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"The fourth
edition of
Elements of
Chemical
Reaction
Engineering is
a completely

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Engineering
revised
Levenspiel
version of the
book. It
combines
authoritative
coverage of
the principles
of chemical
reaction
engineering
with an
unsurpassed

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focus on
Levenspiel
critical
thinking and
creative
problem
solving,
employing open-
ended
questions and
stressing the
Socratic
method. Clear

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and organized,
it integrates
text, visuals,
and computer
simulations to
help readers
solve even the
most
challenging
problems
through
reasoning,

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rather than by
memorizing equ
ations." --BOOK
JACKET.

Focuses on the
major research
developments
which are
pertinent to
engineers
concerned with
predictive

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methods and
design of
fluidization
beds.

This book
describes how
modeling fluid
flow in
chemical
reactors may
offer
solutions that

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improve
design,
operation, and
performance of
reactors.

Chemical
reactors are
any vessels,
tubes, pipes,
or tanks in
which chemical
reactions take

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place.
Levenspiel.

Computational
Flow Modeling
for Chemical
Reactor
Engineering
will show the
reactor
engineer how
to define the
specific roles
of

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computational
flow modeling,
select
appropriate
tools, and
apply these
tools to link
reactor
hardware to
reactor
performance.
Overall

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methodology is illustrated with numerous case studies. Industry has invested substantial funds in computational flow modeling which will pay off only if it

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can be used to realize significant performance enhancement in chemical reactors. No other single source exists which provides the information

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contained in
this book.

Since the
publication of
the first
edition of
Canada, and
Australia have
increased
teach Handbook
of Powder
Science and

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Technology,
ing, research,
and training
activities in
areas the
field of
powder science
and technology
has related to
particle
science and
technology.

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gained broader
recognition
and its
various ar In
addition, it
is worth
mentioning the
many eas of
interest have
become more
defined and
books and

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monographs
that have been
pub focused.
Research and
application
activities
lished on
specific areas
of particle,
powder,
related to
particle

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technology
have increased
and particle
fluid by
professional
publishers,
globally in
academia,
industry, and
research
technical
societies and

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university
Levenspiel
presses. Also,
institutions.
During the
last decade,
many to date,
there are many
career
development
groups, with
various
scientific,

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technical, and
courses given
by specialists
and
universities
on engineering
backgrounds
have been
founded
various facets
of powder
science and

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technology to
study, apply,
and promote
interest in
areas of study.

Carbide,
Nitride and
Boride
Materials
Synthesis and
Processing
Numerical

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Modelling and
Design of
Electrical
Machines and
Devices
Proceedings of
the Eighth
Engineering
Foundation
Conference on
Fluidization,
May 14-19,

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1995, Tours,
France

Overview of
the New
Developments
of Energy and
Petrochemical
Reactor
Technologies.
Projections
for the 90's
Modeling of a

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fluidized bed
combustor with
immersed tubes

This reference
details particle
characterization,
dynamics,
manufacturing,
handling, and
processing for the
employment of
multiphase reactors,

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as well as procedures
in reactor scale-up
and design for
applications in the
chemical, mineral,
petroleum, power,
cement and
pharmaceuticals
industries. The
authors discuss flow
through fixed beds,
elutriation and
entrainment, gas

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distributor and plenum design in fluidized beds, effect of internal tubes and baffles, general approaches to reactor design, applications for gasifiers and combustors, dilute phase pneumatic conveying, and applications for

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chemical production and processing. This is a valuable guide for chemists and engineers to use in their day-to-day work.

This book provides a comprehensive mechanistic interpretation of the transport phenomena involved

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in various basic modes of gas-liquid-solid fluidization.

These modes include, for example, those for three-phase fluidized beds, slurry columns, turbulent contact absorbers, and three-phase fluidized beds, slurry columns, turbulent contact absorbers,

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and three-phase transport. It summarizes the empirical correlations useful for predicting transport properties for each mode of operation. Gas-Liquid-Solid Fluidization Engineering provides a comprehensive

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account of the state-of-the-art

applications of the three-phase fluidization systems that are important in both small-and large-scale operations.

These applications include

fermentation,
biological
wastewater

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treatment, flue gas desulfurization and particulates removal, and resid hydrotreating. This book highlights the industrial implications of these applications. In addition, it discusses information gaps and future directions for research in this

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field.

Catalytic Reactors presents several key aspects of reactor design in Chemical and Process Engineering.

Starting with the fundamental science across a broad interdisciplinary field, this graduate level textbook offers

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a concise overview on reactor and process design for students, scientists and practitioners new to the field. This book aims to collate into a comprehensive and well-informed work of leading researchers from north America, western Europe and

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south-east Asia. The editor and international experts discuss state-of-the-art applications of multifunctional reactors, biocatalytic membrane reactors, micro-flow reactors, industrial catalytic reactors, micro trickle bed reactors and multiphase

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catalytic reactors.

The use of catalytic reactor technology is essential for the economic viability of the chemical manufacturing industry. The importance of Chemical and Process Engineering and efficient design of reactors are

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another focus of the book. Especially the combination of advantages from both catalysis and chemical reaction technology for optimization and intensification as essential factors in the future development of reactors and

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processes are discussed.

Furthermore, options that can drastically influence reaction processes, e.g. choice of catalysts, alternative reaction pathways, mass and heat transfer effects, flow regimes and inherent design of catalytic

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reactors are reviewed in detail. Focuses on the state-of-the-art applications of catalytic reactors and optimization in the design and operation of industrial catalytic reactors Insights into transfer of knowledge from

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laboratory science to
industry For
students and
researchers in
Chemical and
Mechanical
Engineering,
Chemistry,
Industrial Catalysis
and practising
Engineers
Supplying nearly 350
expertly-written

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articles on technologies that can maximize and enhance the research and production phases of current and emerging chemical manufacturing practices and techniques, this second edition provides gold

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standard articles on the methods, practices, products, and standards recently influencing the chemical industries. New material includes: design of key unit operations involved with chemical processes; design, unit operation, and

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integration of
reactors and
separation systems;
process system
peripherals such as
pumps, valves, and
controllers;
analytical techniques
and equipment;
current industry
practices; and pilot
plant design and
scale-up criteria.

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Magnesium
Technology 2012
Chemical Reactor
Modeling
Elements of
Chemical Reaction
Engineering
Hydrodynamics and
Transport Processes
of Inverse Bubbly
Flow
Principles, Practice
and Economics of

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Plant and Process
Design

Chemical reaction engineering is concerned with the exploitation of chemical reactions on a commercial scale. It's goal is the successful design and operation of

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chemical reactors.

This text
emphasizes
qualitative
arguments, simple
design methods,
graphical
procedures, and
frequent
comparison of
capabilities of the
major reactor

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types. Simple ideas are treated first, and are then extended to the more complex. Fluidization Dynamics has been written for students and engineers who find themselves involved with

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problems concerning the fluidized state. It presents an analysis that focuses directly on the problem of predicting the fluid dynamic behaviour of a proposed fluidized system for which

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empirical data is limited or unavailable. The second objective is to provide a treatment of fluidization dynamics that is readily accessible to the non-specialist. The linear approach

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adopted in this book, starting with the formulation of predictive expressions for the basic forces that act on a fluidized particle, offers a clear way into the theory. The incorporation of the force terms

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into the
conservation
equations for
mass and
momentum and
subsequent
applications are
presented in a
manner that
requires only the
haziest
recollection of

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elementary fluid-dynamics theory. The analyses presented in this book represent a body of research that has appeared in numerous publications over the last 20 years. L.G. Gibilaro has taken the

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opportunity to
reorder much of
the material in the
light of
subsequent
knowledge, to
correct minor
errors and
inconsistencies
and to add detail
and clarification
where necessary.

