1. Record Nr. UNINA9911028671303321

Autore	Zhang Howard Q
Titolo	Nonthermal Processing Technologies for Food
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2025 ©2026
ISBN	1-119-26565-7 1-119-26564-9 1-119-26566-5
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (1097 pages)
Collana	Institute of Food Technologists Series
Altri autori (Persone)	BalasubramaniamV. M DunneC. Patrick YuanJames T. C FarkasDaniel F Barbosa-CánovasGustavo V
Soggetti	Food - Preservation Sterilization
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Volume 1 -- IFT Press -- Title Page -- Copyright Page -- Series Page -- Dedication Page -- Contents -- List of Contributors -- Preface -- Section I Overarching Themes -- Chapter 1 Nonthermal Processing Technology Innovations: Principles, Applications, and Future Prospects -- 1.1. Introduction -- 1.2. Nonthermal Process Development -- 1.2.1. Ensuring Food Safety -- 1.2.1.1. Pasteurization -- 1.2.1.2. Commercial Sterilization -- 1.2.2. Process Uniformity -- 1.2.3. Packaging -- 1.2.4. Retention of Product Quality and Nutrients -- 1.3. Techno-economic Consideration -- 1.4. Sustainability -- 1.5. Understanding Technology Limitations -- 1.6. Consumer Acceptance -- 1.7. Emerging Nonthermal Applications Beyond Food Preservation -- 1.8. Conclusions and Future Outlook -- Acknowledgments -- References -- Chapter 2 Sensory Aspects of Nonthermally Processed Foods -- 2.1. Nonthermal Processing Technologies for Food -- 2.1.1. High Pressure Processing (HPP) -- 2.1.2. Ultrasound (US) -- 2.1.3.

Pulsed Electric Fields (PEF) -- 2.1.4. Irradiation -- 2.1.5. Ultraviolet Light (UV-C) -- 2.1.6. Cold Plasma (CP) -- 2.1.7. Ozone -- 2.2. Final Remarks -- References -- Chapter 3 An Introduction to Global Regulatory Requirements for Novel Process Technologies in the Food Industry -- 3.1. Introduction -- 3.1.1. Regulatory Environment for Novel Technologies Within the European Union (Fiona Lalor and James G. Lyng) -- 3.1.2. Nonthermal Processing Technologies for Food-Regulations in Australia (Ciara K. McDonnell and Roman Buckow) -- 3.1.3. Regulation of Food Products Produced with Nonthermal Processes in Brazil (Amauri Rosenthal) -- 3.1.4. Steps Involved in Getting Approval for Use of Nonthermal Technologies in Food Processing in Kenya (Joshua M. Arimi).
3.1.5. Federal Regulation of Nonthermal Food Processing Technologies in the United States (John Sheehan and Nathan M. Anderson) -- 3.1.6. Attitude of China on Nonthermal Food Treatment (Hao Jiang) -- 3.2. Conclusion -- References -- Chapter 4 Linear and Nonlinear Inactivation Kinetics: Theoretical Equivalence of Thermal and Nonthermal Preservation Processes -- 4.1. Introduction -- 4.1.1. Equivalence -- 4.1.2. Primary, Secondary, and Tertiary Microbial Survival Curves -- 4.1.3. Equivalent Lethality -- 4.2. First-Order Kinetics -- 4.2.1. Equivalence of Static Log-linear Inactivation Processes -- 4.2.2. Equivalence of Static and Dynamic First-order Kinetics Inactivation Processes -- 4.3. Nonlinear Inactivation Kinetics -- 4.3.1. Weibullian Microbial Inactivation -- 4.3.2. Equivalence of Two Static Nonlinear Inactivation Processes -- 4.3.3. Equivalence of a Dynamic and Static Nonlinear Inactivation Processes -- 4.3.4. Construction of Equivalence Curves for a Dynamic and Static Nonlinear Inactivation Processes Using MS Excel® -- 4.3.5. Equivalence of Two Dynamic Nonlinear Inactivation Processes -- 4.4. Concluding Remarks -- References -- Section II Physical Processes -- Chapter 5 High-Pressure Processing of Foods -- 5.1. Introduction -- 5.2. Basic Principles Governing High Pressure Processing -- 5.2.1. Le Chatelier's Principle -- 5.2.2. Isostatic Principle -- 5.2.3. Microscopic Ordering Principle -- 5.2.4. Arrhenius Relationship -- 5.3. Processing and Equipment -- 5.3.1. Batch High Pressure Processing -- 5.3.2. Bulk High Pressure Processing -- 5.3.3. Ultrashear Technology for Beverage Processing -- 5.3.4. Pressure-transmitting Fluid -- 5.4. Packaging -- 5.5. Pressure-Temperature History During Processing -- 5.5.1. Pressure Come-up Time -- 5.5.2. Pressure Holding Time -- 5.5.3. Decompression Time -- 5.5.4. Cycle Time -- 5.5.5. Process Pressure. 5.5.6. Product Initial Temperature -- 5.5.7. Process Temperature -- 5.6. High-pressure Treatment Effects -- 5.6.1. High-pressure Pasteurization -- 5.6.2. Pressure-assisted Thermal Processing -- 5.6.3. Pressure Pulsing -- 5.6.4. Pressure-ohmic Thermal Sterilization (POTS) -- 5.6.5. High-pressure Freezing and Thawing -- 5.6.6. Pressure-assisted Blanching -- 5.6.7. Hyperbaric Storage -- 5.6.8. Lipid Crystallization -- 5.6.9. Infusion -- 5.6.10. Extraction -- 5.7. Engineering Properties of Food Materials Under High Pressure -- 5.7.1. Compressibility -- 5.7.2. Heat of Compression -- 5.7.3. Thermal Conductivity -- 5.7.4. Specific Heat -- 5.7.5. Thermal Diffusivity -- 5.7.6. Density -- 5.7.7. Electrical Conductivity -- 5.7.8. pH -- 5.8. Process Uniformity During High Pressure Processing -- 5.8.1. Modeling Process Uniformity -- 5.8.2. Approaches to Minimize Process Nonuniformity -- 5.9. Conclusion -- References -- Chapter 6 High-Pressure Processing Equipment Fundamentals -- 6.1. Introduction -- 6.2. Pressure Vessels and Their Materials and Methods of Construction -- 6.3. Pressure Vessel Design -- 6.4. Vessel Closures -- 6.5. Operating Temperature Considerations -- 6.6. Pressure Vessel and

