

New ingredients in food processing

Biochemistry and agriculture

**Guy Linden
Denis Lorient**



Contents

Abbreviations	xii
Foreword	xv
Preface	xvii

Part One – Manufacture and properties of intermediate food products

Chapter 1 Intermediate food product strategy	1
1.1 Introduction	1
1.1.1 Consumer's viewpoint	3
1.1.2 Manufacturer's viewpoint	4
1.2 Scientific and economic essentials	5
1.2.1 Scientific and technical criteria	5
1.2.2 Economic criteria	6
1.3 Illustrating the IFP strategy: low-calorie foods	6
Chapter 2 Functional properties	9
2.1 Definition and classification: role of functional properties of food components within sensory quality	9
2.1.1 Definition and factors of variation	9
2.1.2 Nature of links and forces occurring within functional properties: classification	12
2.1.3 Influence of different phases of dispersion on functional properties	13
2.1.4 Methodology of functional properties	14
2.2 Properties of hydration	15

2.2.1	Interaction between water and the components	15
2.2.2	Hydration properties: influence of principal factors . .	17
2.3	Properties of association and polymerisation	21
2.3.1	Forces that are involved in molecular and interparticle interactions	21
2.3.2	Motions of particles	22
2.3.3	Process of dispersion destabilisation	23
2.3.4	Various gels obtained from macromolecules	25
2.3.5	Coagulation kinetics	25
2.4	Interfacial properties	26
2.4.1	Surface tension	26
2.4.2	Interfacial adsorption of the surfactant molecules . .	27
2.4.3	Emulsifying properties	30
2.4.4	Foaming properties	33
2.4.5	Mixed systems: expanded emulsions or emulsified fatty foams	35
Chapter 3	Extraction and texturisation processes	36
3.1	Extraction and purification	36
3.1.1	Proteins	36
3.1.2	Glycans	49
3.2	Structurisation/Texturisation	52
3.2.1	Biochemical bases of texturisation	53
3.2.2	Techniques of thermomechanical and thermal texturisation	54
3.2.3	High-pressure texturisation process	62
3.2.4	Texturisation process using chemical means	62
Chapter 4	Intermediate food products of plant origin	66
4.1	Plant proteins	66
4.1.1	General information and definitions	66
4.1.2	Physico-chemical properties of plant proteins	67
4.1.3	Functional properties of plant protein substances . .	71
4.1.4	Biological properties of plant protein substances	83
4.2	Plant oils and fats	89
4.2.1	Composition	89
4.2.2	General principles of processing	90
4.2.3	Properties and applications	94
Chapter 5	The dairy industry	100
5.1	Introduction	100
5.1.1	Characteristics of the raw material	100
5.1.2	General properties of the ingredients	101
5.1.3	Technological aims	104
5.2	IFPs based on dairy proteins	106
5.2.1	Functional properties of dairy proteins	106

5.2.2	Preparation and applications	107
5.2.3	Modification and improvement of functional properties	111
5.3	Proteins exhibiting biological activity: lactoferrin and lactoperoxidase	113
5.3.1	Lactoferrin	113
5.3.2	The peroxidase system	115
5.4	Lipid IFPs	117
Chapter 6	Egg products	121
6.1	Structure and composition of the egg	121
6.1.1	Whole egg	121
6.1.2	Composition of the white	121
6.1.3	Composition of the yolk	123
6.2	Nutritional value of the egg	125
6.2.1	Biological value of the proteins	125
6.2.2	Lipid digestibility	126
6.2.3	Minerals and vitamins	126
6.3	Functional properties	127
6.3.1	Aromatic and colorant capacity	127
6.3.2	Coagulation and gelling	127
6.3.3	Emulsifying properties	129
6.3.4	Foaming capacity	130
6.3.5	Other functional properties	130
6.3.6	Modifications to functional properties	131
6.4	Current economic developments	132
6.4.1	Technologies implemented	132
6.4.2	Industrial uses	135
6.4.3	Future prospects	138
Chapter 7	Meat products	139
7.1	Composition of the carcass	140
7.1.1	Muscles	140
7.1.2	Adipose tissue	143
7.1.3	Bones	144
7.2	Molecular and functional properties of muscle proteins	144
7.2.1	Myofibril and sarcoplasmic proteins	144
7.2.2	Proteins from the connective tissue	151
7.3	Meat restructuring	154
7.3.1	Manufacturing restructured meats	155
7.3.2	Properties of structured meats	157
7.3.3	Meat emulsions	158
Chapter 8	Products from the sea	161
8.1	Structure of fish flesh and seaweed	161
8.1.1	Fish muscle	162