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This material helps to form the basis for university course modules in engineering and applied science at undergraduate and graduate level, as well as focused, post-experienced

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courses for the
process, and allied
industries. ·

Bridges the gulf
between observed
behaviour and
fluid-dynamic
theory · Clear
account of basic
theory of
fluidization ·

Accessible

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Fluidization
Engineering
Levenspiel
treatment of
fluidization

analysis

The Engineering
of Chemical
Reactions focuses
explicitly on
developing the
skills necessary to
design a chemical
reactor for any
application,

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including chemical production, materials processing, and environmental modeling.

This text provides an overview of numerical field computational methods and, in particular, of the

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finite element
method (FEM) in
magnetics.

Detailed attention
is paid to the
practical use of
the FEM in
designing
electromagnetic
devices such as
motors,
transformers and

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actuators. Based on the authors' extensive experience of teaching numerical techniques to students and design engineers, the book is ideal for use as a text at undergraduate

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and graduate level, or as a primer for practising engineers who wish to learn the fundamentals and immediately apply these to actual design problems.
Contents:
Introduction;

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Computer Aided
Design in
Magnetics;
Electromagnetic
Fields; Potentials
and Formulations;
Field Computation
and Numerical
Techniques;
Coupled Field
Problems;
Numerical

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Optimisation;
Linear System
Equation Solvers;
Modelling of
Electrostatic and
Magnetic Devices;
Examples of
Computed Models.
Catalytic Reactors
Fast Fluidization
Reaction
Engineering

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Proceedings of the
Second
Engineering
Foundation
Conference,
Trinity College,
Cambridge,
England, 2-6 April
1978

The third

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*edition of
Engineering
Flow and Heat
Exchange is the
most practical
textbook
available on
the design of
heat transfer
and equipment.
This book is an
excellent
introduction to*

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*real-world
applications
for advanced
undergraduates
and an
indispensable
reference for
professionals.
The book
includes
comprehensive
chapters on the
different types*

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*classifications
of fluids, how
to analyze
fluids, and
where a
particular
fluid fits into
a broader
picture. This
book includes
various a wide
variety of*

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problems and solutions - some whimsical and others directly from industrial applications. Numerous practical examples of heat transfer Different from other

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*introductory
books on fluids*

*Clearly
written, simple
to understand,
written for
students to
absorb material
quickly*

*Discusses non-
Newtonian as
well as
Newtonian*

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*fluids Covers
the entire
field concisely
Solutions
manual with
worked examples
and solutions
provided
Today's
frustrations
and anxieties
resulting from
two energy*

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*crises in only
one decade,
show us the
problems and
fragility of a
world built on
high energy
consumption,
accustomed to
the use of
cheap non-
renewable
energy and to*

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*the acceptance
of existing
imbalances
between the
resources and
demands of
countries.*

*Despite all
these stressing
factors, our
world is still
hesitating
about the*

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*urgency of
undertaking new
and decisive
research that
could stabilize
our future,
Could this
trend change in
the near
future? In our
view, two
different
scenarios are*

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possible. A renewed energy tension could take place with an unpredictable timing mostly related to political and economic factors, This could bring again

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*scientists and
technologists
to a new state
of shock and
awaken our
talents, A
second
interesting and
beneficial
scenario could
result from the
positive
influence of a*

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*new generation
of researchers
that with or
without
immediate
crisis, acting
both in
industry and
academia, will
face the
challenge of
developing
technologies*

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*and processes
to pave the way
to a less
vulnerable
society,
Because
Chemical
Reactor Design
and Technology
activities are
at the heart of
these required
new*

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*technologies
the timeliness
of the NATO-
Advanced Study
Institute at
the University
of Western
Ontario,
London, was
very
appropriate.*

*Market_Desc: .
Chemical*

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*Engineers in
Levenspiel
Chemical,*

*Nuclear and
Biomedical
Industries*

Special

Features: .

