

1. Record Nr.	UNISA996212583503316
Titolo	Dynamics of environmental bioprocesses [[electronic resource]] : modelling and simulation / / Jonathan B. Snape ... [et al.]
Pubbl/distr/stampa	Weinheim ; ; New York, : VCH, c1995
ISBN	1-281-75864-7 9786611758646 3-527-61539-3 3-527-61538-5
Descrizione fisica	1 online resource (524 p.)
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Disciplina	628.168015118 628.5/01/5118 628.5015118
Soggetti	Bioremediation - Mathematical models Water - Pollution - Mathematical models Bioremediation - Computer simulation Water - Pollution - Computer simulation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Dynamics of Environmental Bioprocesses; Preface; Organisation of the Book; ISIM Simulation Software; Acknowledgements; Table of Contents; Nomenclature for Chapters 1 and 2; 1 Modelling Principles; 1.1 The Role of Modelling in Environmental Technology; 1.2 General Aspects of the Modelling Approach; 1.3 Model Classification; 1.3.1 Deterministic Models; 1.3.2 Stochastic Models; 1.3.3 Steady-State Models; 1.3.4 Dynamic Models; 1.4 General Modelling Procedure; 1.5 Simulation Tools; 1.6 ISIM; 1.7 Introductory ISIM Example: WASTE; 1.8 Formulation of Dynamic Balance Equations 1.8.1 Mass Balance Procedures 1.8.1.1 Case A . Continuous Stirred-Tank Reactor; 1.8.1.2 Case B . Tubular Reactor; 1.8.1.3 Case C . River with Eddy Current; 1.8.1.4 Rate of Accumulation Term; 1.8.1.5 Convective Flow Terms; 1.8.1.6 Production Rate; 1.8.1.7 Diffusion of Components; 1.8.1.8 Interphase Transport; 1.8.1.9 Case A . Waste Holding Tank: Total and Component Mass Balance Example; 1.8.1.10

Case B . The Plug-Flow Tubular Reactor; 1.8.1.11 Case C . Biological Hazard Room; 1.8.1.12 Case D . Lake Pollution Problem; 1.8.2 Energy Balancing

1.8.2.1 Case A . Determining Heat Transfer Area or Cooling Water Temperature1.8.2.2 Case B . Heating of a Filling Tank; 1.9 Chemical and Biological Reaction Systems; 1.9.1 Modes of Reactor Operation; 1.9.1.1 Batch Reactors; 1.9.1.2 Semi-Continuous or Fed-Batch Operation; 1.9.1.3 Continuous Operation; 1.9.2 Reaction Kinetics; 1.9.2.1 Chemical Kinetics; 1.9.2.2 Biological Reaction Kinetics; 1.9.2.3 Simple Microbial Growth Kinetics; 1.9.2.4 Substrate Uptake Kinetics; 1.9.2.5 Substrate Inhibition of Growth; 1.9.2.6 Additional Forms of Inhibition; 1.9.2.7 Other Expressions for Specific Growth Rate 1.9.2.8 Multiple-Substrate Kinetics1.9.2.9 Structured Kinetic Models; 1.9.2.10 Interacting Micro-Organisms; 1.10 Modelling of Bioreactor Systems; 1.10.1 Stirred Tank Reactors; 1.10.2 Modelling Tubular Plug-Flow Reactor Behaviour; 1.10.2.1 Steady-State Balancing; 1.10.2.2 Unsteady-State Balancing; 1.11 Mass Transfer Theory; 1.11.1 Phase Equilibria; 1.11.2 Interphase Mass Transfer; 1.11.2.1 Case A . Steady-State Tubular and Column Modelling; 1.11.3 Case Studies; 1.11.3.1 Case A . Aeration of a Tank of Water; 1.11.3.2 Case B . Biological Oxidation in an Aerated Tank 1.11.3.3 Case C . Determination of Biological Oxygen Uptake Rates by a Dynamic Method1.11.4 Gas-Liquid Phase Transfer Across a Free Surface; 1.12 Diffusion and Biological Reaction in Solid Phase Biosystems; 1.12.1 External Mass Transfer; 1.12.2 Finite Difference Model for Internal Transfer; 1.12.3 Case Studies for Diffusion with Biological Reaction; 1.12.3.1 Case A . Estimation of Oxygen Diffusion Effects in a Biofilm; 1.12.3.2 Case B . Biofilm Nitrification; 1.13 Process Control; 1.14 Optimisation. Parameter Estimation and Sensitivity Analysis

1.14.1 Case A . Estimation of Bioreaction Kinetic Parameters for Batch Degradation Using ESL and SIMUSOLV

Sommario/riassunto

Dynamic environmental processes are complex; the easiest and most effective way to understanding them lies through the disciplines of dynamic modelling and computer simulation. The prerequisite modelling fundamentals are presented in the first chapter in a manner comprehensible to students as well as to practising scientists and engineers. The second chapter describes the many environmental processes that lend themselves to modelling, for example pollution and wastewater treatment. The third part of the book provides 65 simulation examples both on the page and on an accompanying diskett
