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membranes play a central role in our daily life or as indicated by one of my foreign colleagues richard bowen if you are tired of membranes you are tired of life biological membranes are hardly used in industrial applications but separations with synthetic membranes have become increasingly important today membrane processes are used in a wide range of applications and their numbers will certainly increase therefore there is a need for well educated and qualified engineers chemists scientists and technicians who have been taught the basic principles of membrane technology however despite the growing importance of membrane processes there are only a few universities that include membrane technology in their regular curricula one of the reasons for this may be the lack of a comprehensive textbook for me this was one of the driving forces for writing a textbook on the basic principles of membrane technology which provides a broad view on the various aspects of membrane technology i realise that membrane technology covers a broad field but nevertheless i have tried to describe the basic principles of the various disciplines although the book was written with the student in mind it can also serve as a first introduction for engineers chemists and technicians in all kind of industries who wish to learn the basics of membrane technology

membrane bioreactor mbr technology is a wastewater treatment method combining biological pollutant treatment with physical membrane separation it has gained increasing commercial significance over the last decade with applications in municipal and industrial wastewater treatment becoming increasingly widespread this book covers a wide variety of mbr topics including filtration theory membrane materials and geometry fouling phenomena and properties and strategies for minimizing fouling also covered are practical aspects such as operation maintenance design and application

grasp the essential principles of membrane bioreactor processes evolved from the conventional activated sludge cas process membrane bioreactor mbr processes have become the next generation solution for municipal and industrial wastewater treatment and recycle membrane bioreactor processes principles and applications explores nearly all the th

an updated guide to the growing field of nanofiltration including fundamental principles important industrial applications as well as novel materials with contributions from an international panel of experts the revised second edition of nanofiltration contains a comprehensive overview of this growing field the book covers the basic principles of nanofiltration including the design and characterizations of nanofiltration membranes the expert contributors highlight the broad ranges of industrial applications including water treatment food pulp and paper and textiles the book explores photocatalytic nanofiltration reactors organic

solvent nanofiltration as well as nanofiltration in metal and acid recovery in addition information on the most recent developments in the field are examined including nanofiltration retentate treatment and renewable energy powered nanofiltration the authors also consider the future of nanofiltration materials such as carbon as well as polymer based materials this important book explores the fast growing field of the membrane process of nanofiltration examines the rapidly expanding industrial sector s use of membranes for water purification covers the most important industrial applications with a strong focus on water treatment contains a section on new membrane materials including carbon based and polymer based materials as well as information on artificial ion and water channels as biomimetic membranes written for scientists and engineers in the fields of chemistry environment food and materials the second edition of nanofiltration provides a comprehensive overview of the field outlines the principles of the technology explores the industrial applications and discusses new materials

membrane separation principles and applications from material selection to mechanisms and industrial uses the latest volume in the handbooks in separation science series is the first single resource to explore all aspects of this rapidly growing area of study membrane technology is now accepted as one of the most effective tools for separation and purification primarily due to its simple operation the result has been a proliferation of studies on this topic however the relationships between fundamental knowledge and applications are rarely discussed this book acts as a guideline for those who are interested in exploring membranes at a more progressive level covering methods of pressure driving force partial pressure driving force concentration driving force electrical potential driving force hybrid processes and more this volume is more complete than any other known resource on membrane separations covers membrane material selection membrane fabrication membrane characterization separation mechanisms and applications in each chapter authored by contributors who are internationally recognized as experts in their respective fields organized by the driving force behind each type of membrane separation a unique approach that more clearly links fundamental principles with their dominant applications

the most comprehensive and authoritative reference available today on colorectal surgery this revised fourth edition of gordon and nivatvongs principles and practice of surgery for the colon rectum and anus edited by david beck steven wexner and janice rafferty strikes a perfect balance between evidence based medicine in depth details and clinical pearls the result is a highly engaging and authoritative tome in the grand tradition of philip gordon and santhat nivatvongs building on the widely acclaimed previous editions reputation for superb quality and reader friendliness the fourth edition includes contributions from an expanded cadre of internationally known experts significant advances have been made in this field since the third edition was published the latest diagnostic modalities are highlighted such as mri ct angiography and enterography the first section covers essentials such as anatomy physiology diagnosis colonoscopy and patient management sections two through four discuss a full spectrum of anorectal diseases colorectal disorders trauma unexpected challenges and complications among the additions are expanded sections on transanal total mesorectal excision genetics personalized medicine wait and watch principles outpatient management of anorectal surgery and large bowel obstruction key highlights thirty seven chapters cover a wide array of gastrointestinal disorders such as fecal incontinence ulcerative colitis crohn s disease diverticulitis carcinomas and other malignant lesions a multidisciplinary team approach to rectal cancer

encompasses rectal cancer protocol mri synoptic reporting and various neoadjuvant therapy protocols the use of cutting edge approaches including laparoscopy robotics hyperbaric oxygen and radiofrequency tissue remodeling superb full color plates illustrations photographs diagrams detailed tables graphics and surgical videos elucidate underlying disease and management as the most comprehensive resource on colorectal surgery available on the market today this is a must have for every colon and rectal surgeon from residents to veteran practitioners

the field of membrane separation technology is presently in a state of rapid growth and innovation many different membrane separation processes have been developed during the past half century and new processes are constantly emerging from academic industrial and governmental laboratories while new membrane separation processes are being conceived with remarkable frequency existing processes are also being constantly improved in order to enhance their economic competitiveness significant improvements are currently being made in many aspects of membrane separation technology in the development of new membrane materials with higher selectivity and or permeability in the fabrication methods for high flux asymmetric or composite membranes in membrane module construction and in process design membrane separation technology is presently being used in an impressive variety of applications and has generated businesses totalling over one billion u s dollars annually the main objective of this book is to present the principles and applications of a variety of membrane separation processes from the unique perspectives of investigators who have made important contributions to their fields another objective is to provide the reader with an authoritative resource on various aspects of this rapidly growing technology the text can be used by someone who wishes to learn about a general area of application as well as by the knowledgeable person seeking more detailed information

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Introduction

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