

COOKING INNOVATIONS

USING HYDROCOLLOIDS FOR THICKENING,
GELLING, AND EMULSIFICATION



AMOS NUSSINOVITCH • MADOKA HIRASHIMA

About the pagination of this eBook

Due to the unique page numbering scheme of this book, the electronic pagination of the eBook does not match the pagination of the printed version. To navigate the text, please use the electronic Table of Contents that appears alongside the eBook or the Search function.

For citation purposes, use the page numbers that appear in the text.

COOKING INNOVATIONS

**USING HYDROCOLLOIDS FOR THICKENING,
GELLING, AND EMULSIFICATION**

COOKING INNOVATIONS

USING HYDROCOLLOIDS FOR THICKENING,
GELLING, AND EMULSIFICATION

AMOS NUSSINOVITCH • MADOKA HIRASHIMA



CRC Press
Taylor & Francis Group
Taylor & Francis HealthCare Group

an informa business
Taylor & Francis Group, an informa business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

© 2014 by Taylor & Francis Group, LLC
CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works
Version Date: 20130711

International Standard Book Number-13: 978-1-4398-7589-6 (eBook - PDF)

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access www.copyright.com (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Visit the Taylor & Francis Web site at
<http://www.taylorandfrancis.com>

and the CRC Press Web site at
<http://www.crcpress.com>

*To our mothers, Rebekah Nussinovitch and Nariko Hirashima, who gave us life,
taught us how to cook, and spiced our existence with knowledge, tradition, and love.*

Contents

Preface	xxi
Acknowledgments.....	xxxix
The Authors	xxxiii
1. Hydrocolloids—Where, Why, and When?.....	1
Introduction	1
Terminology	1
Classification	3
Economics	3
Gum Constituents and Their Effects on Processing	4
Functions of Hydrocolloids in Food Applications	5
Functions in Food Products	5
Viscosity Formation and Its Typical Food Applications.....	5
Gelation, Gel Types, and Linkages	6
Gel Textures	7
Gel-Enhancing Effects of Other Gums.....	7
Hydrocolloids in Emulsions, Suspensions and Foams, and in Crystallization Control.....	8
Other Unique Food Applications	9
Regulatory Aspects	10
References and Further Reading	10
2. Agar–Agar	13
Historical Background	13
Collection and Processing of Seaweed for Agar.....	13
Types of Agar Products.....	14
Regulatory Status and Toxicity	16
Structure of Agar.....	16
Agar–Agar Properties	16
Dissolution and Viscosity.....	16
Gelation and Melting.....	17
Gel Clarity.....	18
Gel Syneresis.....	18
Effect of Addition of Other Materials on Agar Properties	18
Commercial Food Applications	18
Agar in the Baking Industry	18
Agar in Confections	19
Agar in Wet and Dried Structured Fruit Products.....	19
Meat, Milk, Fish, and Other Products	20

Recipes with Agar–Agar	21
<i>Mizu Yokan</i> (Agar Jelly with Red Bean Paste) (Figure 2.3).....	21
Ingredients.....	21
Preparation	22
Hints	22
<i>Mitsu-Mame</i> (Agar Jelly with Rice Dumplings).....	23
Ingredients.....	23
Preparation	24
Hints	25
Orange Jelly (Figure 2.9).....	26
Ingredients.....	26
Preparation	26
Hint.....	26
<i>Awayuki-Kan</i> (Agar Jelly with Egg White) (Figure 2.10).....	27
Ingredients.....	27
Preparation	27
Hint.....	28
<i>Xingrén</i> Jelly (Chinese Almond Pudding) (Figure 2.12)	28
Ingredients.....	28
Preparation	29
Hint.....	29
Agar Spaghetti (Figure 2.13).....	29
Ingredients.....	29
Preparation	29
Tips for the Amateur Cook and Professional Chef	30
References and Further Reading	31
3. Alginates	35
Historical Background	35
Sources	35
Structure	36
Alginate Sources and Manufacture.....	36
Raw Materials	36
Alginate and PGA Production	36
Regulatory Status and Toxicity	36
Commercial Characteristics	37
Hydrocolloid Solution Preparation Procedures	37
Mechanism of Alginate Gelation	38
Degree of Conversion, Thixotropy, and Alginate–Pectin Gels	38
Diffusion Setting	39
Establishing Differences between Alginate Gels	39
Applications.....	40
Fruit-Like Products and Coatings on Fresh-Cut Fruit Pieces.....	40
Water Dessert Gels.....	41
Milk Puddings, Ice-Cream Stabilizers, and Other Dairy Products.....	41
Fish and Meat Preservation and Sausage Casings	41

