies, which tide with target molecules such as proteins with affinities, specificities, and stabilities across a range of experimental conditions. Other than nucleic acid aptamers, there is another class of aptamers, known as peptide aptamers, related to combinatorial non-immunoglobulin proteins. The nanosize of up to 1–2 nm makes aptamers more sensitive toward hidden antigenic determinant, which cannot be bound by natural antibodies (size ≈ 10 nm). As the natural antibodies suffer from permanent degradation, aptamers can undergo multiple denaturation or regeneration cycles. The unnecessary toward immunization and animal hosts may be a specialty of aptamers over natural antibodies. In vitro

performance of selection process (Systematic Evolution of Ligands by Exponential Enrichment, SELEX) toward binding molecules makes aptamers more sensitive and controllable species in sensing purposes. The target molecules or species may bind either through electrostatic interactions, hydrogen bonding, van der Waals forces, shaping complementarity, base stacking, or combination of these with the aptamers. Aptamers also show an extraordinary flexibility in the making of assays by easily modifying with the number of tags such as gold nanoparticles (AuNPs) and fluorescence materials.

Aptasensors based on aptamers are kind of biosensors used to detect or recognize biomolecules ranging from small ions to large proteins. When aptamers are accompanied with target molecules, they change their random coil structures to G-quadruplex-like conformational structure and recognize the biomolecules by several detection methods. The basic treatment of recognition is fulfilled by aptamers and the detection methods, which is described in this entry, act as transducer for the aptasensors.



# 1 Symmetry elements and symmetry operations: molecular symmetry

## 1.1 Introduction

Symmetry is a very important and fascinating property of molecules. The concept of molecular symmetry is important from the view point of their applications to chemical problems, viz., molecular orbitals in polyatomic molecules, and thus their structure and bonding, crystal field and molecular orbital theory of complex compounds, electronic and vibrational spectra of simple and complex compounds and so on.

In order to use the symmetry properties of molecules in solving chemical problems as mentioned above, it is necessary to have some acquaintance with the branch of mathematics known as the *Group Theory*. It can be applied to any set of elements, which obey the necessary conditions to be called a Group.

A *Group* in the mathematical sense is a collection of elements having certain properties in common, which enable a wide variety of algebraic manipulations to be carried out. The elements could be numbers, matrices, symmetry operations or symmetry elements. All the symmetry operations present in a molecule forms a Group. Moreover, each symmetry operation in a molecule can be represented by a matrix. *Hence, the symmetry operations/symmetry elements of a molecule constitute what is known as a mathematical group.*

Hence, the formal treatment of the concept of molecular symmetry is the subject matter of this chapter.

## 1.2 Molecular symmetry: in non-mathematical and geometrical



## 2 Application of group theory to electronic spectroscopy

### 2.1 Introduction

Spectroscopy deals with the transitions induced in a chemical species by its interaction with the photons of electromagnetic radiation. Thus, spectroscopy is defined as the interaction of electromagnetic radiation with matter. Group Theory can be applied to predict the probability of transitions, number of bands in the spectrum and their intensities, which transition is allowed or forbidden, and so on. Atomic and molecular spectra provide detailed information of electronic distributions, bond lengths, bond angles, molecular symmetry, and so on. Presently, spectroscopy is the one of the important tools to elucidate the structure of organic and inorganic compounds. In this chapter, discussion will be centered on electronic spectroscopy only.

### 2.2 Electronic spectroscopy

The basic principle in spectroscopy is that all kinds of spectra arise due to transition of electrons from lower energy to high energy quantized levels by the absorption of electromagnetic radiations. In electronic spectroscopy (UV-visible spectroscopy), the transition takes place between electronic energy levels by the absorption of UV or visible light. The molecular orbital theory is very helpful to understand the electronic spectra of molecules. Accordingly, the transition takes place from lower filled molecular orbital (HOMO) to the higher vacant orbital (LUMO) by the absorption of light of energy equal to the difference in the energies of HOMO and LUMO.



