

# 11

## Food Packaging

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### 11.1 Introduction

Food packaging is defined as a co-ordinated system of preparing food for transport, distribution, storage, retailing, and end-use to satisfy the ultimate consumer with optimal cost (Coles et al., 2003). Food packaging is an essential part of modern society; commercially processed food could not be handled and distributed safely and efficiently without packaging. The World Packaging Organization (WPO) estimates that more than 25% of food is wasted because of poor packaging (WPO, 2009). Thus, it is clear that optimal packaging can reduce the large amount of food waste. Moreover, the current consumer demand for convenient and high-quality food products has increased the impact of food packaging. The purpose of this chapter is to provide background knowledge for those who are interested in or may become involved in the development of food packaging and/or processing.

This chapter consists of four major parts. The development of quality food packaging is impossible if the packaging does not perform its required functions. Therefore, the first part of this chapter discusses the important role packaging plays in maintaining food quality and reducing product waste. The second part is about the properties and forms of food packaging materials and systems to facilitate understanding and appreciation of the major packaging materials, including plastic, paper, metal, and glass, which can affect the quality of food and its shelf life. The third part of the chapter explains aseptic packaging, modified atmosphere packaging and active packaging technologies, which have assumed increasing importance in the food industry in recent years. Finally, the last part of the chapter discusses sustainable food packaging issues, including recycling, biodegradable materials, and package design.

### 11.2 Functions of food packaging

#### 11.2.1 Containment

The term "containment" means, simply, to contain products to enable them to be moved or stored. It is so basic that it is easily overlooked. However, containment is a key factor for all other packaging functions. All products must be contained for delivery from their point of production to their ultimate destination. Even items that consumers consider as "not a packaged product," such as bulk produce, must be packaged for transportation. Without packaging, products are likely to be lost or contaminated by the environment. For this reason, we have actually used packaging for millennia. Early packaging such as animal skins, baskets, or leaves from trees were used to contain liquids, powders, grains, etc. The containment function significantly contributes to protecting and preserving products during their distribution.

#### 11.2.2 Protection/preservation

There are two broad types of damage that fresh and processed foods sustain during storage and transportation. One is physical damage such as shock, vibration, compressive forces, etc. The other is environmental damage that occurs due to exposure to water, light, gases, odors, microorganisms, etc. A good packaging system will protect or reduce these types of damage to the package contents. For example, an essential aroma or flavor in coffee or juice may easily be evaporated or oxidized without optimum barrier packaging. A shelf-stable food in a can or pouch may maintain its stability (especially against microorganisms) as long as the package provides protection. However, in the case of fresh food products, the ideal

# Manual Of Food Quality Control Introduction To Food Sampling 9

**Food and Agriculture Organization of  
the United Nations**



## **Manual Of Food Quality Control Introduction To Food Sampling 9:**

**Manual of Food Quality Control** Food and Agriculture Organization of the United Nations,1993-01-01 Manuals of Food Quality Control P. G. Martin,Food and Agriculture Organization of the United Nations,1986 Manuals of Food Quality Control Food and Agriculture Organization of the United Nations,1998-01-01 *Manual of Food Quality Control* Food and Agriculture Organization of the United Nations,1993 On the day of the fire at Chernobyl power station the world s attitude toward radiounclide contamination of foods suddenly changed Radioactive particles were transported over Europe and Asia by air currents and nations soon began intensive sampling and analysis efforts to determine the level and extent of contamination This manual provides an introduction to radioactivity and radiation with an emphasis on analytical methodology for determining radiounclides in food Background information covered includes radioactivity in the environment metabolism of radiation in humans and animals and radiounclides in the food chain Manuals of Food Quality Control ,1988 **Handbook of Food Process Modeling and Statistical Quality Control** Mustafa Ozilgen,1998-09-16

Fundamental techniques of mathematical modeling of processes essential to the food industry are explained in this text Instead of concentrating on detailed theoretical analysis and mathematical derivations important mathematical prerequisites are presented in summary tables Readers attention is focused on understanding modeling techniques rather than the finer mathematical points Topics covered include modeling of transport phenomena kinetic processes and food engineering operations Statistical process analysis and quality control as applied to the food industry are also discussed The book s main feature is the large number of worked examples presented throughout Included are examples from almost every conceivable food process most of which are based on real data given in the many references Each example is followed by a clear step by step worked solution FAO Food and Nutrition Paper ,2010 **Manual on the Application of the HACCP System in**

**Mycotoxin Prevention and Control** Food and Agriculture Organization of the United Nations,2001-01-01 The manual provides guidance on the application of the Hazard Analysis Critical Control Point HACCP approach to the prevention and control of mycotoxin contamination of foods and feed After a brief introduction on the nature of mycotoxins and their effects on human and animal health the document describes the HACCP system as defined by the Codex Alimentarius Commission Six examples yellow maize kernels maize based animal feed copra cake and meal commercially produced peanut butter apple juice and pistachio nuts illustrate how the HACCP approach can be applied to prevent and control mycotoxin contamination