*Emphasis is
placed*

*throughout on
the development
of common*

design strategy

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*for all
systems,
homogeneous and
heterogeneous.
This edition
features new
topics on
biochemical
systems,
reactors with
fluidized
solids,
gas/liquid*

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reactors, and more on non ideal flow. The book explains why certain assumptions are made, why an alternative approach is not used, and to indicate the limitations of the treatment

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*when applied to
real situations*

About The Book:

*Chemical
reaction*

*engineering is
concerned with
the*

*exploitation of
chemical*

*reactions on a
commercial*

scale. Its goal

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is the successful design and operation of chemical reactors. This text emphasizes qualitative arguments, simple design methods, graphical procedures, and

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frequent comparison of capabilities of the major reactor types. Simple ideas are treated first, and are then extended to the more complex. This reference details

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particle characterization, dynamics, manufacturing, handling, and processing for the employment of multiphase reactors, as well as procedures in reactor scale-up and design

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for applications in the chemical, mineral, petroleum, power, cement and pharmaceuticals industries. The authors discuss flow through fixed beds, elutriati

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*Chemical
Engineering
Fluid Mechanics
Multiphase
Reactive Flows
Chemical and
Catalytic
Reaction
Engineering
Engineering
Flow and Heat
Exchange
The Engineering*

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Engineering
of Chemical
Levenspiel
Reactions

This book provides readers with the most current, accurate, and practical fluid mechanics related applications that the practicing BS level engineer needs today in the

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chemical and related industries, in addition to a fundamental understanding of these applications based upon sound fundamental basic scientific principles. The emphasis remains on problem solving,

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and the new edition
includes many
more examples.

Fluidized beds
have gained
prominence in
many process in
dustries (including
chemicals,
petroleum,
metallurgy, food
and

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pharmaceuticals)
as a means of
bringing particulate
solids into contact
with gases and/or
liquids. Many
fluidized bed
operations are
physical in nature
(e.g. drying,
coating,
classification,

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granulation, and rapid heat transfer as in quenching or annealing). Other operations involve chemical reactions including the catalytic cracking of hydrocarbons, the manufacture of acrylonitrile and phthalic anhydride,

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the roasting of metallurgical ores, and the regeneration of spent catalysts. In recent years fluidized beds have been of special interest because of their potential as the central component in new

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processes for utilizing coal as a source of energy, notably in coal combustion and gasification processes. The fluidized bed offers a number of advantages over most other methods of

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contacting, in particular high rates of heat transfer, temperature uniformity and solids mobility.

Among the disadvantages are particle losses by entrainment, attrition of solids,

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limited reactor efficiency due to gas bypassing and gas and solids backmixing, and difficulties in design and scale-up due to the complexity of fluidized beds. The International Fluidization Conference held in

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Henniker, New
Hampshire, U.S.A.
from 3-8 August
1980 was the fifth
inter national
congress devoted
to the entire field of
fluidization.

Fluidization
Engineering,
Second Edition,
expands on its

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original scope to encompass these new areas and introduces reactor models specifically for these contacting regimes. Completely revised and updated, it is essentially a new book. Its aim is to distill from the

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thousands of
studies those
particular
developments that
are pertinent for the
engineer
concerned with
predictive
methods, for the
designer, and for
the user and
potential user of

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fluidized beds.

Covers the recent
advances in the
field of fluidization.

Presents the
studies of
developments
necessary to the
engineers,
designers, and
users of fluidized
beds.

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This conference is the second such meeting under the auspices of the International Energy Agency's Bioenergy Agreement. The first IEA sponsored Fundamentals of Thermochemical Biomass

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Conversion
Conference was held in Estes Park in 1982 and attracted 153 delegates from 13 countries around the world at a time when interest in biomass derived energy was at a peak. Since then oil

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prices have fallen considerably and with most prognoses for level prices until the end of the century, there has been a significant downturn in support for biomass conversion

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technologies. It has been particularly encouraging, therefore, to have received such an excellent response to this meeting. A total of 122 papers were offered, and 135 delegates registered for the conference from 19

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countries. The theme of this meeting was Research in Thermochemical Biomass Conversion to reflect the advances made in research, development, demonstration and

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commercialisation
since the

Fundamentals
meeting in 1982.