बार्णा

# हिन्दी - अँगरेज़ी कोश

संकलन-संपादन

प्रो. त्रिभुवननाथ शुक्ल

डॉ. भवदेव पाण्डेय



## वाणी प्रकाशन

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शाखाएँ

अशोक राजपथ, पटना 800 004, बिहार

कॉफ़ी हाउस कैम्पस, महात्मा गांधी मार्ग, इलाहाबाद 211 001, उत्तर प्रदेश

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# हिंदी - भीली

अध्येता कोश



प्रधान संपादक  
प्रो. नन्द किशोर पाण्डेय

Hindi-Bhili  
Learner's Dictionary



केंद्रीय हिंदी संस्थान  
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## 3 Molecular symmetry and group theory to vibrational spectroscopy

### 3.1 Introduction

A molecule has three types of internal energy. These are electronic, vibrational and rotational energies in the decreasing order of their magnitudes. In the previous chapter, we have dealt with the use of symmetry properties for understanding the electronic states of various kinds of molecules and ions. Rotational energy states have no symmetry properties of importance in ordinary chemical processes, and so it is not considered here. Then, we are left with the molecular vibrations (molecular vibrational energy), to which symmetry arguments may be fruitfully applied.

Each molecule is constantly executing vibrational motions at all temperatures, including even the absolute zero with some energy known as zero point energy ( $E = \frac{1}{2} h\nu$ ). In such vibrational motions of the molecule, its bond lengths and internal angles change periodically without producing any net translation of the center of mass of the molecule or imparting any net angular momentum (rotator motion) to the molecule. Although a superficial look at a vibrating molecule might suggest that its vibratory motion is random, a close inspection and proper analysis reveals a basic regularity and simplicity. It is the underlying basis for this simplicity that we shall formulate in this chapter. We shall also develop working methods by which all the analysis of molecular motions which symmetry alone allows may be rapidly and reliably performed.

Spectroscopy deals with the use of electromagnetic radiations in the study of structure and shapes of molecules. The infrared and Raman spectra comprise a major part of spectroscopic techniques. Molecular vibrations can interact with infrared radiations and this interaction is the subject matter of infrared or vibra-



## 4 Chemical reactions: orbital symmetry rules

### 4.1 Introduction

Symmetry arguments/properties of atomic orbitals, molecular orbitals (MOs) and electronic states can be applied to predict the course of certain inorganic and organic chemical reactions. Activation energy, because of its exponential effect, plays a dominant role in predicting the course of a chemical reaction. For this reason, any rule that can be used to predict whether a given reaction has large or small activation energy will be of utmost importance. A great stride in this direction was taken by R. B. Woodward (Nobel prize for Chemistry, 1965) and R. Hoffmann (Nobel prize for Chemistry, 1980), K. Fukui and R. G. Pearson. They emphasized on using the symmetry properties of MOs of reactants and products. The change in symmetry properties is simply the change in sign that occurs for the wave function (that is, MO) at different parts of the molecule during the course of chemical reaction. If the reactant molecule has symmetry elements (rotation axes, symmetry planes, etc.), then this information can be easily utilized for studying the course of chemical reaction of the molecule and its products using certain symmetry elements (s) that is/are conserved during the course of chemical reaction.

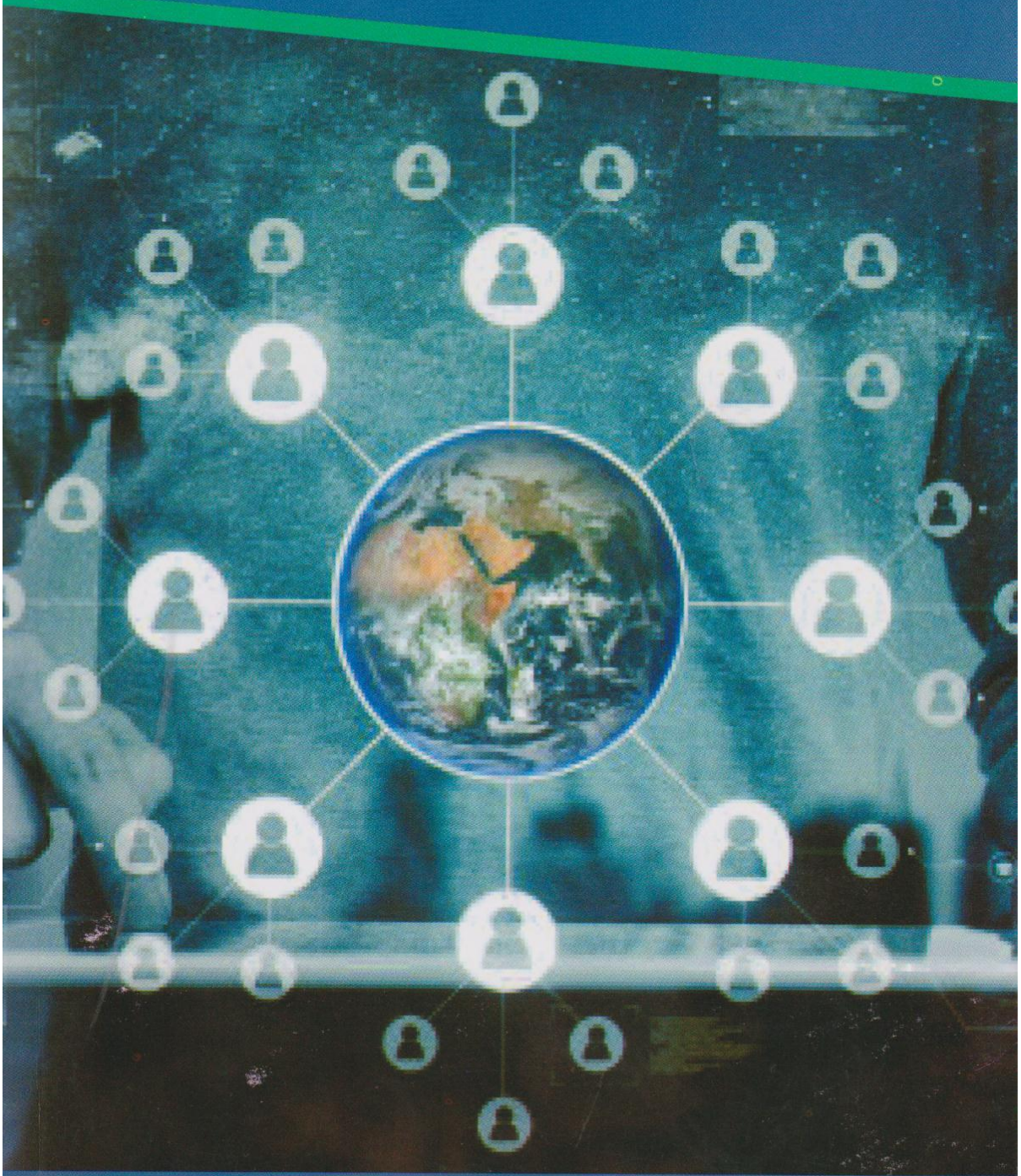
According to *Woodward and Hoffmann*, if filled MOs of the product are correlated with filled MOs of the reactant, then the reaction is said to be allowed by the orbital symmetry, that is, the reaction has *low activation barrier*. Contrary to this, if the filled MOs of the reactants and products do not correlate with each other, then the reaction is said to be forbidden by orbital symmetry, that is, has *high activation barrier*.

*Pearson* used quantum mechanical perturbation theory in which MOs of the reactants develop into MOs of the products as a result of the motion along reaction coordinates



