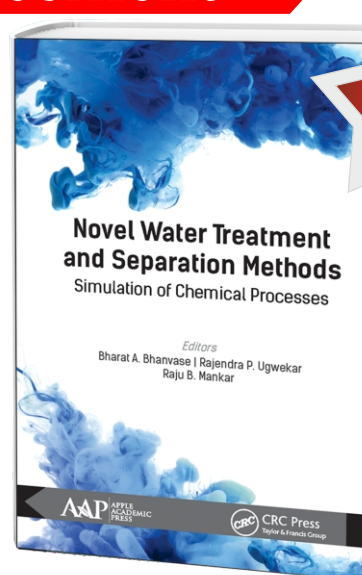


Novel Water Treatment and Separation Methods

Simulation of Chemical Processes

★
Available
October 2017
★



Save
15%

Editors: Bharat A. Bhanvase, PhD
Associate Professor, Chemical Engineering Department,
Laxminarayan Institute of Technology, RTM Nagpur University,
Nagpur, Maharashtra, India

Rajendra P. Ugwekar, PhD
Associate Professor, Chemical Engineering Department,
Laxminarayan Institute of Technology, RTM Nagpur University,
Nagpur, Maharashtra, India

Raju B. Mankar
Director, Laxminarayan Institute of Technology, Nagpur, India;
Ex-Vice-Chancellor, Dr. Babasaheb Ambedkar Technological
University, Lonere-Raigad, India

Due to increasing demand for potable and irrigation water, new scientific research is being conducted to deal with wastewater from a variety of sources. Novel Water Treatment and Separation Methods: Simulation of Chemical Processes presents a selection of research related to applications of chemical processes for wastewater treatment, separation techniques, and modeling and simulation of chemical processes.

Among the many topics are:

- degradation of herbicide
- removal of anionic dye
- efficient sun-light driven photocatalysis
- removal of copper and iron using green activated carbon
- defluoridation of drinking water
- removal of calcium and magnesium from wastewater using ion exchange resins
- degradation of vegetable oil refinery wastewater
- novel separation techniques, including microwave-assisted extraction and more

The volume presents selected examples in wastewater treatment, highlighting some recent examples of processes such as photocatalytic degradation, emulsion liquid membrane, novel photocatalyst for degradation of various pollutants, and adsorption of heavy metals. The book goes on to explore some novel separation techniques, such as microwave-assisted extraction, anhydrous ethanol through molecular sieve dehydration, batch extraction from leaves of *Syzygium cumini* (known as jambul, jambolan, jamblang or jamun), and reactive extraction. These novel separation techniques have proved be advantageous over conventional methods.

The volume also looks at modeling and simulation of chemical processes, including chapters on flow characteristics of novel solid-liquid multistage circulating fluidized bed, mathematical modeling and simulation of gasketed plate heat exchangers, optimization of the adsorption capacity of prepared activated carbon, and modeling of ethanol/water separation by pervaporation, along with topics on simulation using CHEMCAD software.

This volume will be very valuable to food science engineers and researchers as well as to faculty and students in food science and engineering.



US office: 9 Spinnaker Way
Waretown, NJ 08758 USA
Tel: 732-998-5302 / Fax: 866-222-9549
Email: info@appleacademicpress.com

Canadian office: 3333 Mistwell Crescent
Oakville, Ontario L6L 0A2 Canada
Tel: 289-937-6300, Fax: 866-222-9549
Email: info@AppleAcademicPress.com

REVIEWS

“Brings out important information on various aspects of water treatment technologies. With the increase in global population, water has now been a primary focus for geopolitics in water-starved nations. It is important, therefore, to preserve, recycle, and reuse water. The book provides insights into the importance of water and various methods of water treatment. . . . In the initial sections of the book, details on various techniques for water treatment have been provided. Subsequently, the book deals with novel separation processes and modeling and simulation of various chemical processes involved in water treatment technologies. I strongly feel that the book provides a complete package for researchers and practicing engineers working in the field of water treatment technologies.” —Dr. Jitendra Sangwai, Indian Institute of Technology Madras, Chennai, India

