Record Nr. UNINA9910831057603321 Food mixing [[electronic resource]]: principles and applications // **Titolo** edited by P.J. Cullen Pubbl/distr/stampa Ames, Iowa, : Blackwell Pub., c2009 **ISBN** 1-282-37150-9 9786612371509 1-4443-1292-8 1-4443-0988-9 Descrizione fisica 1 online resource (320 p.) Altri autori (Persone) CullenP. J (Patrick J.) Disciplina 664 664/.024 Food industry and trade - Mathematical models Soggetti Mixing - Mathematical models Food mixes 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 Cover; Contents; Contributors; 1 Mixing in the food industry: trends and challenges; 1.1 Role of mixing; 1.2 Design criteria for mixing; 1.3 Specific challenges in food mixing; 1.3.1 Quality assurance compliance through mixing: 1.3.2 Engineering texture through mixing: 1.4 Advances in the science of mixing; 1.5 Book objectives; 2 Mixing fundamentals; 2.1 Introduction; 2.2 Defining mixing; 2.2.1 Macromixing; 2.2.2 Mesomixing; 2.2.3 Micromixing; 2.3 Scale of scrutiny; 2.4 Quantifying mixedness; 2.4.1 Inference of mixing indices; 2.5 Determining the end point of mixing; 2.5.1 Solids mixing 2.5.2 Fluid mixing2.5.3 Multi-phase mixing; 2.5.4 Alternative measures of mixedness in industrial practice; 2.6 Residence time distributions; 2.6.1 Modelling of residence time distributions; 3 Kinematics of flow and mixing mechanisms; 3.1 Introduction; 3.2 Fluid mixing; 3.2.1 Kinematics of fluid flow; 3.2.2 Quantification of flow regimes; 3.2.3 Chaotic advection; 3.2.4 Fluid mixing mechanisms; 3.3 Solids mixing; 3.3.1 Mixing flow in solids; 3.3.2 Solids mixing mechanism; 3.4

Identification of mixing mechanisms; 3.4.1 Solids; 3.4.2 Fluids; 4

Rheology and mixing; 4.1 Introduction

4.2 Dispersion rheology4.2.1 Forces acting on dispersed particles; 4.2.2 Parameters affecting suspension rheology; 4.3 Fluid rheology and mixing; 4.3.1 Shear flow; 4.3.2 Elongational flow; 4.4 Effects of mixing on fluid rheology; 4.5 Mixer rheometry; 4.5.1 Theory; 4.5.2 Mixer rheometry applications; 4.6 Conclusion; 5 Equipment design; 5.1 Introduction; 5.2 Liquid mixing equipment; 5.2.1 Portable mixers; 5.2.2 General purpose liquid mixers; 5.2.3 Mixer shafts design; 5.2.4 Other mechanical design considerations; 5.2.5 Special purpose liquid mixing equipment

5.2.6 Food specific mixing equipment5.3 Powder mixing equipment; 5.3.1 Ribbon blenders; 5.3.2 Paddle blenders; 5.3.3 Combination blenders; 5.3.4 Tumble blenders; 5.3.5 Loading and emptying blenders; 5.3.6 Liquid addition to powders; 5.3.7 Sampling; 5.3.8 Safety; 5.3.9 Blending systems; 5.4 Equipment components; 5.4.1 Electric motors: 5.4.2 Speed reducers: 5.4.3 Seals: 6 Mixing scale-up: 6.1 Introduction; 6.2 Scale-up for fluid mixing; 6.2.1 Dimensional analysis; 6.2.2 Scale-up with geometric similarity; 6.2.3 Scale-up without geometric similarity; 6.3 Scale-up for powder mixing 7 Monitoring and control of mixing operations 7.1 Introduction; 7.2 Torque and power measurement; 7.3 Flow measurement; 7.3.1 Hotwire anemometry; 7.3.2 Laser Doppler anemometry; 7.3.3 Phase Doppler anemometry: 7.3.4 Flow visualization using computer vision: 7.3.5 Particle image velocimetry; 7.3.6 Planar laser-induced fluorescence; 7.3.7 Tomography; 7.4 Quantification of mixing time; 7.4.1 NIR spectroscopy; 7.4.2 Chemical imaging; 8 Computational fluid mixing; 8.1 Introduction; 8.1.1 History of CFD; 8.1.2 Steps towards CFD simulation of mixing processes; 8.2 Conservation equations 8.2.1 Mass conservation

Sommario/riassunto

The mixing of liquids, solids and gases is one of the most common unit operations in the food industry. Mixing increases the homogeneity of a system by reducing non-uniformity or gradients in composition, properties or temperature. Secondary objectives of mixing include control of rates of heat and mass transfer, reactions and structural changes. In food processing applications, additional mixing challenges include sanitary design, complex rheology, desire for continuous processing and the effects of mixing on final product texture and sensory profiles. Mixing ensures delivery of a product wi