The programme
was divided into
sections on
fundamental
research, applied
research, and
demonstration and
commercial

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activities to emphasise the interaction and roles of all levels of research in supporting the eventual commercial implementation. The layout of the proceedings reflects this same

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pattern, with an introductory section on status and technoeconomics to identify opportunities and constraints in different parts of the world. All the papers included in these proceedings have been

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subjected to the usual peer review process to ensure the highest standards.

Chemical Reaction
Engineering
Fluidized-Bed
Reactors:
Processes and
Operating
Conditions

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Levenspiel
Research in
Thermochemical
Biomass
Conversion
Design, Operation
and Maintenance
Handbook of
Powder Science &
Technology
In this Special
Issue, one
review paper

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highlights the necessity of multiscale CFD, coupling micro- and macro-scales, for exchanging information at the interface of the two scales. Four research papers investigate the hydrodynamics,

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heat transfer,
and chemical
reactions of
various
processes using
Eulerian CFD
modeling. CFD
models are
attractive for
industrial
applications.
However,
substantial
efforts in

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physical
modeling and
numerical
implementation
are still
required before
their widespread
implementation.

- Explains
operation and
scientific
fundamentals of
circulating
fluidized bed

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(CFB) boilers ·
Outlines
practical issues
in industrial
use · Teaches
how to optimize
design for
maximum
reliability and
efficiency ·
Discusses
operating and
maintenance
issues and how

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to troubleshoot them This book provides practicing engineers and students with insight into the design and operation of circulating fluidized bed (CFB) boilers through a combination of

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theoretical
concepts and
practical
experience. An
emphasis on
combustion,
hydrodynamics,
heat transfer,
and material
issues
illustrates
these concepts
with numerous
examples from

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actual operating plants. The relevance of design and feed-stock parameters to the operation of a CFB boiler are also examined, along with their impacts on designs of mechanical components,

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including cyclones, air distributor grids, and solid recycle systems. This versatile resource explains how fluidized bed equipment works and how the basic principles of thermodynamics

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and fluid
mechanics
influence
design, while
providing
insight into
planning new
projects,
troubleshooting
existing
equipment, and
appreciating the
capabilities and
limitations of

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the process.

From

hydrodynamics to
construction and
maintenance, the
author covers
all of the
essential
information
needed to
understand,
design, operate,
and maintain a
complete

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fluidized bed system. It is a must for clean coal technology as well as for biomass power generation.

This book closes the gap between Chemical Reaction Engineering and Fluid Mechanics. It provides the

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basic theory for
momentum, heat
and mass
transfer in
reactive
systems.
Numerical
methods for
solving the
resulting
equations as
well as the
interplay
between physical

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and numerical modes are discussed. The book is written using the standard terminology of this community. It is intended for researchers and engineers who want to develop their own codes, or

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who are interested in a deeper insight into commercial CFD codes in order to derive consistent extensions and to overcome "black box" practice. It can also serve as a textbook and reference book.

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The fluidized-bed reactor is the centerpiece of industrial fluidization processes. This book focuses on the design and operation of fluidized beds in many different industrial processes,

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emphasizing the rationale for choosing fluidized beds for each particular process. The book starts with a brief history of fluidization from its inception in the 1940's. The authors present

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both the fluid dynamics of gas-solid fluidized beds and the extensive experimental studies of operating systems and they set them in the context of operating processes that use fluid-bed

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reactors.
Chemical
engineering
students and
postdocs as well
as practicing
engineers will
find great
interest in this
book.

Handbook of
Fluidization and
Fluid-Particle
Systems

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Engineering
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Chemical Reactor
Design and
Technology
Gas-Liquid-Solid
Fluidization
Engineering
Computational
Fluid Dynamics
(CFD) of
Chemical
Processes
International
Fluidization
Conference

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Fluidization E
ngineering Butt
erworth-
Heinemann
Hydrodynamics
and Transport
Processes of
Inverse Bubbly
Flow provides
the science
and
fundamentals

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behind
hydrodynamic c
haracteristics
, including
flow regimes,
gas
entrainment,
pressure drop,
holdup and
mixing charact
eristics,
bubble size

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distribution,
and the
interfacial
area of
inverse bubble
flow regimes.
Special
attention is
given to mass
and heat
transfer. This
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aims to
present the
main ideas of
reactor design
in a simple
and direct
way. it
includes key
formulas,
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exercises,
problems from
experience and
it skims over
the field
touching on
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to show the

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threads its

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way through
all reactor
problems, a
strategy which
involves three
factors:
identifying
the flow
patter,
knowing the
kinetics, and
developing the

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proper
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performance
equation. It
is this common
strategy which
is the heart
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Beds

***Besides being
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Clean Coal
Technologies,
fluidized beds
are also
proving to be
the most
practical option
for biomass***

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conversion.