Bakery Toppings, Fillings, Beverages, and Salad Dressings	43
Further Applications	43
Recipes with Alginates.....	44
Yogurt Spheres (Figure 3.1)	44
Ingredients.....	44
Preparation	44
Artificial <i>Ikura</i> (Salmon Eggs) (Figure 3.2).....	45
Ingredients.....	45
Preparation	45
Hints	46
Onion Rings (Figure 3.3)	47
Ingredients.....	47
Preparation	47
French Dressing (Figure 3.5)	49
Ingredients.....	49
Preparation	49
Hint.....	50
Tips for the Amateur Cook and Professional Chef	50
References and Further Reading	51
4. Carrageenan and Furcellaran	57
Introduction and Historical Background.....	57
Structure	58
Sources and Production.....	58
Accessible Types of Gum	59
Regulatory Aspects	60
Molecular Weight and Consistency.....	60
Solutions and Gels.....	60
Properties	60
Preparation	61
Viscosity	61
Effect of Molecular Weight.....	62
Gel Preparation and Mechanical Properties	62
Reactivity with Proteins	63
Applications.....	64
Milk Applications	65
Water Applications.....	66
Meat and Fish Applications.....	67
Recipes with Carrageenan and Furcellaran	68
Milk Pudding (Figure 4.1).....	68
Ingredients.....	68
Preparation	69
Hints	69
Flan (Figure 4.2).....	69
Ingredients.....	69
Preparation	69
Hint.....	70

Chocolate Drink (Figure 4.3).....	71
Ingredients.....	71
Preparation.....	71
Hint.....	71
Ham (Figure 4.4).....	71
Ingredients.....	71
Preparation.....	72
Hints.....	72
Tips for the Amateur Cook and Professional Chef.....	73
References and Further Reading.....	73
5. Cellulose Derivatives.....	77
Introduction.....	77
Manufacture.....	77
Properties of Methylcellulose (MC) and Methylhydroxypropylcellulose (MHPC).....	78
Hydroxypropylcellulose (HPC).....	79
Microcrystalline Cellulose (MCC).....	80
Carboxymethylcellulose (CMC).....	81
General Information.....	81
Chemical Nature and Manufacture.....	82
Chemical and Physical Properties.....	82
Solution Properties.....	82
Viscosity.....	83
Stability and Physical Data.....	84
Food Applications.....	85
Recipes with Cellulose Derivatives.....	88
Parsley Spaghetti (Figure 5.1).....	88
Ingredients.....	88
Preparation.....	88
Hints.....	88
Takoyaki (Octopus Dumpling) (Figure 5.2).....	89
Ingredients.....	89
Preparation.....	90
Hints.....	91
Soy Burger Patties (Figure 5.4).....	91
Ingredients.....	91
Preparation.....	92
Hints.....	92
Pineapple Ice Cream (Figure 5.5).....	93
Ingredients.....	93
Preparation.....	93
Hint.....	94
Sugarpaste (Figure 5.6).....	94
Ingredients.....	94
Preparation.....	95
Hints.....	95

Low-Fat Whipped Cream (Figure 5.7).....	95
Ingredients.....	95
Preparation.....	95
Hint.....	95
Tips for the Amateur Cook and Professional Chef.....	96
References and Further Reading.....	96
6. Curdlan	101
Historical Background.....	101
Production.....	101
Chemical Structure.....	101
Regulatory Status and Toxicity.....	102
Functional Properties.....	102
Solution Properties and Conformations.....	102
Aqueous Suspension Properties.....	102
Gelation.....	102
Commercial Food Applications.....	103
Recipes with Curdlan.....	105
<i>Udon</i> (Japanese Noodles) (Figure 6.3).....	105
Ingredients.....	105
Preparation.....	106
Hint.....	106
<i>Kamaboko</i> (Fish Cake) (Figure 6.4).....	106
Ingredients.....	106
Preparation.....	107
Hints.....	108
Sausages (Figure 6.5).....	108
Ingredients.....	108
Preparation.....	109
Hints.....	110
Doughnuts (Figure 6.8).....	111
Ingredients.....	111
Preparation.....	112
Hint.....	112
<i>Kinugoshi Tofu</i> (Soybean Curd) (Figure 6.9).....	112
Ingredients.....	112
Preparation.....	113
Hint.....	113
Multilayered Jelly (Figure 6.10).....	114
Ingredients.....	114
Preparation.....	114
Hints.....	115
Tips for the Amateur Cook and Professional Chef.....	115
References and Further Reading.....	116
7. Egg Proteins	119
Historical Background.....	119
The Structure of the Egg.....	119

The Composition of the Egg	119
Egg Yolk.....	120
Egg White.....	120
Essential Nutrients and Value of Eggs	121
Egg Yolk Emulsions	121
Egg White Foams.....	122
Gels.....	123
Egg Yolk Gels	123
Egg White Gels	123
Recipes with Eggs	124
Plain Omelette (Figure 7.2).....	124
Ingredients.....	124
Preparation	124
Hints	125
Japanese Rolled Omelette (<i>Sushi Egg</i>) (Figure 7.3).....	125
Ingredients.....	125
Preparation	125
Hints	126
Crabmeat and Egg Drop Soup.....	127
Ingredients.....	127
Preparation (Figure 7.5)	127
Hints	127
<i>Chawan-Mushi</i> (Savory Egg Custard) (Figure 7.6)	128
Ingredients.....	128
Preparation	129
Hint.....	129
Caramel Custard (Figure 7.7).....	130
Ingredients.....	130
Preparation	130
Hints	131
<i>Crème Brûlée</i> (Figure 7.8).....	131
Ingredients.....	131
Preparation	131
Hints	132
Cream Puffs (Figure 7.9).....	132
Ingredients.....	132
Preparation	133
Hint.....	134
Meringues (Figure 7.10)	134
Ingredients.....	134
Preparation	134
Hints	135
Tips for the Amateur Cook and Professional Chef	135
References and Further Reading	135
8. Galactomannans.....	139
Introduction	139
Locust Bean Gum: Sources, Manufacturing, and Legislation.....	139

Guar Gum: Sources, Processing, and Regulatory Status.....	140
Tara Gum.....	140
Fenugreek Gum.....	141
Galactomannan Structure.....	141
Gum Solution Properties.....	142
Gelation and Interactions of Galactomannans.....	143
Stability.....	144
Food Applications.....	144
Recipes with Galactomannans.....	147
Brown Sugar Sherbet (Figure 8.1).....	147
Ingredients.....	147
Preparation.....	147
Hints.....	148
Raspberry Sauce (Figure 8.2).....	148
Ingredients.....	148
Preparation.....	149
Hint.....	149
Banana and Nuts Ice Cream (Figure 8.3).....	150
Ingredients.....	150
Preparation.....	150
Hints.....	150
Frozen Fruit Drink (Figure 8.4).....	151
Ingredients.....	151
Preparation.....	151
Hint.....	151
Empanada Dough (Figure 8.5).....	152
Ingredients.....	152
Preparation.....	152
Hints.....	153
Loukoums (Figure 8.6).....	153
Ingredients.....	153
Preparation.....	153
Hint.....	154
Yoghurt Dressing (Figure 8.7).....	155
Ingredients.....	155
Preparation.....	155
Hints.....	155
Sharbat Hilba (Fenugreek Soup) (Figure 8.8).....	156
Ingredients.....	156
Preparation.....	156
Pear and Fenugreek Jam (Figure 8.9).....	157
Ingredients.....	157
Preparation.....	157
Hint.....	158
Tips for the Amateur Cook and Professional Chef.....	158
References and Further Reading.....	158

