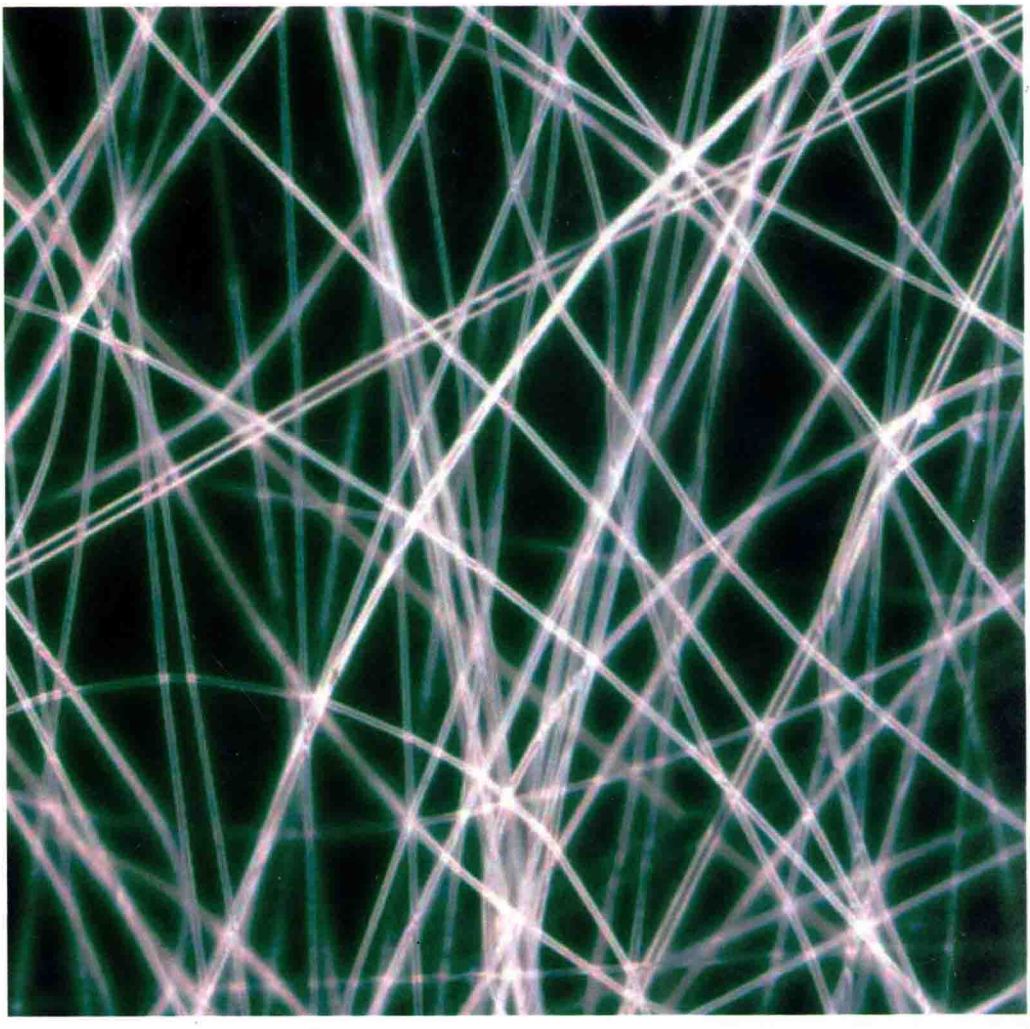
Edited by Peter A. Williams and Glyn O. Phillips

Gums and Stabilisers for the Food Industry 16



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Gums and Stabilisers for the Food Industry 16

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Gums and Stabilisers for the Food Industry 16

Preface

This volume presents the most successfully reviewed papers from the 16th International Gums and Stabilisers for the Food Industry Conference. The first book in this series appeared in 1982 and in the subsequent years the readership has grown continuously. The volumes have now established themselves as the most widely referenced publications in the food hydrocolloids sector. It was these publications which inspired the parallel Journal *"Food Hydrocolloids"* which during the 16th conference celebrated its 25th Anniversary. The review by Dennis Seisun shows that the subject is continuing to grow at a rapid rate with the applications calling for new and innovating materials and processes. The publications presented here show how imaginatively this challenge is being met.

For this conference the venue was changed from Wales (at the North East Wales Institute (now Glyndwr University), to the Netherlands. I must thank our friends in Wageningen for their hospitality. We thought that a change of venue would give us a fresh impetus. And where better could we go than to Wageningen University with its rich tradition in food and polysaccharide research. Professor Pilnic would have certainly approved and his memory was honoured at the conference with Professor Bill Williams giving the now established Pilnik Lecture. Our valued committee member Professor Fons Voragen was the catalyst in our fixing on Wageningen for our "sabbatical" and we thank him and his colleagues for their support and welcome.

