CONTENTS



xv

Preface

World Wide Web (WWW) Sites		xvii	
PART I	In.	TRODUCTION TO FOOD COMPONENTS	1
CHAPTER	1	Evaluation of Food Quality	3
		Introduction	3
		Aspects of Food Quality	4
		Taste Sensitivity	5
		Sensory Evaluation	6
		Objective Evaluation	12
		Comparison of Subjective and Objective Evaluation	17
		Conclusion	18
		Glossary	18
		References	19
CHAPTER	2	Water	21
		Introduction	21
		Chemistry of Water	22
		Specific Heat and Latent Heat of Water	23
		Vapor Pressure and Boiling Point	24
		Water as a Dispersing Medium	25
		Free, Bound, and Entrapped Water	27
		Water Activity (A _w)	28
		Role of Water in Food Preservation and Shelf Life of Food	28
		Water Hardness and Treatments	29
		Beverage Consumption	29
		Conclusion	29

VI CONTENTS

		Glossary	30
		References	31
		Bibliography	31
PART II	C	ARBOHYDRATES	33
CHAPTER	3	Carbohydrates in Food: An Introduction	35
		Introduction	35
		Monosaccharides	35
		Disaccharides	39
		Some Properties of Sugars	41
		Oligosaccharides	43
		Polysaccharides	44
		Conclusion	46
		Glossary	46
		Bibliography	47
CHAPTER 4	4	Starches in Food	49
		Introduction	49
		Starch Sources	49
		Starch Structure and Composition	50
		Gelatinization Process	52
		Factors Requiring Control in Gelatinization	54
		Gelation or Setting of Gelatinized Starch Pastes During	
		Cooling	58
		Retrogradation	59
		Syneresis	60
		Separating Agents and Lump Formation	60
		Modified Starches	61
		Waxy Starches	62
		Starch Uses in Food Systems	63
		Cooking With Starch	64
		Nutritive Value of Starch	65
		Conclusion	65
		Glossary	66
		References	67
		Bibliography	67
CHAPTER	5	Pectins and Gums	69
		Introduction	69
		Pectic Substances	69
		Gums	75
		Conclusion	79
		Glossary	79
		References	80
		Bibliography	80

CHAPTER 6	Grains: Cereal, Flour, Rice, and Pasta	81
	Introduction	81
	Structure of Cereal Grains	81
	Composition Of Cereal Grains	83
	Cereals	85
	Common Cereal Grains and Their Uses	86
	Other Grains	95
	Noncereal "Flours"	97
	Cooking Cereals	98
	Breakfast Cereals	98
	Pasta	98
	Nutritive Value of Grains	100
	Conclusion	102
	Glossary	102
	References	103
	Bibliography	103
	Glossary for Cereals, Flour, and Flour Mixtures	104
CHAPTER 7	Vegetables and Fruits	107
	Introduction	107
	Structure and Composition of Cell Tissue	107
	Chemical Composition of Plant Material	109
	Turgor Pressure	111
	Pigments and Effects of Additional Substances	112
	Flavor Compounds	118
	Vegetable Classifications	120
	Harvesting and Postharvest Changes	121
	Ripening	122
	Enzymatic Oxidative Browning	123
	Cooking Effect	124
	Fruits: Unique Preparation and Cooking Principles	126
	Grading	128
	Organically Grown Fruits and Vegetables	128
	Biotechnology (See also Appendices)	129
	Irradiation	130
	Vegetarian Food Choices	130
	Labeling of Vegetables and Fruits	131
	Nutritive Value of Vegetables and Fruits	132
	Safety of Vegetables and Fruits	136
	Conclusion	137
	Glossary	138
	References	139
	Bibliography	140