# राजनय एवं मानवाधिकार

लेखक : डॉ. रामदेव भारद्वाज



मध्यप्रदेश हिन्दी ग्रन्थ अकादमी, भोपाल



# अन्तर्राष्ट्रीय राजनीति और समसामयिक राजनीतिक मुद्दे

• डॉ. रामदेव भारद्वाज

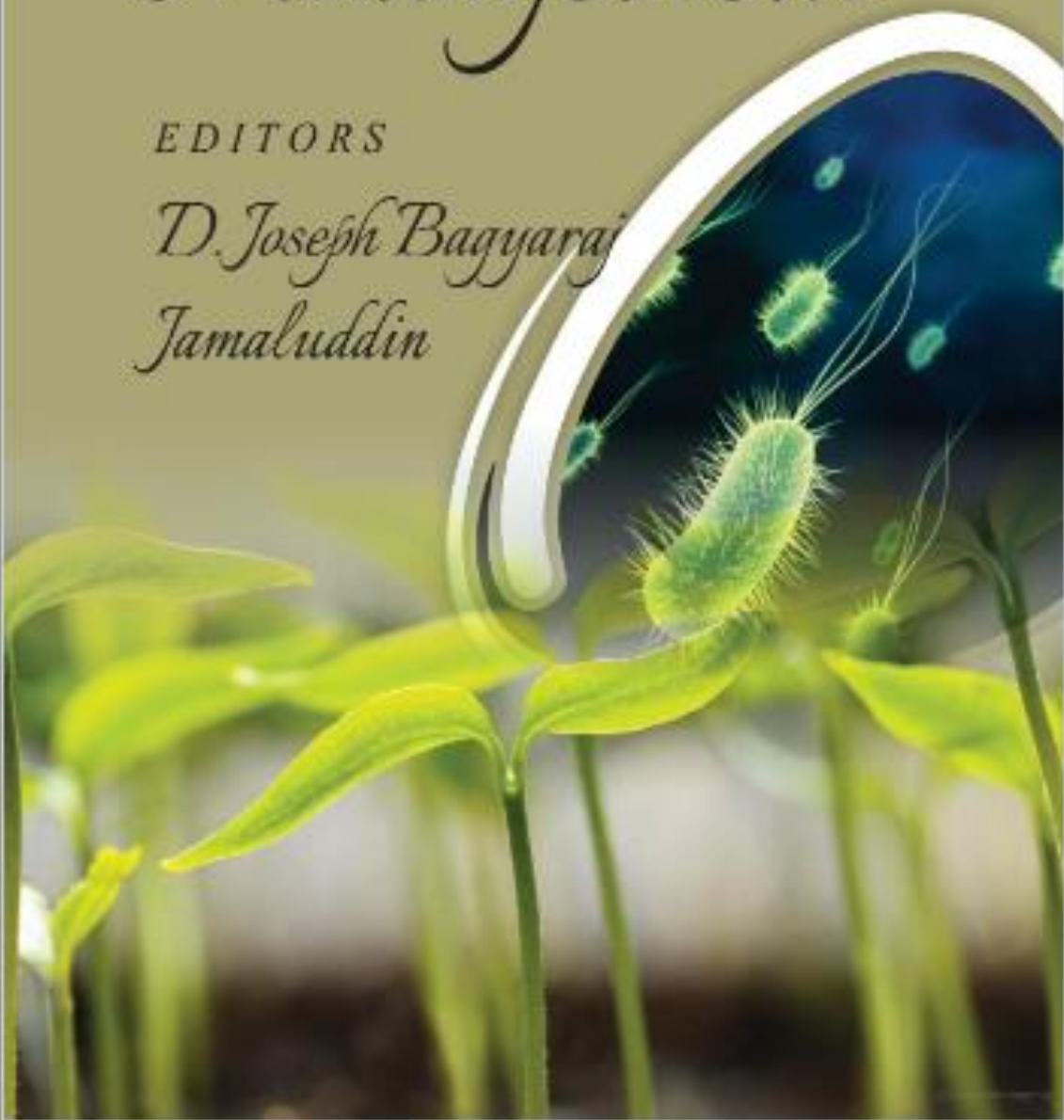


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# *Microbes for Plant Stress Management*

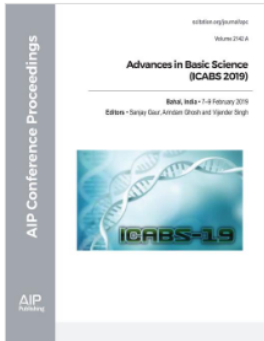
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RESEARCH ARTICLE | AUGUST 29 2019

## Synthesis and electroluminescence in CdSe nanocrystals

Sarita Kumari ; Kamal Kumar Kushwaha; Pooja Devi Sahu; M. Ramrakhaini

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*AIP Conf. Proc.* 2142, 140021 (2019)

<https://doi.org/10.1063/1.5122534>

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Currently there is a great interest in II–VI semiconductor nanoparticles, particularly organically capped soluble particles of cadmium and selenide, for their ready to use application in devices. In this study, CdSe nanocrystals have been synthesized by using starch as a capping agent through a chemical synthesis route at room temperature. Samples have been prepared varying quantity of

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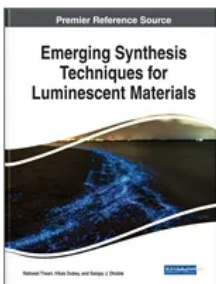
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## Electroluminescence Principle and Novel Electroluminescent Materials