CONTENTS

Preface

PART I: MODERN TECHNIQUES IN WATER TREATMENT

1. Photocatalytic Degradation of Herbicide by Using Aeroxide®P-90 TiO₂ Photocatalyst and Photo-Fenton Process in the Presence of Artificial and Solar Radiation
V. Sakhalkar, A. Khandare, M. P. Deosarkar, and S. P. Kamble
2. Studies on Removal of Anionic Dye Using Emulsion Liquid Membrane
R. Kankate, S. Ghodke, and S. Sonawane
3. Zinc Oxide Microarchitectures with Exposed Crystal Face for Enhanced Photocatalytic Activity
S. P. Chaudhari, S. P. Meshram, P. D. Jolhe, G. N. Chaudhari, and A. B. Bodade
4. Sonochemical Synthesis of Mg-Doped ZnO NPs for Efficient Sun-Light Driven Photocatalysis
S. P. Meshram, P. D. Jolhe, S. D. Shingte, B. A. Bhanvase, and S. H. Sonawane
5. Intensified Removal of Cu²⁺ and Fe²⁺ Using Green Activated Carbon Derived from *Lantana camara* Stem and Soya Hull and Its Comparison with Commercial Activated Carbon
A. A. Kadu, B. A. Bhanvase, and S. H. Sonawane
6. Defluoridation of Drinking Water Using Fe-Al Mixed Metal Hydroxides
Trupti Telang, M. P. Deosarkar, S. P. Kamble, and Rohit Shetty
7. Adsorption of Hexavalent Chromium by Using Sweetlime and Orange Peel Powder
N. M. Rane, S. P. Shewale, S. V. Admane, and R. S. Sapkal
8. Investigation on Elimination of Cr (VI) from Waste Water by Powdered Shell of Peas as Adsorbent
V. S. Wadgaonkar and R. P. Ugwekar
9. Removal of Calcium and Magnesium from Wastewater Using Ion Exchange Resins
V. D. Pakhale and P. R. Gogate

10. Degradation of Vegetable Oil Refinery Wastewater Using Hydrodynamic Cavitation: A Process Intensification Technique
P. Dhanke and S. Wagh

11. Visible Light Photocatalytic Degradation of Coralene Dark Red 2b
M. D. Sardare, P. Kotwa, S. Jadhav, S. Waghela, and S. M. Sontakke

PART II: NOVEL SEPARATION TECHNIQUES

12. Microwave-Assisted Extraction of Carvone from *Carum carvi*
O. D. Borole, S. R. Shirsath, and S. G. Gaikwad

13. Kinetic Model for Extraction of Betulic Acid by Batch Extraction from Leaves of *Syzygium cumini* (Jamun)
S. V. Admane, S. G. Gaikwad, and S. M. Chavan

14. Reactive Extraction of Propionic Acid
A. Thorgule and R. P. Ugwekar

PART III: MODELING AND SIMULATION OF CHEMICAL PROCESSES

15. Flow Characteristics of Novel Solid-Liquid Multistage Circulating Fluidized Bed
M. A. Thombare and P. V. Chavan

16. Mathematical Modeling and Simulation of Gasketed Plate Heat Exchanger
J. Katiyar and S. Husain

17. Optimization of Adsorption Capacity of Prepared Activated Carbon Using Response Surface Methodology
V. N. Ganvir, M. L. Meshram, and R. R. Patil

18. Modeling of Ethanol/Water Separation by Pervaporation Membrane Process
S. D. Dawande, R. P. Birmod, and N. G. Kanse

19. Modeling and Simulation of Crystallizer Using Copper Oxide Based Nanofluids
G. P. Lakhawat and R. P. Ugwekar

20. Sensitivity Analysis of Shell and Tube Heat Exchanger Using Chemcad
S. M. Wagh, D. P. Barai, and M. H. Talwekar

21. Extractive Distillation Simulation for the Separation of Methylcyclohexane and Toluene Mixture with Phenol as an Extractor Using CHEMCAD
S. S. Anwani and S. P. Shirsat

PART IV: EXPERIMENTAL REVIEW

22. An Experimental Review of Non-Destructive Testing Methods for Fruits and Vegetables
A. Sharma, Md. N. Iqbal, and S. Singha