VIII CONTENTS

ROTEINS	143
Proteins in Food: An Introduction ¹	145
Introduction	145
Amino Acids	146
Protein Structure and Conformation	148
Reactions and Properties of Proteins	151
Enzymes	155
Functional Roles of Proteins in Foods	156
Conjugated Proteins	157
Conclusion	157
Glossary	157
Bibliography	159
Meat, Poultry, Fish, and Dried Beans	161
Introduction	161
	162
Muscle Contraction in Live Animals	167
Postmortem Changes in the Muscle	169
Meat Pigments and Color Changes	171
Meat-Handling Process	173
Grading of Meat	175
Hormones and Antibiotics	176
Cuts of Meat	176
Cooking Meat	179
Alterations to Meat	182
Poultry	187
Fish	188
Dried Beans and Peas (Legumes)	190
Meat Alternatives	193
Nutritive Value of Meat, Poultry, and Fish	194
Safety	198
Conclusion	200
Glossary	201
References	202
Bibliography	203
Associations	204
Eggs and Egg Products	205
Introduction	205
Physical Structure and Composition of Eggs	205
Egg Function	210
Inspections and Grading for Egg Quality	210
Egg Size	215
Processing/Preservation of Eggs	216
Storing Eggs	218
	Proteins in Food: An Introduction¹ Introduction Amino Acids Protein Structure and Conformation Reactions and Properties of Proteins Enzymes Functional Roles of Proteins in Foods Conjugated Proteins Conclusion Glossary Bibliography Meat, Poultry, Fish, and Dried Beans Introduction Characteristics of Meat Muscle Contraction in Live Animals Postmortem Changes in the Muscle Meat Pigments and Color Changes Meat-Handling Process Grading of Meat Hormones and Antibiotics Cuts of Meat Cooking Meat Alterations to Meat Poultry Fish Dried Beans and Peas (Legumes) Meat Alternatives Nutritive Value of Meat, Poultry, and Fish Safety Conclusion Glossary References Bibliography Associations Eggs and Egg Products Introduction Physical Structure and Composition of Eggs Egg Function Inspections and Grading for Egg Quality Egg Size Processing/Preservation of Eggs

	Denaturation and Coagulation	219
	Effect of Added Ingredients on Coagulation	220
	Cooking Changes	221
	Egg White Foams and Meringues	224
	Egg Products And Egg Substitutes	228
	Nutritive Value of Eggs	229
	Safety of Eggs	230
	Conclusion	233
	Glossary	233
	References	234
	Bibliography	235
CHAPTER 11	Milk and Milk Products	237
	Introduction	237
	Definition	238
	Composition of Milk	238
	Sanitation and Grading of Milk	242
	Flavor of Milk	242
	Milk Processing	243
	Types of Milk	246
	Other Milk Products	250
	Whey	258
	Cooking Applications	259
	Milk Substitutes and Imitation Milk Products	260
	Safety/Quality of Milk	261
	Nutritive Value of Milk and Milk Products	262
	Lactose Intolerance	265
	Marketing Milk	265
	Conclusion	266
	Glossary	266
	References	268
	Bibliography	268
PART IV FA	TS	271
CHAPTER 12	Fat and Oil Products	273
CHAITER 12	Introduction	273
	Structure and Composition of Fats	274
	Structure of Fatty Acids	276
	Nomenclature of Fatty Acids	278
	Properties of Fats and Oils	280
	Composition of Dietary Fats and Oils	283
	Production and Processing Methods	285
	Modification of Fats	286
	Deterioration of Fats	288
	Shortening and Shortening Power of Various Fats and Oils	292

X CONTENTS

	Emulsification (see also Chapter 13)	294
	Frying	296
	Low-Fat and No-Fat Foods	296
	Fat Replacements	297
	Nutritive Value of Fats and Oils	304
	Conclusion	306
	Glossary	306
	References	308
	Bibliography	309
CHAPTER 13	Food Emulsions and Foams	311
	Introduction	311
	Emulsions	311
	Foams	321
	Conclusion	325
	Glossary	326
	Bibliography	327
PART V Su	GARS	329
CHAPTER 14	Sugars, Sweeteners, and Confections	331
	Introduction	331
	Sources Of Sugar	331
	Roles of sugar in food systems	331
	Types of Sugars and Sugar Syrups	333
	Properties of Sucrose	335
	Sugar Substitutes	338
	Confections	341
	Nutritive Value of Sugars and Sweeteners	345
	Conclusion	346
	Glossary	346
	References	347
	Bibliography	347
PART VI BA	AKED PRODUCTS	349
CHAPTER 15	Baked Products: Batters and Dough	351
	Introduction	351
	Classes of Batters and Dough	352
	Gluten	352
	Function of Various Ingredients in Batters and Dough	355
	The Leavening Process of Baked Products	361
	Ingredients in Specific Baked Products	366
	Mixing Methods for Various Batters and Doughs	370