9. Gelatin	161
Historical Background	161
Definitions	161
Manufacture and Sources.....	162
Acid Processing.....	162
Alkaline Processing	162
Final Products	163
Physical Properties	163
Technical Data.....	163
Bloom Strength	163
Chemical and Microbiological Properties	163
Food Uses and Applications.....	164
Gelatin Desserts	164
Confections.....	164
Ice-Cream Stabilizers, Dairy, Fish and Meat Products	165
Baked Goods, Carriers, and Miscellaneous	166
Regulations.....	167
Recipes with Gelatin	168
Fruit Jelly (Figure 9.1).....	168
Ingredients.....	168
Preparation	168
Hints	169
Fruit Gummy Candy (Figure 9.2)	169
Ingredients.....	169
Preparation	170
Aspic Jelly Salad (Figure 9.3)	170
Ingredients.....	170
Preparation	171
Hint.....	172
<i>Bavaroise</i> (Bavarian Cream) (Figure 9.4).....	172
Ingredients.....	172
Preparation	173
Hints	173
Marshmallows (<i>Guimauve</i>) (Figure 9.5).....	173
Ingredients.....	173
Preparation	174
Hints	175
Tips for the Amateur Cook and Professional Chef	175
References and Further Reading	175
10. Gellan Gum	179
Historical Background	179
Structure and Chemical Composition	179
Source, Production Supply, and Regulatory Status	179
Manufacture	179
Nutritional Aspects	180

Regulatory Status	180
Functional Properties	180
Hydration	180
Low-Acyl (LA) Gellan Gum	180
High-Acyl (HA) Gellan Gum	181
Mechanism of Gelation and Gellan-Gum Gel Properties	181
Comparison to Other Hydrocolloids	182
Food and Other Applications	183
Recipes with Gellan Gum	186
Fruit-Juice Jelly (Figure 10.1)	186
Ingredients	186
Preparation	186
Hint	187
Low-Solids Jam (Figure 10.2)	187
Ingredients	187
Preparation	187
Hint	188
Liqueur Jelly (Figure 10.4)	188
Ingredients	188
Preparation	188
Pulp-Suspension Fluid Gel (Figure 10.5)	189
Ingredients	189
Preparation	189
Herb-Suspension Oil-Free Dressing (Figure 10.6)	190
Ingredients	190
Preparation	191
Hint	191
Tips for the Amateur Cook and Professional Chef	191
References and Further Reading	191
11. Gum Arabic	195
Introduction	195
Common Names, Economic Importance, and Distributional Range	195
Gum Arabic Production	195
Gum Arabic Properties	196
Gum Chemical Characteristics	196
Viscosity and Acid Stability	197
Applications of Gum Arabic	197
Recipes with Gum Arabic	199
Fruit Juice (Figure 11.1)	199
Ingredients	199
Preparation	200
Hint	200
Sugar-Free Candy (Figure 11.2)	200
Ingredients	200
Preparation	201
Hint	201

Brown Gravy (Figure 11.3)	202
Ingredients.....	202
Preparation	202
Hint.....	203
Tips for the Amateur Cook and Professional Chef.....	203
References and Further Reading	203
12. Konjac Mannan	207
Historical Background	207
The Plant and the Tuber	207
Manufacture	208
Structure	208
Technical Data.....	209
Food Applications	209
Recipes with Konjac Mannan	211
<i>Kon-Nyaku</i> (Konjac) (Figure 12.6)	211
Ingredients.....	211
Preparation	211
Hints.....	211
Konjac Jelly (Figure 12.9)	213
Ingredients.....	213
Preparation	213
Hint.....	213
<i>Okara</i> (Soybean Fiber) Konjac (Figure 12.10).....	214
Ingredients.....	214
Preparation	214
Hint.....	215
<i>Okara</i> Konjac Recipes	215
BBQ <i>Okara</i> Konjac (Figure 12.11).....	215
Ingredients.....	215
Preparation	216
Hint.....	216
Fried <i>Okara</i> Konjac (Figure 12.12).....	216
Ingredients.....	216
Preparation	216
Hint.....	217
Regulatory Status	217
Tips for the Amateur Cook and Professional Chef	217
References and Further Reading	218
13. Pectin	221
Introduction	221
Nomenclature	221
Structure	222
Sources and Properties.....	222
Pectin Manufacture	223
Commercial Availability, Specifications, and Regulatory Status.....	224
Solution Properties	225
Viscosity.....	226

Pectin Gel Types and Properties	226
Applications.....	228
Recipes with Pectin.....	231
Apple Jam (Figure 13.1)	231
Ingredients.....	231
Preparation	231
Hints.....	232
How to Sterilize Jams and Preserves	232
Orange Marmalade (Figure 13.4).....	233
Ingredients.....	233
Preparation	233
Hint.....	234
Milk Jam (Low Sugar) (Figure 13.5).....	234
Ingredients.....	234
Preparation	234
Hints.....	235
<i>Nappage Neutre</i> (Clear Glaze) (Figure 13.6).....	235
Ingredients.....	235
Preparation	235
Hint.....	236
Dessert Base (Figure 13.8).....	236
Ingredients.....	236
Preparation	237
Hint.....	237
Tips for the Amateur Cook and Professional Chef.....	238
References and Further Reading	238
14. Starch.....	243
Introduction	243
Varieties of Starch.....	243
Structure and Composition	245
Functional Properties of Starch Suspensions.....	246
Starch Pastes and Gels	247
Effect of Food Ingredients on Starch Functionality	248
Properties of Available Starches	249
Properties of Dry Starch	249
Pregelatinized Starches.....	250
Modified Starches	250
Commercial Applications of Starches.....	252
Recipes with Starch.....	255
<i>Blanc Manger</i> (Figure 14.1)	255
Ingredients.....	255
Preparation (Figure 14.2)	256
Hints.....	257
<i>Warabi-Mochi</i> (Sweet Potato Starch Jelly) (Figure 14.3)	257
Ingredients.....	257
Preparation (Figure 14.4)	257
Hint.....	258

Creamy Corn Soup (Figure 14.5).....	258
Ingredients.....	258
Preparation.....	259
Hints.....	259
Sardine Meatball Soup (Figure 14.6).....	259
Ingredients.....	259
Preparation (Figure 14.7).....	260
Hints.....	261
Squid Meatball Soup (Figure 14.8).....	261
Ingredients.....	261
Preparation.....	261
Hints.....	262
<i>Goo Lou Yok</i> (Sweet and Sour Pork) (Figure 14.9).....	262
Ingredients.....	262
Preparation.....	263
Hints.....	264
<i>Mapo Tofu</i> (Spicy Tofu) (Figure 14.10).....	264
Ingredients.....	264
Preparation.....	265
Hints.....	265
Deep-Fried Mackerel with Vegetables (Figure 14.11).....	266
Ingredients.....	266
Preparation (Figure 14.12).....	267
Hints.....	268
Tips for the Amateur Cook and Professional Chef.....	268
References and Further Reading.....	269
15. Xanthan Gum	271
Introduction.....	271
Processing.....	271
Chemical Structure.....	272
Xanthan Gum Solutions.....	272
Stability in Different Media, under Different Technological Treatments..	273
Solution Preparation.....	273
Xanthan Gum Interactions.....	274
Food Applications.....	275
Toxicity.....	277
Recipes with Xanthan Gum.....	277
Italian Dressing (Figure 15.1).....	277
Ingredients.....	277
Preparation.....	278
Hints.....	278
Creamy Italian Dressing (Figure 15.2).....	279
Ingredients.....	279
Preparation.....	279

