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Principles of Food Processing

Sung Hee Park,¹ Buddhi P. Lamsal,² and V.M. Balasubramaniam^{1,3}

¹*Department of Food Science and Technology, The Ohio State University, Columbus, Ohio, USA*

²*Department of Food Science and Human Nutrition, Iowa State University, Ames, Iowa, USA*

³*Department of Food Agricultural and Biological Engineering, The Ohio State University, Columbus, Ohio, USA*

1.1 Processing of foods: an introduction

Processing of foods is a segment of manufacturing industry that transforms animal, plant, and marine materials into intermediate or finished value-added food products that are safer to eat. This requires the application of labor, energy, machinery, and scientific knowledge to a step (unit operation) or a series of steps (process) in achieving the desired transformation (Heldman & Hartel, 1998). Value-added ingredients or finished products that satisfy consumer needs and convenience are obtained from the raw materials.

The aims of food processing could be considered four-fold (Fellows, 2009): (1) extending the period during which food remains wholesome (microbial and biochemical), (2) providing (supplementing) nutrients required for health, (3) providing variety and convenience in diet, and (4) adding value.

Food materials' shelf life extension is achieved by preserving the product against biological, chemical, and physical hazards. Bacteria, viruses, and parasites are the three major groups of biological hazards that may pose a risk in processed foods. Biological hazards that may be present in the raw food material include both pathogenic microorganisms with public health implications and spoilage microorganisms with quality and esthetic implications. Mycotoxin, pesticide, fungicide, and allergens are some examples of chemical hazards that may be present in food. Physical hazards may involve the presence of extraneous material (such as stones, dirt, metal, glass, insect fragments, hair). These hazards may accidentally or deliberately (in cases of adulteration) become part of the processed product. Food processing operations

ensure targeted removal of these hazards so that consumers enjoy safe, nutritious, wholesome foods. With the possibility of extending shelf life of foods and advances in packaging technology, food processing has been catering to consumer convenience by creating products, for example, ready-to-eat breakfast foods and TV dinners, on-the-go beverages and snacks, pet foods, etc. Food processing, as an industry, has also responded to changes in demographics by bringing out ethnic and specialty foods and foods for elderly people and babies. Nutrition fortification, for example, folic acid supplementation in wheat flour, is another function of processing food.

The scope of food processing is broad; unit operations occurring after harvest of raw materials until they are processed into food products, packaged, and shipped for retailing could be considered part of food processing. Typical processing operations may include raw material handling, ingredient formulation, heating and cooling, cooking, freezing, shaping, and packaging (Heldman & Hartel, 1998). These could broadly be categorized into primary and secondary processing. Primary processing is the processing of food that occurs after harvesting or slaughter to make food ready for consumption or use in other food products. Primary processing ensures that foods are easily transported and are ready to be sold, eaten or processed into other products (e.g. after the primary processing of peeling and slicing, an apple can be eaten fresh or baked into a pie). Secondary processing turns the primary-processed food or ingredient into other food products. It ensures that foods can be used for a number of purposes, do not spoil quickly, are healthy and wholesome to eat, and are available all year (e.g. seasonal foods).

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Principles of Food Processing Richard W Hartel, Dennis R. Heldman, 2012-12-06 The approach to teaching the concepts of food processing to the undergraduate food science major has evolved over the past 40 years In most undergraduate food science curricula food processing has been taught on a commodity basis In many programs several courses dealt with processing with emphasis on a different commodity such as fruits and vegetables dairy products meat products and eggs In most situations the emphasis was on the unique characteristics of the commodity and very little emphasis on the common elements associated with processing of the different commodities Quite often the undergraduate student was allowed to select one or two courses from those offered in order to satisfy the minimum standards suggested by the Institute of Food Technologists The current IFT minimum standards suggest that the undergraduate food science major be required to complete at least one food processing course The description of this course is as follows One course with lecture and laboratory which covers general characteristics of raw food materials principles of food preservation processing factors that influence quality packaging water and waste management and sanitation Prerequisites general chemistry physics and general microbiology

