Contents

PART 1 UNDERSTANDING AND MEASURING CHEMICAL DETERIORATION OF FOODS AND BEVERAGES

Oxidative rancidity in foods and food quality
J Velasco, C Dobarganes and G Márquez-Ruiz, Consejo Superior de Investigaciones Científicas (CSIC), Spain
- Introduction: oxidative rancidity and food quality
- Mechanisms of lipid oxidation
- Factors affecting the rate of lipid oxidation
- Measuring oxidation in a food or food ingredient
- Measuring oxidative stability in a food or food ingredient
- Prevention of oxidative rancidity
- Future trends
- Sources of further information and advice
- References

Protein oxidation in foods and food quality
M N Lund, KU-LIFE and C P Baron, DTU AQUA, Denmark
- Introduction
- Protein oxidation definition and mechanisms
- From amino acid oxidation to protein oxidation
- Measuring protein oxidation in foods
- Protein oxidation in food
- Predicting and monitoring and controlling
- Future trends
- References

The Maillard reaction and food quality deterioration
C Perez-Locas and V A Yaylayan, McGill University, Canada
- Introduction to Maillard reaction and food quality deterioration
- Mechanisms involved in the Maillard reaction
- Factors affecting the Maillard reaction
- Maillard reaction and food flavour deterioration
- Maillard reaction, food nutritional losses and browning
- Maillard-generated toxicants
- Measuring and monitoring the Maillard reaction in foods with regards to quality in foods with regards to quality deterioration
- Future trends
- Conclusion
- References

Flavour deterioration during food storage
G Reineccius, University of Minnesota, USA
- Introduction
- Loss of desirable aroma components from model systems during storage
- Loss of desirable aroma components from food systems during storage
- Measuring, predicting and monitoring flavour deterioration in foods
- Methodologies
- Case studies
- Minimising flavour deterioration
- Future trends
- References
Light-induced quality changes in foods and beverages
M L Andersen and L H Skibsted, University of Copenhagen, Denmark
- Introduction
- Photochemical reactions in food and beverages
- Meat and meat products
- Frozen fish
- Dairy products
- Vegetable oils
- Beer
- Alcoholic beverages
- Future trends
- References

PART 2 UNDERSTANDING AND MEASURING PHYSICAL DETERIORATION OF FOODS AND BEVERAGES

Moisture loss, gain and migration in foods and its impact on food quality
G Roudaut and F Debeaufort, Université de Bourgogne, France
- Introduction
- Basic concepts of the mechanisms of the moisture transfers in food products
- Sorption isotherm characterisation of foods
- Water relationships in foods
- Conditions for moisture migration and foods affected by moisture transfer
- Measurement of water migration
- Modelling moisture transport phenomena in food products
- References

Crystallization in foods and food quality deterioration
R K Bund and R W Hartel, University of Wisconsin, USA
- Introduction
- Crystallization in foods
- Measurement of crystalline microstructure in foods
- Quality deterioration in food products associated with crystallization
- Future trends
- References

Structural and mechanical properties of fats and their implications for food quality
M F Peyronel, N C Acevedo and A G Marangoni, University of Guelph, Canada
- Introduction
- Fat crystal network structure components
- Structural basis for the elasticity and yield stress of fats
- Processing conditions for fats
- Future trends
- References

Emulsion breakdown in foods and beverages
S Ghosh and D Rousseau, Ryerson University, Canada
- Introduction: breakdown and quality deterioration
- Mechanisms of emulsion breakdown
- Controlling emulsion breakdown
- Factors influencing emulsion breakdown
- Measuring, predicting and monitoring emulsion breakdown
- Future trends
- Sources of further information and advice
- References
Gelatinization and retrogradation of starch in foods and its implications for food quality
A-C Eliasson, Lund University, Sweden
- Introduction
- Concepts of gelatinization and retrogradation
- Measuring, predicting and monitoring starch gelatinization and retrogradation in foods
- Controlling starch gelatinization and retrogradation to improve shelf life
- Sources of further information and advice
- References

Syneresis in food gels and its implications for food quality
S Mizrahi, Technion-Israel Institute of Technology, Israel
- Introduction
- Monitoring syneresis
- Mechanism of syneresis
- Characteristics of syneresis phenomena in different foods
- Future trends
- References

Understanding, detecting and preventing taints in food
D Kilcast, Consultant, formerly Leatherhead Food Research, UK
- Introduction
- Chemistry of taint
- Sources of taints
- Detection and analysis of taints
- Diagnostic taint testing
- Ethical aspects
- Case studies
- Future trends
- Sources of further information and advice
- References

PART 3 DETERIORATION IN SPECIFIC FOOD AND BEVERAGE PRODUCTS

Chemical and physical deterioration of bakery products
S P Cauvain and L S Young, BakeTran, UK
- Introduction
- Rancidity
- Staling of bakery products: changes which contribute to loss of freshness
- Storage instability in baked products
- Manipulating the shelf life of bakery products
- Case studies
- Future trends
- Sources of further information and advice
- References

Chemical and physical deterioration of bulk oils and shortenings, spreads, and frying oils
F D Gunstone, formerly University of St Andrews, UK and S Martini, Utah State University, USA
- Introduction
- Chemical deterioration and physical instability
- Analytical procedures for detecting, predicting, and monitoring undesirable changes
- Preventing oxidative deterioration with antioxidants
- Future trends
- Sources of further information and advice
- References

**Chemical processes responsible for quality deterioration in fish**

*C Jacobsen, H H Nielsen, B Jørgensen and J Nielsen, Technical University of Denmark, Denmark*
- Introduction
- Composition of fish
- The rigor mortis process
- Protein degradation catalysed by enzymes
- Degradation of lipids by enzymes
- Enzymatic degradation of trimethylamine-N-oxide (TMAO)
- Oxidative damages of seafood
- Conclusions and future trends
- Sources of further information and advice
- References

**Chemical and physical deterioration of wine**

*A L Waterhouse, University of California Davis and R J Elias, The Pennsylvania State University, USA*
- Introduction
- Mechanisms of wine deterioration
- Methods for monitoring wine deterioration
- Use of oxidation during processing and post-bottling
- Case studies
- Future trends
- Acknowledgements
- References

**Postharvest chemical and physical deterioration of fruit and vegetables**

*A K Thompson, formerly Cranfield University, UK*
- Introduction
- Processes involved in qualitative and quantitative deterioration of fruit and vegetables
- Factors affecting the rate of postharvest chemical and physical deterioration of fruit and vegetables
- Detecting, predicting and monitoring chemical deterioration and physical instability of fruit and vegetables
- Preventing chemical deterioration and physical instability in fruit and vegetables
- Future trends
- Sources of further information and advice
- References

**Enzymatic deterioration of plant foods**

*M N A Eskin and M Aliani, University of Manitoba, Canada*
- Introduction
- Peroxidases
- Lipoxygenase
- Polyphenol oxidase
- Pectin methylesterases and polygalacturonases
- Alternative methods of inactivation
- References

**Stability of vitamins during food processing and storage**

*P Berry Ottaway, Berry Ottaway & Associates Ltd, UK*
- Introduction
- The vitamins
- Factors affecting vitamin stability
- Classification of vitamins
- Vitamin–vitamin interactions
- Effect of irradiation on vitamin stability in foods
- Vitamin loss during processing
- Food product shelf life and its determination
- Protection of vitamins in foods
- References

**Chemical and physical deterioration of frozen foods**
*N E Zaritzky, CIDCA and Universidad Nacional de La Plata, Argentina*
- Introduction
- Basic principles of food freezing
- The freezing process: ice formation
- Freezing graphs
- Definitions of freezing rate
- Mathematical modeling of freezing time
- Intracellular and extracellular ice crystals in frozen tissues
- Physical changes in frozen foods
- Chemical changes produced by freezing and frozen storage
- Microbial stability of frozen foods
- Effect of freezing and frozen storage on food quality: case studies
- Shelf life of frozen foods
- Packaging of frozen food
- Glass transition temperature and stability of frozen food
- Cryostabilization of food systems: a case study
- Future trends
- References

**Chemical deterioration and physical instability in ready-to-eat meals and catered foods**
*P G Creed, formerly Bournemouth University, UK*
- Introduction
- Chemical deterioration and physical instability of ready-to-eat meals and catered foods
- Detecting, predicting and monitoring chemical deterioration and physical instability of ready-to-eat meals and catered foods
- Preventing chemical deterioration and physical instability of ready-to-eat meals and catered foods
- Role of chemical deterioration and physical instability in determination of shelf-life of ready-to-eat meals and catered foods: a case study
- Future trends
- Sources of further information and advice
- References

**Chemical deterioration and physical instability of food powders**
*P Intipunya, Chiang Mai University, Thailand and B R Bhandari, University of Queensland, Australia*
- Introduction
- Food powders
- Basic and functional properties of powders
- Powder formation techniques and manipulation of powder properties
- Glass transition related phenomena and quality changes in food powders
- Deterioration of powder properties
- Prevention of physical instability and chemical deterioration
The effect of non-meat ingredients on quality parameters in meat and poultry
M N O’Grady and J P Kerry, University College Cork, Ireland
- Introduction
- Factors affecting meat and poultry quality
- Prevention of quality deterioration in meat and poultry
- Conclusions
- References

Chemical deterioration and physical instability of dairy products
G Mortensen, University of Aarhus, U Andersen, Arla Foods, J H Nielsen, University of Aarhus and H J Andersen, Arla Foods and University of Aarhus, Denmark
- Introduction
- Milk as raw material
- General aspects of deterioration of dairy products
- Oxidation in dairy products
- Maillard reaction in dairy products
- Proteolysis in dairy products
- Lipolysis in dairy products
- Syneresis in dairy products
- Structure changes in dairy products
- Future trends
- Sources of further information and advice
- References