**Compendium of Food Additive Specifications** Joint FAO/WHO Expert Committee on Food Additives. Meeting,World Health Organization,2001 The specification of identity and purity of food additives established by the Joint FAO WHO Expert Committee on Food Additives JECFA identify substances that have been subject to biological testing to ensure they are of adequate purity for the safe use in food This volume contains specification prepared at the fifty seventh meeting of JECFA and should be considered in conjunction with the Report of the meeting which will be published in the WHO Technical Report

Series     *Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods, FAO Headquarters, Rome, 17-21 July 2000* Food and Agriculture Organization of the United Nations, 2000 The microbiological safety of food is becoming an increasingly important issue in many countries A number of factors have contributed to this including changes in methods of food production and processing changing consumption patterns greater consumer awareness of food safety issues and emerging and re emerging pathogens Also the expansion of international trade in food has increased the risk of infectious agents being disseminated from the original point of production to locations thousands of miles away In addressing this issue at the international level FAO and WHO convened a joint Expert Consultation on Risk Assessment of Microbiological Hazards in Foods from 17 to 21 July 2000 in Rome The meeting specifically addressed risk assessment of *Salmonella* spp in broilers and eggs and *Listeria monocytogenes* in ready to eat foods This report summarizes its findings and includes advice and guidance on hazard characterization and exposure assessment of these pathogen commodity combinations for consideration by FAO WHO Member Countries and the Codex Alimentarius Commission     **Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods** Food and Agriculture Organization of the United Nations, 2001 This report summarizes the findings of the Joint Meeting on the risk assessments of salmonella in eggs and broiler chickens and listeria in ready to eat foods It presents a preliminary response to the specific risk management questions posed by the Codex Committee on Food Hygiene It provides advice on how these risk assessments can be used and adapted by FAO and WHO member countries     *Marine Biotoxins* Hans P. Egmond, Food and Agriculture Organization of the United Nations, 2004 This paper provides an extensive review of different aspects of five shellfish poisoning syndromes paralytic diarrhoeic amnesic neurologic and azapiracid as well as one fish poisoning syndrome ciguatera fish poisoning and discusses in detail the causative toxins produced by marine organisms chemical structures and analytical methods of the toxins habitat and occurrence of the toxin producing organisms case studies and existing regulations Based on this analysis risk assessments are carried out for each of the toxins and recommendations are elaborated to improve the management of these risks in order to reduce the harmful effect of these toxins on public health

Food Laboratory News , 1989     The Application of Risk Communication to Food Standards and Safety Matters Food and Agriculture Organization of the United Nations, 1999-01-01 With increased public concern regarding food safety greater demands are placed on risk communicators to involve the public and other interested parties in an interactive dialogue and to explain the magnitude and severity of risks associated with foodborne hazards in clear and comprehensible terms that convey credibility and trustworthiness This requires communicators to recognize and overcome gaps in knowledge as well as obstacles inherent in the uncertainties of scientific risk assessment This document is the report of a Joint FAO WHO Expert Consultation on the Application of Risk Communication to Food Standards and Safety Matters was held from 26 February 1998 at the Italian Ministry of Health Rome     **Residues of Some Veterinary Drugs in Animals and Foods** Joint

FAO/WHO Expert Committee on Food Additives. Meeting, 2002 This document is one of three publications prepared by the fifty eighth meeting of the Joint FAO WHO Expert Committee on Food Additives JECFA held in Rome in February 2002 and dedicated exclusively to the evaluation of veterinary drug residues in food The report of the meeting will be published in the WHO Technical Report Series and the toxicological monographs in the WHO Food Additives Series The present volume contains monographs of the residue data on nine of the fourteen compounds on the agenda The MRLs for doramectin tiabendazole neomycin were maintained as previously recommended The temporary MRL for thiamphenicol was not extended while the temporary MRL for cyhalothrin was extended until 2004 Data in the monographs on the nine compounds included provide information on chemical identity properties use pharmacokinetics metabolism tissue residues and their depletion and analytical methods for substances indicated on the cover This publication is designed for regulatory authorities veterinary drug researchers and any other concerned persons who wish to gain information on and insights into the assessment of the above listed information involved in recommending maximum limits for veterinary drug residues in food

*Enhancing Developing Country Participation in FAO/WHO Scientific Advice Activities* Food and Agriculture Organization of the United Nations, 2006-01-01 FAO and WHO have a long history of providing scientific advice on food safety and nutrition to Codex Alimentarius and FAO WHO member countries Since 2003 both organizations have been implementing a consultative process to guide their efforts to improve the quality quantity and timelessness of the scientific advice provided The consultative process has followed several steps including a planning meeting an electronic forum and a workshop facilitating an open and transparent review process that considered the opinions of all interested parties Through this process two key issues have been identified the urgent need to enhance the participation of experts from developing countries in the discussions and expert meetings used to generate and provide the advice and the importance of considering data and information from developing countries in all deliberations FAO and WHO therefore held a meeting on this matter in December 2005 in Belgrade to address these needs The report highlights the mechanisms identified by the meeting to reach out better to qualified experts and institutions in developing countries including mechanisms to search for information and experts that may not be easily accessible through normal channels and suggested plans to strengthen the capacity of developing country experts to participate effectively in expert meetings including training efforts at international and national levels involving governmental non governmental and scientific institutions The report calls on commitment from governments industry and academia at national and regional levels to generate scientific data from developing countries and facilitate their input to international FAO WHO scientific advice