Yoke Orientations: Vertical, Horizontal, and Tilting Systems -- 6.7. Pump-Intensifiers and Supporting High-pressure Components -- 6.8. Control Systems -- 6.9. Other System Considerations -- 6.10. Laws Regulating the Installation and Operation of High-pressure Equipment -- 6.11. Conclusion -- References -- Chapter 7 Food Commercialization with High-Pressure Processing (HPP): Techno-economical Aspects and Commercial Applications -- Abbreviations -- 7.1. Introduction -- 7.2. General Aspects of Industrial High Pressure Processing (HPP) Equipment -- 7.2.1. "In-Pack" HPP Equipment -- 7.2.1.1. Techno-economical Aspects of "In-Pack" HPP Equipment. 7.2.2. Hiperbaric "In-Bulk" HPP for Semi-continuous Beverage Production Lines -- 7.2.3. Operation of "In-Bulk" Equipment -- 7.2.4. Techno-economical Aspects of HPP "In-Bulk" Equipment -- 7.2.5. The Future of HPP: The Potential of Insulated Baskets for "In-Pack" High-. Pressure Thermal Processing (HPTP) -- 7.3. Commercial Applications -- 7.3.1. Beverages -- 7.3.2. Meat Products -- 7.3.2.1. Raw Meat -- 7.3.2.2. Cured/Fermented Meat -- 7.3.2.3. Cooked Meat -- 7.3.2.4. Pet Food -- 7.3.3. Avocado Products -- 7.3.4. Plant-based Products -- 7.3.5. Seafood -- 7.3.5.1. Shucking -- 7.3.5.2. Raw Seafood -- 7.3.5.3. Cooked Seafood -- 7.3.6. Ready-to-eat (RTE) and Ready-to-cook (RTC) Meals -- 7.3.7. Dairy -- 7.3.8. HPP Tolling -- 7.3.9. Cosmetics, Biotechnological, and Pharmaceutical Applications -- 7.4. Regulations -- 7.5. Final Remarks -- References -- Chapter 8 Microbiological Aspects of High-Pressure Food Processing -- 8.1. Introduction -- 8.2. The Effects of High Pressure Processing on Vegetative Bacteria -- 8.3. Mechanisms of Pressure-induced Inactivation -- 8.4. The Effects of Suspending Medium on Pressure-induced Inactivation -- 8.5. Injury and Repair -- 8.6. Pressure-inactivation Kinetics -- 8.7. The Effects of High Pressure Processing on Bacterial Spores -- 8.8. Pressure-assisted Thermal Sterilization -- 8.9. The Effects of High Pressure Processing on Yeasts and Molds -- 8.10. Activation and Germination of Yeast and Mold Ascospores by High Pressure -- 8.11. The Effect of Suspending Medium on Pressure-induced Inactivation of Yeasts and Molds -- 8.12. Process Implications for Controlling Yeast and Molds -- 8.13. The Effects of High Pressure Processing on Viruses -- 8.14. Mechanisms of Pressure Inactivation of Viruses -- 8.15. Effect of Suspending Medium on Pressure Inactivation of Viruses -- 8.16. Virus Surrogates. 8.17. Other Applications of HPP and Viruses -- 8.18. Future Research Needs -- References -- Chapter 9 Biochemical Aspects of High-Pressure Food Processing -- 9.1. Introduction -- 9.2. Effect of High Pressure on Proteins -- 9.2.1. Change in Functional Properties of Proteins -- 9.2.2. Protein Solubility -- 9.2.3. Water-Holding Capacity and.Oil-Holding Capacity of Proteins -- 9.2.4. Protein Emulsifying Properties -- 9.2.5. Protein Foaming Properties -- 9.2.6. Changes in Molecular Structure of Proteins as a Result of High Pressure Processing -- 9.3. Effect of High Pressure on Carbohydrates -- 9.3.1. Effect of High Pressure on Starch Gelatinization -- 9.3.2. Effect of High Pressure on Starch Digestibility -- 9.4. Effect of High Pressure on Lipids -- 9.5. Effect of High Pressure on Water -- 9.6. Effect of High Pressure on Quality Parameters -- 9.6.1. Texture -- 9.6.2. Color -- 9.7. Factors Affecting High Pressure Processing of Biomolecules -- 9.7.1. Temperature -- 9.7.2. Time -- 9.7.3. Pressure Magnitude -- 9.7.4. Compression and Decompression Rate -- 9.7.5. Product pH -- 9.7.6. Product Composition -- 9.8. Conclusions -- References -- Chapter 10 Mathematical Modeling of High-Pressure Processing -- 10.1. Introduction -- 10.1.1. High-pressure Application Goals -- 10.1.1.1. Microbial Inactivation -- 10.1.1.2. Enzyme Inactivation -- 10.2. Mathematical Modeling -- 10.2.1. Primary Models -- 10.2.1.1. Linear