Vikas Lahariya, Meera Ramrakhiani

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### Abstract

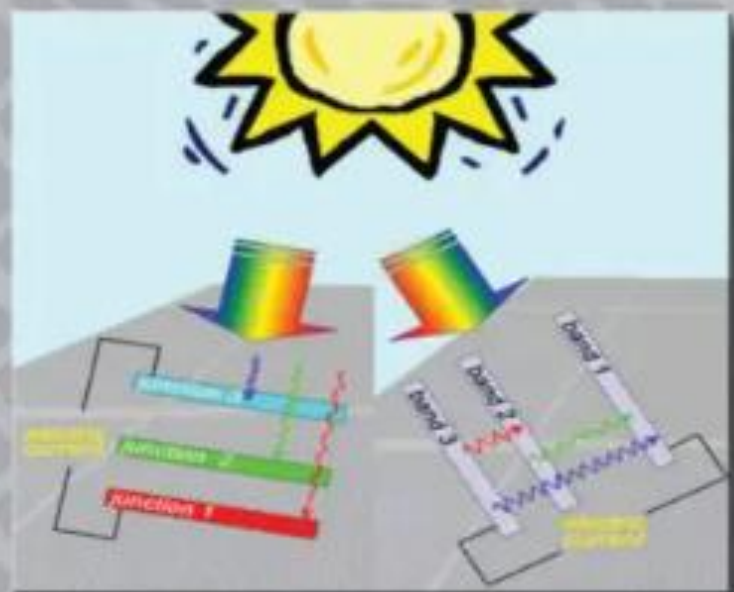
Over the past few decades, many efforts have been put to optimize the properties of electroluminescent devices such as electroluminescence (EL) panel, organic light emitting diode (OLED), flat panel display, EL lamps, etc. In this chapter, the authors provide a comprehensive review of the state-of-the-art research activities related to EL phenomena, the principle of electroluminescence, different types of EL, fabrication of devices, studies on novel electroluminescent materials, their characteristics and potential applications. The authors begin with a historical background of electroluminescence, description of its structure, working principle and parameters with mechanism. They discuss the experiments determining the electrical, optical, and physical properties of the powder as well as thin film EL cells. The recent progress on the improvement of their characteristics and finding novel structures, such as the latest achievements in using various semiconductor nanostructures in polymer matrix as emitting layer in EL devices, are summarized.

Chapter Preview





# Recent Advances in Photovoltaics



*Edited by*  
Meera Ramrakhiani





*Chapter 4*

**MICROALGAE AS A SUSTAINABLE SOURCE OF  
BIOENERGY: PRESENT STATUS AND FUTURE  
PROSPECTS**

***Surendra Singh\**, *Rishibha Dixit* and *Ankita Kachhwaha***

Algal Biotechnology Laboratory, Department of P. G. Studies and Research in  
Biological Science, Rani Durgavati University,  
Jabalpur, Madhya Pradesh, India

**ABSTRACT**

An enormous amount of interest has been raised on the use of microalgae-based technologies for the production of a sustainable source of bioenergy and high-value co-products. Biotechnological exploitation of microalgae for human welfare is a recent phenomenon although these wonderful organisms exist on this planet since archeological era. Microalgae are eukaryotic photosynthetic microorganism known for their rapid growth. The main microalgae are *Scenedesmus*, *Chlorella*, *Spirulina*, *Dunaliella* and *Haematococcus* are currently cultivated photo-synthetically for the production of variety of bioenergy and valuable products. Micro-algal biomass have high biotechnological potential and it is being used as a source of drugs in pharmaceutical industries, biochemicals, biofuels (bio-diesel, bio-gas, bio-ethanol and bio-butanol), bio-fertilizer, bio-pigments and dye, renewable food, Polyunsaturated fatty acid (DHA, EPA, GLA), feed, cosmetic, sink for greenhouse gases, soil amelioration, bioremediation and other applications such as treatment of wastewater. A major bottleneck in the application of microalgae to such processes is low productivity of the culture, both in terms of biomass and product. Comparison of productivity between economically important microalgae

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\*Corresponding Author Email: [singhbiosci@yahoo.co.in](mailto:singhbiosci@yahoo.co.in).