23. Novel Technology for Essential Fatty Acids: An Experimental Review
S. P. Nayak and S. Singha

Index

ABOUT THE EDITORS

Dr. Bharat A. Bhanvase is currently working as Associate Professor in the Chemical Engineering Department at the Laxminarayan Institute of Technology, RTM Nagpur University, Nagpur, Maharashtra, India. His research interests are focused on conventional and cavitation-based synthesis of nanostructured materials, ultrasound-assisted processes, polymer nanocomposites, heat transfer enhancement using nanofluid, process intensification, and microreactors for nanoparticle and chemical synthesis. He has published many articles in international and national journals and has presented papers at international and national conferences. He has written several book chapters in internationally renowned books and applied for three Indian patents. He is the recipient of a Summer Research Fellowship from the Indian Academy of Sciences, Bangalore, India, in 2009. He has more than 13 years teaching experience. He has completed several research projects with the University of Pune. He is a reviewer for several international journals.

Rajendra P. Ugwekar, PhD, is currently working as Associate Professor in the Chemical Engineering Department at the Laxminarayan Institute of Technology, RTM Nagpur University, Nagpur, Maharashtra, India. His research interests are focused on hydrogen energy, nanotechnology, wastewater treatment, and heat transfer enhancement using nanofluid. He has published several articles in international and national journals and has presented papers at international and national conferences. He has more than 22 years of teaching experience and several years of industrial experience as well. He has completed research projects received from the All India Council for Technical Education and has several advanced students working with him. He has worked as Head of the Department at Anuradha Engineering College, Chikhali, Buldhana, India, and at the Priyasharshani Institute of Engineering and Technology, Nagpur, India. He is a trainer and motivator for entrepreneurship.

Raju B. Mankar, PhD, is currently Director of the Laxminarayan Institute of Technology in Nagpur, India. He is also the former Vice-Chancellor of Dr. Babasaheb Ambedkar Technological University in Lonere-Raigad, India. Professor Mankar was the Nominee of His Excellency, the Vice President of India on the Court of Pondicherry University during 2007–2010. He is also the Nominee of His Excellency, the Governor of Maharashtra on the Board of Management of Yashwantrao Chavan Maharashtra Open University, Nashik, India. He is the Member of Western Regional Committee, Mumbai, of All India Council for Technical Education (AICTE), New Delhi, and also a Member of Pravesh Niyantaran Samiti, Government of Maharashtra. He has been nominated as a Council Member by the President of the Institution of Engineers (India), as an "Eminent Engineering Personality". Professor Mankar has served as Vice-Chairman of the Governing Council, Engineering Staff, College of India, Hyderabad, by the President Institution of Engineers (India) for several years. A Life Member of Indian Institute of Chemical Engineers (IICChE), Professor Mankar is a Fellow of the Institution of Engineers (India) and a Life Member of Indian Society for Technical Education (ISTE). He is also Fellow of DAAD, Federal Republic of Germany.

20 color and 130 b/w illustrations.

356 pages with index.

ISBN hard: 978-1-77188-578-2. Cat#: N11859.

ISBN ebook: 978-1-315-22539-5. Cat#: NE12123

\$159.95 US | £124.00 hardback. **October 2017.**

Order your copy of **Novel Water Treatment and Separation Methods** today.

Save 15% when you order online and enter promo code APP12.

FREE standard shipping when you order online only.

TO ORDER ONLINE: Go to <http://www.appleacademicpress.com/title.php?id=9781771885782>.

Use promo code
APP12 for a
15% discount & free
standard shipping
(online orders only)

In the U.S., Canada, Central & South America:
Tel: 800-272-7737
Fax: 800-374-3401
E-mail: orders@crcpress.com

In East and South-East Asia:
Tel: 65 6741 5166
Fax: 65 6742 9356
E-mail: sales@tandf.com.sg

In the United Kingdom:
Tel: +44 (0) 1235 400524
Fax: +44 (0) 1235 400525
E-mail: book.orders@tandf.co.uk

In the Rest of The World:
Tel: +44 (0) 1235 400524
Fax: +44 (0) 1235 400525
E-mail: book.orders@tandf.co.uk

published by
AAP APPLE
ACADEMIC
PRESS

To pay in Indian rupees, send your inquiry with the
promo code AAP12 for discount of 15% off list price via
email to : marketing@tandfindia.com or inquiry@tandfindia.com

distributed by
CRC CRC Press
Taylor & Francis Group