Models -- 10.2.1.2. Fractional Conversion and Multiphasic Models -- 10.2.1.3. Concave Models -- 10.2.1.4. Sigmoidal Model -- 10.2.1.5. Gompertz Model -- 10.2.2. Secondary Models -- 10.2.2.1. Bigelow Principle -- 10.2.2.2. Le Chatelier Principle -- 10.2.2.3. Eyring-Arrhenius Models -- 10.2.2.4. Weibull Models -- 10.3. Experimental Design Considerations -- 10.3.1. Generic Recommendations for Mathematical Model Assessment and Model Selection. 10.3.1.1. Experimental Planning.

Sommario/riassunto

"Nonthermal processing brings food science, food engineering, microbiology, sensory science, polymer science together for safe and wholesome foods desired by modern consumers. Nonthermal technologies employ energy forms such as elevated pressure, electric field, ionizing radiation, ultraviolet light, ultrasound, ozone and cold plasma, as lethal agents, to inactivate foodborne pathogens and spoilage organisms in food while reducing product thermal exposure. Different intensities of these energy forms and their selective combinations with heat can result in 'pasteurization' or 'commercial sterilization' treatment effects. Different nonthermal technologies are at various stages of technology development. For example, technologies such as high pressure and PEF found many industrial applications, cold plasma research is relatively infancy stage."-- Provided by publisher.