*Advances in Plant Physiology*, Vol. 17

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Scientific Publishers (India), Jodhpur, 2016 pp. 405-421.

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## 20

### MICROALGAE AS A POTENTIAL SOURCE OF NUTRACEUTICALS AND PHARMACEUTICALS

**Surendra Singh\*, Ankita Kachhwaha and Rishibha Dixit**

*Algal Biotechnology Laboratory,*

*Department of Post Graduate Studies and Research in Biological Science,*

*Rani Durgavati University, Jabalpur (M.P.), India*


*E-mail: [singhbiosci@yahoo.co.in](mailto:singhbiosci@yahoo.co.in)*

#### INTRODUCTION

Microalgae are microscopic photosynthetic organisms that are found in both marine and freshwater environments. They occupy the bottom of the food chain in aquatic ecosystems and possess the intrinsic ability to take up H<sub>2</sub>O and CO<sub>2</sub> in presence of sunlight to form complex organic compounds (Guedes *et al.*, 2011). Microalgae appeared then as a good source of protein and has continued as such, but with an increased interest due to the unique bioactive ingredients recently found in these small microorganisms, which gives them great potential as a food source and as a source of functional molecules (Chacon-Lee and Gonzalez-Marino, 2010). They are a rich and varied sustainable source of pharmacologically active natural products and nutraceuticals and over 15,000 novel compounds originated from algal biomass have been identified. While nutraceutical and pharmaceutical content in the microalgal strain is very small, current market values for these products are extremely high. The major products being commercialized or under consideration for commercial extraction include carotenoids, phycobilins, fatty acids, polysaccharides, vitamins, sterols and biologically active molecules for use in human and animal health (Talero *et al.*, 2015).

**Endophytes: Biology and Biotechnology** pp 303–331[Home](#) > [Endophytes: Biology and Biotechnology](#) > Chapter

## Endophytic Fungi: Eco-Friendly Future Resource for Novel Bioactive Compounds

[Sardul Singh Sandhu](#) , [Suneel Kumar](#), [Ravindra Prasad Aharwal](#) & [Monika Nozawa](#)

Chapter | [First Online: 04 November 2017](#)

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Part of the [Sustainable Development and Biodiversity](#) book series (SDEB, volume 15)

### Abstract

The current research focuses on the isolation of bioactive compounds from the natural sources which have immense potential for pharmaceutical value. Pharmaceutical biology perceives plants as a unique resource of potentially precious remedial bioactive metabolites. But due to slow growth and harvest of endangered plants species pose a threat



[Home](#) > [Microorganisms for Green Revolution](#) > [Chapter](#)

## Efficacy of Entomopathogenic Fungi as Green Pesticides: Current and Future Prospects

[Sardul Singh Sandhu](#) , [Harshita Shukla](#), [Ravindra Prasad Aharwal](#), [Suneel Kumar](#) & [Shyamji Shukla](#)

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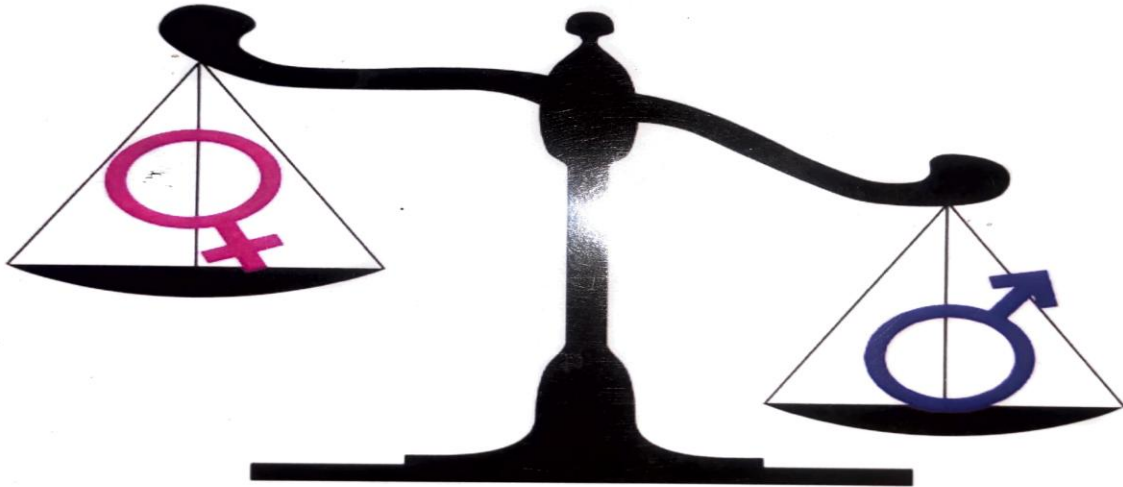
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### Abstract

