processing, packaging and storage techniques including the use of additives, in particular to interfere with oxidative chemical reactions and to prevent or delay microbial growth. Of all the quality loss reactions of foods, the microbiological ones are the most important from the economic and consumer safety viewpoint. Microbiological problems associated with foods have generated much public concern, and the dangerous pathogens are now becoming a new focus for food and consumer safety. At same time, new methods of preservation such as high pressure processing are being introduced and these may well benefit from the selective use of antimicrobial preservatives, particularly in new combinations with the new and existing techniques.

Food preservatives are employed principally to prevent spoilage during storage and throughout distribution, retailing and use by the consumers. Therefore, the targets of food preservatives are those microorganisms that are able to multiply and eventually spoil the food. At the same time, preservatives may help to ensure safety by inhibiting the growth of any infectious or toxinogenic microorganisms that may be present.

The first introductory chapter summarizes the major groups of microorganisms responsible for food poisoning and major preservation technologies are covered in the second chapter. The detailed information about different preservatives, their mechanisms of action and their uses have been given in the proceeding chapters. The different topics not only cover the basic modes of action of chemical preservatives, but also their application as antimicrobial additives in the food industry. Water activity, which greatly influences the multiplication, metabolic activity, resistance, and survival of the microorganisms, has been discussed in separate chapter.

Bacteriocins are low molecular weight antimicrobial peptides produced by bacteria that are inhibitory to other bacteria, which are usually closely related to the producer bacteria. Numerous bacteriocins have been discovered particularly over 15 years, however, nisin has been known to posses a broader antimicrobial spectrum that most other bacteriocins and has proven success as a food preservative. The stability, antimicrobial spectrum, mode of action, toxicological studies, practical applications and protein engineering of nisin has been explained in chapter 8.

The prevention of mold growth is an important issue for the food industry because economic losses due to fungal spoilage of foods can be considerable. Natamycin at low concentrations is effective against nearly all molds and yeasts. The physical and chemical properties, mechanism of action, applications and regulatory status of natamycin have been discussed in the proceeding chapter.

The ability of modified-atmospheres and vacuum packaging has been known for a long time. The principal function of most types of preservative packaging is to delay microbial spoilage by restricting the growth of spoilage organisms. However, ideally they must also restrict non-microbial deterioration of product. The chapter on vacuum packaging and modified atmosphere packaging discusses the different gases used in packaging, packaging materials, microbial safety and developments in modified atmosphere packaging. The topics like surface preservation and naturally occurring antimicrobial systems have also been covered.

Consumers in developed countries are demanding minimally processed foods that contain few synthetic additives. Food manufactures are considering the possible uses of antimicrobial agents derived from animals, plants and microorganisms, to meet at least in part, the demand for more natural foods. More recently, and with the food safety issue remaining a matter of growing worldwide concern, 'biological' means for food preservation, are receiving increased attention in research. Therefore, issues like role of starter and protective cultures, their mechanism of action, their role in food processing along with genetic optimization has also been discussed in separate chapter.

The book concludes with chapters addressing towards this important issues like legislative aspects of food preservatives and future perspectives. The use of preservatives is also an important facet of food product regulation and ensuring food safety. Many countries have strict regulatory controls on the use of these compounds, particularly chemical preservatives. The regulation of preservatives is also major issue to food manufactures all over the world.

This book would be useful resource for all the persons those are involved in food production, processing, distribution and to the students/researchers in the fields of food science, technology and microbiology and will make a real contribution to the continuing development of food safety and quality.

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Thermal processing is the primary method for adding value and ensuring microbial safety of food products.

Although several technologies, e.g. irradiation, ultra high pressure, pulsed electric fields, use of bacteriocins have been developed for the food industry, the application of heat will certainly continue as the dominant means to impact desirable characteristics and ensure product safety. Additionally, major shifts in consumer demand and regulatory burden have increased the importance of thermal processing of these areas. During the development of any new treated product it is essential to assess the combined effects of the total system such as heat process, preservatives, packaging and storage conditions in order to ensure that the product is of a good microbiological standard and does not present any food safety hazard.

Temperature is one of the most important environmental factors influencing the growth and survival of organisms. As temperature rises, chemical and enzymatic reactions in the cell proceed at more rapid rates resulting in faster growth. However, above a certain temperature, proteins, nucleic acids and other cellular components are sensitive to high temperatures and may get irreversibly denatured. Thus thermal processing is used to produce safe and stable foods to eliminate pathogenic microorganisms. However, thermal technologies must ensure the safety of food without compromising good quality. An essential issue for food processor is the effective application of thermal technologies to achieve the desired objectives without damaging other desirable sensory and nutritional qualities in a food product.

This book summarises key research both on improving particular thermal processing techniques and measuring the effectiveness and validity. The three major objectives for thermal processing are denaturation of enzymes, killing of vegetable microbial cells and destroying bacterial spores. These three biological entities have different resistances to thermal treatment and different sensitivity to temperature changes, so there is need for their independent assessment. However, when food products are heated, the components are generally affected by the time and temperature of the heating process. Thus, during thermal processing, besides beneficial effects there can also be undesirable effects on the food products. So there is need for the optimisation of the thermal processes. This book begins with this particular issue in the Part 1, which includes topics addressing safety and quality, efficiency and productivity, batch processing and application of computational fluid dynamics. The principles of computational fluid dynamics, its possibility, limitations and further developments have been discussed.

Part II focuses on the development in technologies for sterilisation and pasteurisation having chapters on modelling retort temperature control, developments in packaging, cook-chill and sous vide processing. The chapter on developments in cook-chill and sous vide processing addresses the use of minimal thermal processing combined with the use of modified packaging techniques for preservation of foods. Sous vide is a French term which meaning 'under vacuum,' i.e. processing foods under reduced air pressure (vacuum) packaging. Cook-chill is a process that uses a plastic bag from which air is removed and immediately filled with hot cooked food and then bag is closed with a plastic or metal crimp and cooled.

In subsequent part, developments in continuous heat processing such as aseptic processing, tubular heat exchangers, ohmic heating, air impingement heating and laser based packaging has been discussed. Air impingement systems involve arrays of jets that impinge air on the surface of a food product. Industrial impingement systems have been applied to food processes such as drying, baking, toasting and freezing. The fourth part covers the validation of thermal processes with chapters on modelling heat penetration curves, data loggers, time–temperature integrators and new techniques for measuring and validating thermal processes. The minimal and non-invasive measurements, magnetic resonance imaging and futures trends have been described.

Finally, this book discusses methods of analysing microbial contamination in thermal processing and optimising thermal processing of liquids containing solid particulates. The different microorganisms have different resistance to high temperatures. Vegetable cells and yeasts are, generally, the most susceptible while endospores are much more resistant. This type of foodstuff to be heat treated will often have associated with high thermal resistances which is important to inactivate to ensure sterility. Keeping this in view, types of heat resistant microorganisms, thermal inactivation kinetics of bacterial spores and new thermal inactivation processes have been discussed in a separate chapter.

This informative book can be excellent resource of information for all individuals interested in development and processing of different food products with increased shelf life. It will not only support research and development but also be suitable for teaching.

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