<i>Tempura</i> (Figure 15.3).....	280
Ingredients.....	280
Preparation.....	281
Hints.....	281
Chocolate Soufflé (Figure 15.4).....	281
Ingredients.....	281
Preparation.....	282
Hints.....	282
Tips for the Amateur Cook and Professional Chef.....	283
References and Further Reading.....	283
16. The Use of Multiple Hydrocolloids in Recipes	287
Synergistic Combinations.....	287
Protein–Polysaccharide Interactions: Conjugates and Complexes.....	287
Applications.....	288
Locust Bean Gum (LBG) Interactions with Carrageenan and Xanthan	288
Carrageenan and Protein Synergy.....	289
Recipes with Multiple Hydrocolloids.....	290
Coffee Jelly (Figure 16.1).....	290
Ingredients.....	290
Preparation.....	290
Hint.....	290
Hot Savory Jelly (Figure 16.2).....	291
Ingredients.....	291
Preparation.....	291
Hints.....	291
<i>Dulce de Batata</i> (Sweet Potato Jam) (Figure 16.4).....	292
Ingredients.....	292
Preparation.....	292
Hint.....	293
Low-Fat Ice Cream (Figure 16.5).....	293
Ingredients.....	293
Preparation.....	294
Hint.....	294
Tips for the Amateur Cook and Professional Chef.....	295
References and Further Reading.....	295
Glossary	297
Alphabetical List of Hydrocolloid Manufacturers and Suppliers	301

Preface

Hydrocolloids are among the most commonly used ingredients in the food industry. They function as thickeners, gelling agents, texturizers, stabilizers, and emulsifiers; in addition, they have applications in the areas of edible coatings and flavor release. Manufactured foods that are reformulated for reduced fat rely primarily on hydrocolloids to provide suitable sensory quality. Furthermore, hydrocolloids are currently finding increasing applications in the health arena: they provide low-calorie dietary fiber, among many other uses.

Many books have been devoted to a description of the different water-soluble polymers (hydrocolloids) and their uses. In 1969, a monograph by M. Glicksman, *Gum Technology in the Food Industry* (Academic Press), presented a technical compilation of information in the area of hydrocolloid technology as it pertains to the food industry. The need for such a book was apparent to most food technologists and scientists, particularly those engaged in the development of convenience foods. This book was followed by three more volumes by Glicksman (1982 to 1984) entitled *Food Hydrocolloids*, volumes I, II, and III (CRC Press). The first volume was composed of two parts, the first dealing with comparative properties of hydrocolloids and the second with biosynthetic gums. The second volume dealt with natural food exudates and seaweed extracts, and the third volume described cellulose gums, plant seed gums, and plant extracts. Those books were much more comprehensive than Glicksman's first monograph and were very useful for both food technologists and academics.

In 1980, an excellent book entitled *Handbook of Water-Soluble Gums and Resins* (McGraw Hill Company) was edited by R. L. Davidson. The book comprised 23 chapters written by advisors and contributors from universities and the industry. It contained information on where water-soluble gums and resins come from, how they are used, how they work, and their individual uses to obtain specific properties and performance. It gave an encyclopedic description of the major commercial varieties of both natural and synthetic gums and resins, each listing beginning with a concise overview, followed by full details on the chemistry, properties, handling uses, and other pertinent factors.

In 1997, a monograph by one of us (A. Nussinovitch) entitled *Hydrocolloid Applications: Gum Technology in the Food and Other Industries* (Blackie Academic & Professional) was published, composed of two parts. The first dealt briefly with a description of the known hydrocolloids. The second was devoted to information which is more difficult to locate, namely uses of hydrocolloids in ceramics, cosmetics, and explosives, for glues, for immobilization and encapsulation, in inks and paper, and for the creation of spongy matrices, textiles, and different texturized products. Another monograph by A. Nussinovitch entitled *Water-Soluble Polymer Application in Foods* (Blackwell Science) from 2003 was devoted to the uses of hydrocolloids in foods and in biotechnology, and discussed topics such hydrocolloid adhesives, hydrocolloid coatings, dry macro- and liquid-core capsules, multilayered products, flavor

encapsulation, texturization, cellular solids, and hydrocolloids in the production of special textures. Yet another monograph by A. Nussinovitch from 2010, *Plant Gum Exudates of the World: Sources, Distribution, Properties, and Applications* (CRC), provided a description of the most extensive collection of plant gum exudates in print. The book included a chapter specifically devoted to food uses of plant exudates, including confectionery, salad dressings and sauces, frozen products, spray-dried products, wine, adhesives, baked products, and beverages, among many other industrial products and animal foods.