CONTENTS XI

373

	Storage of Baked Products	375
	Nutritive Value of Baked Products	375
	Safety Issues in Batters and Doughs	375
	Conclusion	376
	Glossary	376
	References	377
	Bibliography	378
PART VII A	SPECTS OF FOOD PRODUCTION	379
CHAPTER 16	Food Safety	381
	Introduction	381
	Foodborne Illness	382
	Biological (Microbiological) Hazards	202
	to The Food Supply	383
	Chemical Hazards to The Food Supply	392
	Physical Hazards to The Food Supply	393
	Food Protection Systems	395
	The Haccp System of Food Protection	397
	Surveillance for Foodborne-Disease Outbreaks	409
	Other Causes of Spoilage and Contamination	411
	Labeling as A Means of Assuring Food Safety	411
	Responsibility for Food Safety	413 415
	Recalls	
	Bioterrorism Threat to Food Safety	415
	Conclusion	421 421
	Glossary References	421
		424
	Bibliography Associations and Organizations	424
CHAPTER 17	Food Preservation and Processing	425
	Introduction	425
	Heat Preservation	425
	Refrigeration Preservation	433
	Freezing	434
	Dehydration Concentration	438
		439
	Added Preservatives	440 440
	Other Preservation Techniques	
	Radiation Direct Contact Products	440
	Nutritive Value of Preserved Foods	443
		443
	Safety of Preserved Foods	443

Baking Batters and Doughs

XII CONTENTS

	Conclusion	444
	Glossary	444
	References	445
	Bibliography	445
CHAPTER 18	Food Additives	447
	Introduction	447
	Definition of Food Additives	448
	Function of Food Additives	448
	Legislation and Testing for Additives	449
	Major Additives Used in Processing	451
	Nutrient Supplements in Food	464
	Conclusion	467
	Glossary	468
	References	468
	Bibliography	469
CHAPTER 19	Packaging of Food Products	471
	Introduction	471
	Types of Packaging Containers	471
	Packaging Functions	472
	Packaging Materials	472
	Controlling Packaging Atmosphere	480
	Freezer Packaging Protection	491
	Tamper-Evident Banding and Sleeve Labeling	492
	Manufacturing Concerns in Packaging	493
	Packaging of the Future	495
	Radio Frequency Identification Tags	497
	Packaging as a Communication and Marketing Tool	497
	Conclusion	498
	Glossary	498
	References	499
	Bibliography	500
PART VIII	SOVERNMENT REGULATION OF THE	
FOOD SUPPL	_Y	501
CHAPTER 20	Government Regulation of the Food Supply	
	and Labeling	503
	Introduction	503
	The Food and Drug Administration	504
	The United States Department of Agriculture	508
	Food Security and An Emergency Plan	510
	State and Local Health Departments	512
	Additional Agencies Regulating The Food Supply	512
	General Labeling	512

	CONTENTS	XIII
	Nutrition Labeling	514
	Health Claims (more in Appendices)	518
	Allergens	519
	Labeling for Food Service	519
	Conclusion	521
	Glossary	521
	References	522
	Bibliography	523
APPENDICES		525
	Introduction	525
	Appendix A – Biotechnology and Genetically Modified	
	Organisms (GMOs)	526
	Appendix B – Functional Foods	528
	Appendix C – Nutraceuticals	532
	Appendix D – Phytochemicals	533
	Appendix E – Medical Foods	534
	Appendix F – USDA Food Pyramid	535
	Appendix G – Food Label Heath Claims	537
	Appendix H – Research Chefs Association Certification as	
	a Culinary Scientist and More	539
	Appendix I – Human Nutrigenomics	540
	Glossary	541
	References	541
INDEX		543