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The growing commercialization all over the world has led to a boost in the widespread use of chemical pesticides for crop protection in agricultural fields. It has not only contributed to an increase in food production, but its toxic and non-biodegradable character has also resulted in adverse effects on environment and nontarget organisms. Moreover, most of the pests have

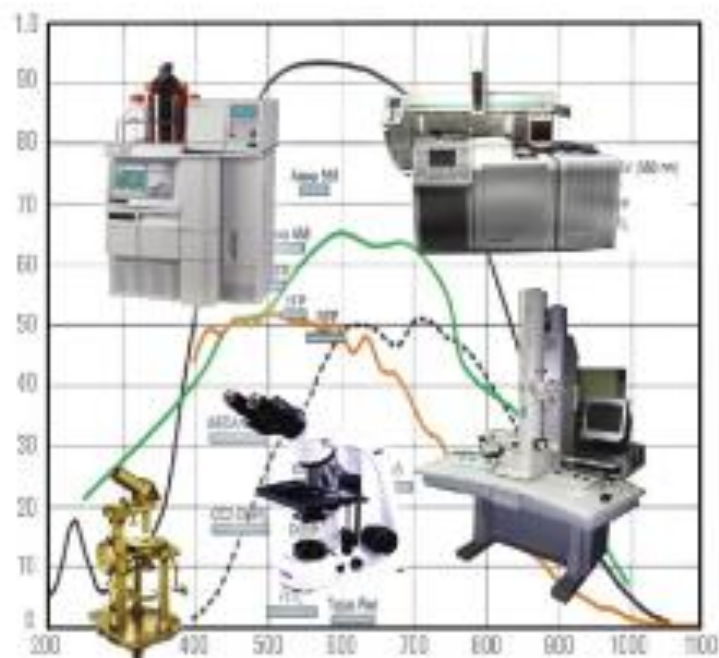
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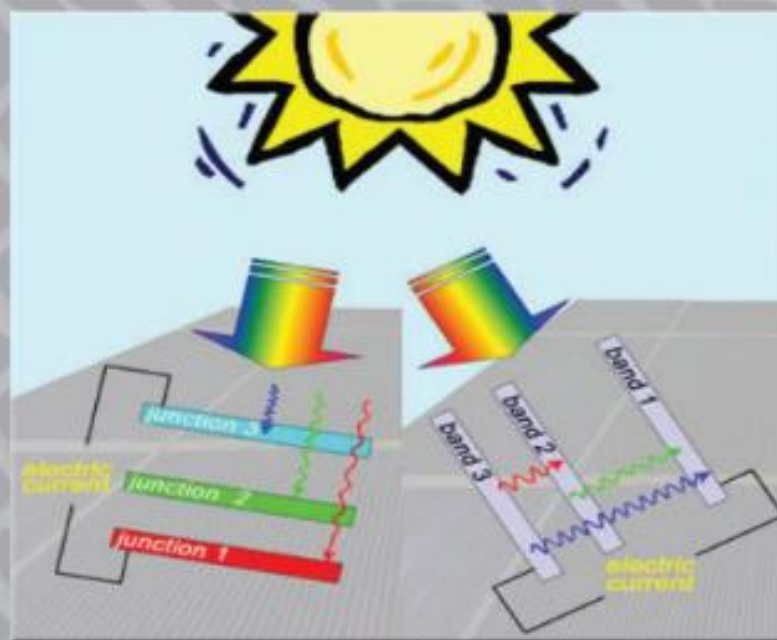
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### Abstract

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The current research focuses on the isolation of bioactive compounds from the natural sources which have immense potential for pharmaceutical value. Pharmaceutical biology perceives plants as a unique resource of potentially precious remedial bioactive metabolites. But due to slow growth and harvest of endangered plants species pose a threat and imbalance in the