In 2009, the 2nd edition of *Handbook of Hydrocolloids*, edited by G. O. Phillips and P. A. Williams, was published. This excellent manuscript reviewed over 25 hydrocolloids, covering their structure and properties, processing, functionality, applications, and regulatory status. In addition to the traditional hydrocolloids, the book emphasized protein hydrocolloids and protein–polysaccharide complexes, expanded the coverage of microbial polysaccharides, and also discussed the role of hydrocolloids in emulsification and as dietary fibers.

These are just a few examples of the wealth of material existing in this field of science. Note that the inclusion of a book in this short list does not imply that it is any better than other published books on hydrocolloids or their widespread applications.

Although some food recipes can be located in a few of these many books, there are no scientific books fully devoted to the fascinating topic of hydrocolloids and their unique applications in the kitchen. A kitchen can be regarded as an experimental laboratory, with food preparation and cookery involving processes that are well described by the chemical or physical sciences. Finally, it is well established that an understanding of the chemistry and physics of cooking and the involvement of different ingredients (such as hydrocolloids) in these processes will lead to improved performance and increased innovation in this realm. Since the use of hydrocolloids is on the rise in many fields, the writing of a book that covers both past and future uses of hydrocolloids in the kitchen is both timely and of great interest.

General Approach and Aims

Each chapter in this book addresses a particular hydrocolloid, protein hydrocolloid, or protein–polysaccharide complex, in alphabetical order. The chapter starts with a brief description of the chemical and physical nature of the hydrocolloid, its manufacture, and its biological/toxicological properties. It is important to note that this book is not intended as a replacement for the already published books on hydrocolloid properties (some of which are mentioned above); our aim is not to compete with or repeat any of the information found in those books. In the present book, the emphasis is on practical information for the professional chef and amateur cook alike. Furthermore, such a volume may serve to inspire cooking students, and to introduce food technologists to the myriad uses of hydrocolloids, how they are used and for what specific purposes. Each chapter includes a few recipes demonstrating that particular hydrocolloid's unique abilities in cooking and those abilities are elaborated upon. Several formulations were chosen specifically for the food technologist, who will be able to manipulate them for large-scale use or as a starting point for novel industrial formulations. In summary, the volume is written such that chefs, food engineers, food science

sample content of Cooking Innovations: Using Hydrocolloids for Thickening, Gelling, and Emulsification

- [download online Are You Smart Enough to Work at Google?: Trick Questions, Zen-like Riddles, Insanely Difficult Puzzles, and Other Devious Interviewing Techniques You Need to Know to Get a Job Anywhere in the New Economy](#)
- [The Return of the Shadow: The History of The Lord of the Rings, Part 1 \(The History of Middle-Earth, Book 6\) here](#)
- [**read online Arduino and LEGO Projects pdf, azw \(kindle\), epub**](#)
- [*Skinny Legs and All book*](#)
- [download online En defensa de los ociosos \(Taurus Great Ideas\)](#)
- [read The Way to Make Wine: How to Craft Superb Table Wines at Home for free](#)

- <http://deltaphenomics.nl/?library/Are-You-Smart-Enough-to-Work-at-Google---Trick-Questions--Zen-like-Riddles--Insanely-Difficult-Puzzles--and-Ot>
- <http://www.mmastyles.com/books/The-Return-of-the-Shadow--The-History-of-The-Lord-of-the-Rings--Part-1--The-History-of-Middle-Earth--Book-6-.pdf>
- <http://toko-gumilar.com/books/Arduino-and-LEGO-Projects.pdf>
- <http://twilightblogs.com/library/Skinny-Legs-and-All.pdf>
- <http://www.gateaerospaceforum.com/?library/En-defensa-de-los-ociosos--Taurus-Great-Ideas-.pdf>
- <http://drmurphreesnewsletters.com/library/Bank-Shot--Dortmunder--Book-2-.pdf>