Residues of Some Veterinary Drugs in Animals and Food Joint FAO/WHO Expert Committee on Food Additives. Meeting, Food and Agriculture Organization of the United Nations, 2004 On cover Cefuroxime sodium Cypermethrin alpha Cypermethrin Doramectin Lincomycin Melengestrol acetate Pirlimycin Ractopamine

**Comprehensive Sampling and Sample Preparation** Josep M. Bayona, Paola Dugo, X. Chris Le, Hian Kee

Lee,Xing-Fang Li,Heather Lord,2012-12-31 Comprehensive Sampling and Sample Preparation is a complete treatment of the theory and methodology of sampling in all physical phases and the theory of sample preparation for all major extraction techniques It is the perfect starting point for researchers and students to design and implement their experiments and support those experiments with quality reviewed background information In its four volumes fundamentals of sampling and sample preparation are reinforced through broad and detailed sections dealing with Biological and Medical Environmental and Forensic and Food and Beverage applications The contributions are organized to reflect the way in which analytical chemists approach a problem It is intended for a broad audience of analytical chemists both educators and practitioners of the art and can assist in the preparation of courses as well in the selection of sampling and sample preparation techniques to address the challenges at hand Above all it is designed to be helpful in learning more about these topics as well as to encourage an interest in sampling and sample preparation by outlining the present practice of the technology and by indicating research opportunities Sampling and Sample preparation is a large and well defined field in Analytical Chemistry relevant for many application areas such as medicine environmental science biochemistry pharmacology geology and food science This work covers all these aspects and will be extremely useful to researchers and students who can use it as a starting point to design and implement their experiments and for quality reviewed background information There are limited resources that Educators can use to effectively teach the fundamental aspects of modern sample preparation technology Comprehensive Sampling and Sample Preparation addresses this need but focuses on the common principles of new developments in extraction technologies rather than the differences between techniques thus facilitating a more thorough understanding Provides a complete overview of the field Not only will help to save time it will also help to make correct assessments and avoid costly mistakes in sampling in the process Sample and sample preparation are integral parts of the analytical process but are often less considered and sometimes even completely disregarded in the available literature To fill this gap leading scientists have contributed 130 chapters organized in 4 volumes covering all modern aspects of sampling and liquid solid phase and membrane extractions as well as the challenges associated with different types of matrices in relevant application areas

Safety Evaluation of Certain Mycotoxins in Food Joint FAO/WHO Expert Committee on Food Additives. Meeting,Food and Agriculture Organization of the United Nations,2001 This volume contains monographs prepared at the fifty sixth meeting of the Joint FAO WHO Expert Committee on Food Additives JECFA Five mycotoxins or groups of mycotoxins that contaminate food commodities were evaluated at the meeting aflatoxin M1 fumonisins B1 B2 and B3 ochratoxin A deoxynivalenol and T 2 and HT 2 toxins The monographs in this volume summarize the data that were reviewed on these contaminants including information on metabolism and toxicity epidemiology analytical methods for their measurement in food commodities sampling protocols effects of processing levels and patterns of contamination of food commodities food consumption and prevention and control Based upon this information the Committee assessed the risks

associated with intake of these mycotoxins      **Testing and Inspection Using Acceptance Sampling Plans** Muhammad Aslam, Mir Masoom Ali, 2019-07-19 This book introduces a number of new sampling plans such as time truncated life tests skip sampling plans resubmitted plans mixed sampling plans sampling plans based on the process capability index and plans for big data which can be used for testing and inspecting products from the raw materials stage to the final product in every industry using statistical process control techniques It also presents the statistical theory methodology and applications of acceptance sampling from truncated life tests Further it discusses the latest reliability quality and risk analysis methods based on acceptance sampling from truncated life which engineering and statisticians require in order to make decisions and which are also useful for researchers in the areas of quality control lifetime analysis censored data analysis goodness of fit and statistical software applications In its nine chapters the book addresses a wide range of testing inspection sampling schemes for discrete and continuous data collected in various production processes It includes a chapter on sampling plans for big data and offers several illustrative examples of the procedures presented Requiring a basic knowledge of probability distributions inference and estimation and lifetime and quality analysis it is a valuable resource for graduate and senior undergraduate engineering students and practicing engineers more specifically it is useful for quality engineers reliability engineers consultants black belts master black belts students and researchers interested in applying reliability and risk and quality methods

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