**Although the
technology is
well**

**established, the
field lacks a
comprehensive
guide to the
design and
operating
principles of
fluidized bed
boilers and**

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experience,
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answers this
pressing need
with
Combustion and
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This book is a versatile resource that explains how fluidized bed equipment works and how to use the basic principles of thermodynamics and fluid mechanics in design while

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***providing
insight into
planning new
projects,
troubleshooting
existing
equipment, and
appreciating
the capabilities
and limitations
of the process.
From
hydrodynamics***

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**to construction
and
maintenance,
the author
covers all of the
essential
information
needed to
understand,
design,
operate, and
maintain a
complete**

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fluidized bed system. It is a must for clean coal technology as well as for biomass power generation. Beginning with a general introduction to fossil or biofuel conversion choices, the

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**book surveys
hydrodynamics,
fundamentals
of gasification,
combustion of
solid fuels,
pollution
aspects
including
climate change
mitigation, heat
transfer in
fluidized beds,**

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***the design and
operation of
bubbling and
circulating
fluidized bed
boilers, and
various
supporting
components
such as
distributor
grates, feeding
systems, and***

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**gas-solid
separators.**

**Chemical
reaction
engineering is
at the core of
chemical
engineering
education.
Unfortunately,
the subject can
be intimidating
to students,**

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***because it
requires a
heavy dose of
mathematics.
These
mathematics,
unless suitably
explained in the
context of the
physical
phenomenon,
can confuse
rather than***

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**enlighten
students.**

***Bearing this in
mind, Reaction
Engineering
Principles is
written
primarily from a
student's
perspective. It
is the
culmination of
the author's***

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***more than
twenty years of
experience
teaching
chemical
reaction
engineering.
The textbook
begins by
covering the
basic building
blocks of the su
bject—stoichio***

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***metry, kinetics,
and thermodyn
amics—ensurin
g students gain
a good grasp of
the essential
concepts before
venturing into
the world of
reactors. The
design and
performance
evaluation of***

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**reactors are
conveniently
grouped into
chapters based
on an
increasing
degree of
difficulty.
Accordingly,
isothermal
reactors—batch
and ideal flow
types—are**

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***addressed first,
followed by non-
isothermal
reactor
operation, non-
ideal flow in
reactors, and
some special
reactor types.
For better
comprehension,
detailed
derivations are***

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***provided for all
important
mathematical
equations.
Narrative of the
physical
context in
which the
formulae work
adds to the
clarity of
thought. The
use of***

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***mathematical
formulae is
elaborated
upon in the
form of problem
solving steps
followed by
worked
examples.
Effects of
parameters,
changing
trends, and***

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***comparisons
between
different
situations are
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exercises are
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end of each
chapter.
Over the last
decade,***

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***circulating
fluidization or
fast fluidization
has developed
rapidly,
superseding
standard
bubbling
fluidization in
many
applications;
for example,
fast fluidization***

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provides a better means for controlling emissions from the combustion of high-sulfur fuels and excels when used in boilers in steam plant and power stations. China initiated the study of

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***fast fluidization
in the early
1970s. Focusing
on the
substantial
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cultivated in
that country,
with Kwauk at
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Because the
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and fluid-
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methods for
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of non-oxides.
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to methods of
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synthesis
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concerned with
the synthesis
of powders,
chapters are
included for
other
materials such
as whiskers,
platelets,
fibres and
coatings.
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Materials
Synthesis and
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a
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the subject
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industry as
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