Food Processing Stephanie Clark, Stephanie Jung, Buddhi Lamsal, 2014-04-03 **FOOD PROCESSING** Food Processing Principles and Applications Second Edition is the fully revised new edition of this best selling food technology title Advances in food processing continue to take place as food scientists and food engineers adapt to the challenges imposed by emerging pathogens environmental concerns shelf life quality and safety as well as the dietary needs and demands of humans In addition to covering food processing principles that have long been essential to food quality and safety this edition of Food Processing Principles and Applications unlike the former edition covers microbial enzyme inactivation kinetics alternative food processing technologies as well as environmental and sustainability issues currently facing the food processing industry The book is divided into two sections the first focusing on principles of food processing and handling and the second on processing technologies and applications As a hands on guide to the essential processing principles and their applications covering the theoretical and applied aspects of food processing in one accessible volume this book is a valuable tool for food industry professionals across all manufacturing sectors and serves as a relevant primary or supplemental text for students of food science

Food Processing Technology Peter Fellows, 2000 This book is split into five parts in which unit operations are grouped according to the nature of the heat transfer that takes place Each chapter describes the theoretical and practical aspects of the unit operation including the formula required for calculation of processing parameters sample problems and the effects on sensory characteristics and nutritional properties of selected foods Provided by publisher

Food Processing Hosahalli S. Ramaswamy, Michele Marcotte, 2005-08-23 Food Processing Principles and Applications is a comprehensive resource that explores the basic and applied aspects of food processing It describes the physical chemical and microbiological basis for each method of preservation Particular emphasis is placed on

the application of three of the most universally used commercial processes t Principles of Food Processing Dennis R. Heldman,2013-11-10 The approach to teaching the concepts of food processing to the undergraduate food science major has evolved over the past 40 years In most undergraduate food science curricula food processing has been taught on a commodity basis In many programs several courses dealt with processing with emphasis on a different commodity such as fruits and vegetables dairy products meat products and eggs In most situations the emphasis was on the unique characteristics of the commodity and very little emphasis on the common elements associated with processing of the different commodities Quite often the undergraduate student was allowed to select one or two courses from those offered in order to satisfy the minimum standards suggested by the Institute of Food Technologists The current IFT minimum standards suggest that the undergraduate food science major be required to complete at least one food processing course The description of this course is as follows One course with lecture and laboratory which covers general characteristics of raw food materials principles of food preservation processing factors that influence quality packaging water and waste management and sanitation Prerequisites general chemistry physics and general microbiology **Food Processing Technology** P.J. Fellows,2009-06-22 The first edition of Food processing technology was quickly adopted as the standard text by many food science and technology courses This completely revised and updated third edition consolidates the position of this textbook as the best single volume introduction to food manufacturing technologies available This edition has been updated and extended to include the many developments that have taken place since the second edition was published In particular advances in microprocessor control of equipment minimal processing technologies functional foods developments in active or intelligent packaging and storage and distribution logistics are described Technologies that relate to cost savings environmental improvement or enhanced product quality are highlighted Additionally sections in each chapter on the impact of processing on food borne micro organisms are included for the first time Introduces a range of processing techniques that are used in food manufacturing Explains the key principles of each process including the equipment used and the effects of processing on micro organisms that contaminate foods Describes post processing operations including packaging and distribution logistics **Food Processing Technology** P.J. Fellows,2000-07-11 The first edition of Food Processing Technology was quickly adopted as the standard text by many food science and technology courses While keeping with the practice of covering the wide range of food processing techniques this new edition has been substantially expanded to take account of the advances in technology that have taken place since the publication of the first edition The Second Edition includes new chapters on computer control of processing novel minimal technologies and Ohmic heating and an extended chapter on modified atmosphere packaging It is a comprehensive yet basic text that offers an overview of most unit operations while at the same time providing details of the processing equipment operating conditions and the effects of processing on the biochemistry of foods The book is divided into five parts in which unit operations are grouped according to

the nature of the heat transfer that takes place Each chapter describes the formulae required for calculation of processing parameters sample problems and the effects on sensory characteristics and nutritional properties of selected foods By combining food processing theory and calculations with descriptions of commercial practice and results of scientific studies Food Processing Technology Principles and Practice Second Edition helps readers make attractive saleable products and extend the shelf life of foods

