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Nota di contenuto

Front Cover; Introduction to Food Engineering; Copyright Page; Contents; About the Authors; Foreword; Preface; CHAPTER 1 Introduction; 1.1 Dimensions; 1.2 Engineering Units; 1.2.1 Base Units; 1.2.2 Derived Units; 1.2.3 Supplementary Units; 1.3 System; 1.4 State of a System; 1.4.1 Extensive Properties; 1.4.2 Intensive Properties; 1.5 Density; 1.6 Concentration; 1.7 Moisture Content; 1.8 Temperature; 1.9 Pressure; 1.10 Enthalpy; 1.11 Equation of State and Perfect Gas Law; 1.12 Phase Diagram of Water; 1.13 Conservation of Mass; 1.13.1 Conservation of Mass for an Open System
1.13.2 Conservation of Mass for a Closed System1.14 Material Balances; 1.15 Thermodynamics; 1.16 Laws of Thermodynamics; 1.16.1 First Law of Thermodynamics; 1.16.2 Second Law of Thermodynamics; 1.17 Energy; 1.18 Energy Balance; 1.19 Energy Balance for a Closed System; 1.19.1 Heat; 1.19.2 Work; 1.20 Energy Balance for an Open System; 1.20.1 Energy Balance for Steady Flow Systems; 1.21 A Total Energy Balance; 1.22 Power; 1.23 Area; Problems; List of Symbols; Bibliography; CHAPTER 2 Fluid Flow in Food Processing; 2.1 Liquid Transport Systems; 2.1.1 Pipes for Processing Plants
2.1.2 Types of Pumps2.2 Properties of Liquids; 2.2.1 Terminology Used in Material Response to Stress; 2.2.2 Density; 2.2.3 Viscosity; 2.3 Handling Systems for Newtonian Liquids; 2.3.1 The Continuity Equation; 2.3.2 Reynolds Number; 2.3.3 Entrance Region and Fully Developed Flow; 2.3.4 Velocity Profile in a Liquid Flowing Under Fully Developed Flow Conditions; 2.3.5 Forces Due to Friction; 2.4 Force Balance on a Fluid Element Flowing in a Pipe-Derivation of Bernoulli Equation; 2.5 Energy Equation for Steady Flow of Fluids; 2.5.1 Pressure Energy; 2.5.2 Kinetic Energy; 2.5.3 Potential Energy
2.5.4 Frictional Energy Loss2.5.5 Power Requirements of a Pump; 2.6 Pump Selection and Performance Evaluation; 2.6.1 Centrifugal Pumps; 2.6.2 Head; 2.6.3 Pump Performance Characteristics; 2.6.4 Pump Characteristic Diagram; 2.6.5 Net Positive Suction Head; 2.6.6 Selecting a Pump for a Liquid Transport System; 2.6.7 Affinity Laws; 2.7 Flow Measurement; 2.7.1 The Pitot Tube; 2.7.2 The Orifice Meter; 2.7.3 The Venturi Meter; 2.7.4 Variable-Area Meters; 2.7.5 Other Measurement Methods; 2.8 Measurement of Viscosity; 2.8.1 Capillary Tube Viscometer; 2.8.2 Rotational Viscometer
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CHAPTER 3 Energy and Controls in Food Processes

Sommario/riassunto

This fourth edition of this successful textbook succinctly presents the engineering concepts and unit operations used in food processing, in a unique blend of principles with applications. Depth of coverage is very high. The authors use their many years of teaching to present food engineering concepts in a logical progression that covers the standard course curriculum. Both are specialists in engineering and world-renowned. Chapters describe the application of a particular principle followed by the quantitative relationships that define the related processes, solved examples and problems t