The book illustrates the breadth of materials, their interaction, methods, functionality, and processing which need to be combined to give innovative and creative solutions. Polysaccharides have been the traditional foundation of this subject and their number and type continue to grow.

Included now in the volume are: xanthan, beta glucan, carrageenan, succinoglycan, chitosan, sago and wheat starch, native and high amylose starch, citrus and sugar beet pectins, CMC, gum arabic, methyl and other cellulose ethers, corn fibre gum and konjac glucomannan.

We wonder now why proteins were not immediately classed as food hydrocolloids but their involvement has now been found to enhance and support the polysaccharide contribution to the product properties.

The following proteins are shown in the book to be able to function alone or in associated complex interactions: fish and other gelatines, beta lactoglobulin, sodium caseinate, papein, cray fish protein isolate, potato protein. Further details of the major role of proteins are given in a recent publication *(Handbook of Food Proteins, Ed.*

G.O.Phillips and P.A.Williams, Woodhead Publishing, ISBN 978-1-84569-7, 2011, 432pp)

The use of the term "product design" is now increasing and justifiably so. Texture is being increasingly planned to deal with specific medical conditions, for example, dysphphagia - the inability for older people to masticate and swallow food correctly. The papers describe how the various materials can be engineered to give the desired physical, mechanical and release properties, whether emulsions, gels or films.

For such controlled modification and still retain the natural character and status the associated rheological and other methodology is necessary as the book testifies. The titles alone are fascinating:

- electrospinning of fish gelatine;
- chitosan films prepared in electrical fields;
- gelatine from black tilapia *(Oreschromis mossambicus)* skins;
- Pectin – zein hydrogels;
- Effect of palm oil incorporation on the properties of biodegradable cobia (*Rachycentron canadum*) skin gelatine;
- Interfacial behaviour of chitosan and crayfish protein isolate mixed films;
- Encapsulation by electrospinning of live bacteria

Drawing attention to these exotic subject areas should not reflect adversely on the traditional structure-function studies which give authority to the subject. The move into nutrition to ensure improved satiety, sensory and health continues in this volume also. Indeed, there is a wealth of fascinating material now available in the book for academic researchers, ingredient providers and users and industrial R&D scientists of hydrocolloids. Please enjoy.

Glyn O. Phillips

Chairman, Gums and Stabilisers for the Food Industry Organising Committee

Gums and Stabilisers for the Food Industry Conferences

The international conference on 'Gums and Stabilisers for the Food Industry' was initiated at the North East Wales Institute, Wrexham, in 1981 and has been held biennially since then. The proceedings of all of the Conferences have been published and details can be found below.

1. Prog. Fd. Nutr. Sci., "Gums and Stabilisers for the Food Industry" (Eds. G. O. Phillips, D. J. Wedlock and P. A. Williams). Pergamon Press Ltd., Oxford Vol 6 (1982).
2. "Gums and Stabilisers for the Food Industry 2" (Eds., G. O. Phillips, D. J. Wedlock and P. A. Williams), Pergamon Press Ltd., Oxford (1984).
3. "Gums and Stabilisers for the Food Industry 3" (Eds., G. O. Phillips, D. J. Wedlock and P. A. Williams), Elsevier Applied Science Publishers (1986).
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5. "Gums and Stabilisers for the Food Industry 5 (G. O. Phillips, D. J. Wedlock and P. A. Williams, Oxford University Press Ltd., Oxford, (1990).
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9. "Gums and Stabilisers for the Food Industry 9" (eds.Williams, P. A. aand Phillips, G.O.), Royal Society of Chemistry, Cambridge, UK (1998).
10. "Gums and Stabilisers for the Food Industry 10" (eds Williams, P. A. and Phillips G.O.) Royal Society of Chemistry, Cambridge, UK (2000).
11. "Gums and Stabilisers for the Food Industry 11" (eds Williams, P. A. and Phillips G.O.) Royal Society of Chemistry, Cambridge, UK (2002).
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13. "Gums and Stabilisers for the Food Industry 13" (eds Williams, P.A. and phillips, G.O.) Royal Society of Chemistry, Cambridge, UK (2006)
14. "Gums and Stabilisers for the Food Industry 14" (eds Williams, P.A. and Phillips, G.O.) Royal Society of Chemistry, Cambridge, UK (2008)
15. "Gums and Stabilisers for the Food Industry 15" (eds Williams, P.A. and Phillips, G.O.) Royal Society of Chemistry, Cambridge, UK (2009)