Food Processing J. Scott Smith, Y. H. Hui, 2004-07-16 Renowned international academicians and food industry professionals have collaborated to create Food Processing Principles and Applications This practical fully illustrated resource examines the principles of food processing and demonstrates their application by describing the stages and operations for manufacturing different categories of basic food products Ideal as an undergraduate text Food Processing stands apart in three ways The expertise of the contributing authors is unparalleled among food processing texts today The text is written mostly by non engineers for other non engineers and is therefore user friendly and easy to read It is one of the rare texts to use commodity manufacturing to illustrate the principles of food processing As a hands on guide to the essential processing principles and their application this book serves as a relevant primary or supplemental text for students of food science and as a valuable tool for food industry professionals

Physical Principles of Food Preservation Marcus Karel, Daryl B. Lund, 2003-06-20 This reference examines the properties conditions and theoretical principles governing the safety and efficacy of various food preservation storage and packaging techniques The book analyzes methods to predict and optimize the nutrition texture and quality of food compounds while reducing operating cost and waste The Second Edition contains new chapters and discussions on non thermal processes the mechanisms of heat transfer including conduction convection radiation and dielectric and microwave heating the kinetic parameters of food process operations freezing technology using illustrative examples recent breakthroughs in cryochemistry and cryobiology and more

Principles of Food Processing Richard W Hartel, Dennis R. Heldman, 1997-03-31 This book focuses on the most common unit operations utilized in modern food processing operations It contains both descriptive and quantitative analysis of the typical food processes found in modern food processing plants The descriptive information provides students with background on the process and the impact of the process on food product quality The quantitative description assists the student in understanding the ability of the process to achieve the desired result and the consequences of improper operation of the process Examples utilizing different food commodities are incorporated to ensure that the student gains an appreciation of the relationship between commodities and processes

Microstructural Principles of Food Processing and Engineering José Miguel Aguilera, David W. Stanley, 1999-09-30 An Aspen Food Engineering Series Book This new edition provides a comprehensive reference on food microstructure emphasizing its interdisciplinary nature rooted in the scientific principles of food materials science and physical chemistry The book details the techniques available to study food microstructure examines the microstructure of basic food components and its relation to quality and explores how microstructure is affected by specific unit operations in

food process engineering Descriptions of a number of food related applications provide a better understanding of the complexities of the microstructural approach to food processing Color plates Smith Peter Smith,2004-03-30 **Basic Principles of Food Processing and Preservation** Oghogho Ukponmwan Ifueko,2015-10-21 These easy notes x rays the basic principles of food processing and preservation It introduces the students into easy steps in preservation of food for further processing These notes are handy for fresh college students who are taking classes in food processing and preservation The book also introduces the students to the basic principles of canning types of food that can be dried modified atmosphere packaging chemicals used in food preservation etc **Engineering Principles for Food Processing Technology and Product Realization** Leonardo Sepulveda Torre,A. K. Haghi,Porteen Kannan,2024-11-22 Discusses essential elements of food process engineering and innovations that are changing the food industry Covers modern methods for engineering processing along with food safety and quality controls Focuses on chemical features of food products food microbiology packaging processing distribution of quality foods and preservation **Principles of Food Sanitation** Norman Marriott,Robert B. Gravani,2006-01-05 In this era of emphasis on food safety and security high volume food processing and preparation operations have increased the need for improved sanitary practices from processing to consumption This trend presents a challenge for the food processing and food preparation industry Now in its 5th Edition the highly acclaimed Principles of Food Sanitation provides sanitation information needed to ensure hygienic practices and safe food for food industry personnel as well as students The highly acclaimed textbook and reference addresses the principles related to contamination cleaning compounds sanitizers cleaning equipment It also presents specific directions for applying these concepts to attain hygienic conditions in food processing or food preparation operations New features in this edition include A new chapter on the concerns about biosecurity and food sanitation Updated chapters on the fundamentals of food sanitation contamination sources and hygiene Hazard Analysis Critical Control Points cleaning and sanitizing equipment and waste handling disposal Comprehensive and concise discussion about sanitation of low intermediate and high moisture foods *Principles and Practices for the Safe Processing of Foods* H J Heinz,2013-10-22 Principles and Practices for the Safe Processing of Foods presents information on the design construction and sanitary maintenance of food processing plants This book also provides guidelines for establishing and implementing the Hazard Analysis Critical Control Points HACCP System and for training personnel in hygienic practices This text is divided into 13 chapters and begins with the assessment of corporate policies concerning the controlled production of clean wholesome foods in a sanitary manner The next chapters deal with some of the requirements for safe food processing including the establishment and implementation of HACCP rules building status sanitation and personnel A chapter briefly covers the structure of some microorganisms that affect safe food such as viruses bacteria and fungi This topic is followed by discussions of the biological factors underlying food safety preservation and stability the principles and application of microbiological control methods pathogenicity and pathogen

profiles and enzymes and their importance in food spoilage The last chapters examine the aspects of microbiological safety in food preservation technologies and the criteria for ingredients and finished products This book will prove useful to food manufacturers policy makers and public health workers

Food Processing: Principles, Technologies and Applications Zachary Walker,2020-09-08 Food processing is the set of techniques and operations which are used in the transformation of raw ingredients into food that are suitable for consumption It includes complex industrial methods for making convenience foods Food processing is classified into primary secondary and tertiary food processing Primary food processing converts agricultural products into a product which can be consumed Secondary food processing produces food which are ready to use for example baked bread Commercial production of processed food is known as tertiary food processing Common techniques of food processing include fermentation liquefaction pasteurization food irradiation etc This book outlines the processes and applications of food processing in detail The topics included herein on food processing are of utmost significance and bound to provide incredible insights to readers Those in search of information to further their knowledge will be greatly assisted by this book

Food Processing and Production Kaden Hunt,2019-06-04 The process of transformation of agricultural products into food for consumption is termed as food processing It is an important aspect of food production It is necessary for making food edible enabling preservation toxin removal and distribution and marketing This is achieved through a number of processes such as food preservation use of food additives and food packaging With processing delicate perishable food can be transported across longer distances and used for longer periods of time as it kills pathogenic microbes and deactivates spoilage A variety of traditional and industrial methods are used for food preservation such as freezing pickling heating pasteurization vacuum packing irradiation etc Food additives can be added to the food during the manufacturing process processing and packaging or during storage and transport to preserve its taste and flavor These may include antioxidants emulsifiers acidity regulators colors etc Packaging ensures that food becomes tamper proof and stays protected from various biological and chemical agents This book is a compilation of chapters that discuss the most vital concepts in the field of food processing and production It unfolds innovative principles and applications which will be crucial for the holistic understanding of the subject matter For all those who are interested in this field this textbook will prove to be an essential guide

Food Processing J Scott Smith (ed),Y H Hui (ed),2014 **Sanitation in Food Processing** John A. Troller,2012-12-02 This is an updated version of the popular First Edition and includes additional chapters on food and waste management raw materials and refrigerated foods Useful to university faculty and students as well as to food industry professionals the book provides a comprehensive introduction to contemporary technologies and methods of sanitary food processing Moving from principles to applications for problem solving in the food plant it presents the most recent data and concepts relative to cleaning and sanitizing food plants and process equipment This volume traces the development of food processing knowledge examines implications to human health provides an understanding of the

processing environment and investigates measures to control health hazards including the control of microbes A special feature is its emphasis on food quality programs with current information on HACCP and other quality programs such as ISO 9000 Food sanitarians and technologists microbiologists students and academicians in food science and nutrition and public health will find this text invaluable in their understanding of sanitary food processing methods food sanitation programs and food borne diseases Traces the development of food processing knowledge Examines implications to human health Provides an understanding of the food processing environment Investigates measures to control health hazards

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