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Market overview

OVERVIEW OF THE FOOD HYDROCOLLOIDS MARKET

Dennis Seisun

IMR International, San Diego CA, USA
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This paper focuses on the various definitions and classifications of hydrocolloids and presents a global overview of hydrocolloids from both a numerical and perceptual point of view. Hydrocolloids for all the studying and analyzing conducted on them, remain a nebulous subject. Ask ten scientists for an exact definition and one is likely to receive ten somewhat different answers. In general, hydrocolloids 'work with water', they thicken, suspend, gel or stabilize a solution. As colloids they fall between a true solution and solid suspension. A range of novel, nutraceutical properties are being discovered and established for hydrocolloids. A key property of some is that of providing fiber, both soluble and/or insoluble.

Hydrocolloids are used in three key segments, industrial, food and oilfield applications. The relative importance of each segment in terms of hydrocolloid value and volume is given in the table below:

Hydrocolloid Market All Applications

Application	'000 TPA	$ Million	% Vol	% Val
Industrial	5,120	6,680	54	42
Food	1,890	5,010	20	32
Oilfield	2,420	4,090	26	26
Total	9,430	15,780	100	100

Source :IMR International
Note : Excluding China

The individual hydrocolloids in food can be roughly divided into three major segments, based on overall value. Starches and gelatin are the giant category with over $1 billion in sales each. The second group includes five hydrocolloids with sales between $200-700 million and the remainder are those with sales less than $200 million as indicated in the table below:

Food Hydrocolloid Market 2010

Hydrocolloid	$ Million	% Total
Starches	1,275	25
Gelatin	1,030	21
Pectin	658	13
Carrageenan	561	11
Xanthan	277	6
Alginates	272	5
Agar	219	4
CMC	169	3
Arabic	147	3
Guar	94	2
MCC	91	2
LBG	85	2
MC/HPMC	80	2
Other	51	1
Total	**5,008**	**100**

Source : IMR International
Note : Excluding China

Unfortunately, data for Chinese production and consumption of hydrocolloids is sporadic and unreliable. The above estimates therefore, do not include China. There is no doubt, however, that China represents a significant additional volume. In the case of CMC for food applications in China, reliable data has been obtained. Chinese consumption of food grade CMC is thought to be twice the volume of CMC consumption in all other parts of the world. Chinese food CMC specifications require a purity level of 95% whereas other parts of the world specify purity above 99%. IMR is gathering estimates of Chinese hydrocolloid consumption as an on-going effort. Results of these efforts will be published in future issues of *The Quarterly Review of Food Hydrocolloids* as they are obtained.

Prices of hydrocolloids vary widely, with the costliest, pure gellan gum (approx $60.00/kg), being as much as 60 times the price of native starch ($1.00/kg). Even within a hydrocolloid category, there is a wide range of different grades, eg gum arabic of the emulsifying *Acacia senegal* grade may cost double the price of non-emulsifying *Acacia seyal* grade. Despite these variations, IMR has established a rough average for each hydrocolloid category as indicated in the below table:

Hydrocolloid Prices - 2010 Average

Hydrocolloid	$/Lb	$/Kg
Starches	0.42	0.92
Gelatin	2.60	5.72
Pectin	6.50	14.30
Carrageenan	5.60	12.32
Xanthan	2.35	5.17
Agar	9.30	20.46
Arabic	1.65	3.63
CMC	2.40	5.28
LBG	3.90	8.58
Alginates	9.15	20.13
Guar	0.83	1.83
MCC	3.85	8.47
MC/HPMC	5.35	11.77

Source : IMR International Quarterly Hydrocolloid Review

The above are averages based on the four quarterly prices published in IMR's *Quarterly Review of Food Hydrocolloids* for 2010. There is much volatility in prices and readers are encouraged to obtain up to date price information, from IMR or elsewhere. Guar gum for example, has more than doubled in price since the above table was produced. Xanthan prices vary widely depending on country of origin. Most prices are directly linked to upstream raw material costs which have increased significantly for most hydrocolloids in 2010-2011.

The rapidly changing world of commerce has wrought many changes on the hydrocolloid industry. Channels of distribution have changed as have relationships between producers themselves with strategic alliances being made. Distributors are more widely used even by the large multinational hydrocolloid producers. Technical service and formulation development are also being offered by some distributors in an effort to differentiate themselves. Overall channels, however, remain the same as indicated in the below diagram established decades ago by IMR: