

Water-Soluble Polymers

6 December 2019

Abstract

The term *water-soluble polymer* encompasses a variety of synthetic, semisynthetic, and natural materials. Although they differ in molecular structure, these polymers share an important attribute: all are soluble in water, at least under some conditions. For the category as a whole, the range of applications is broad, but individual polymers generally have a smaller set of end uses.

Building products represent the single most important end use for water-soluble polymers, especially polyethylene glycols and cellulose ethers. Polyethylene glycol is a starting material for polycarboxylate ethers (PCEs), a family of concrete additives. PCEs function as dispersants and water-reducing agents (superplasticizers) in concrete, improving its compressive and flexural strength. Demand for PCEs (and their polyethylene glycol precursors) will see strong growth, especially in China and Other Asia, as PCEs replace less efficient first- and second-generation superplasticizers.

Food applications—another major end use for water-soluble polymers—are dominated by natural water-soluble polymers, including gelatin, casein/caseinates, xanthan gum, guar gum, and gum arabic. Some of these polymers provide physiological benefits as well as functional attributes. As dietary fibers, they help reduce cholesterol levels; in addition, they serve as thickeners and suspending agents in yogurt, almond milk, and other foodstuffs. Demand for natural water-soluble polymers will benefit from major trends in the food industry, including consumer preferences for natural ingredients and foods that promote health and wellness.

Water treatment is an important end use for water-soluble polymers, especially polyacrylamide and polyacrylic acid. In North America, Western Europe, and Japan, the municipal, wastewater, and industrial water treatment markets are large and well-established; therefore the outlook for consumption growth is moderate. In contrast, demand growth in China and developing nations will be more robust, stimulated by the government's growing attention to water resources.

Oil field operations, paper production, polymerization, pharmaceuticals, detergents, and personal care products are additional end uses for water-soluble polymers.

The following pie chart shows world consumption of water-soluble polymers by region:

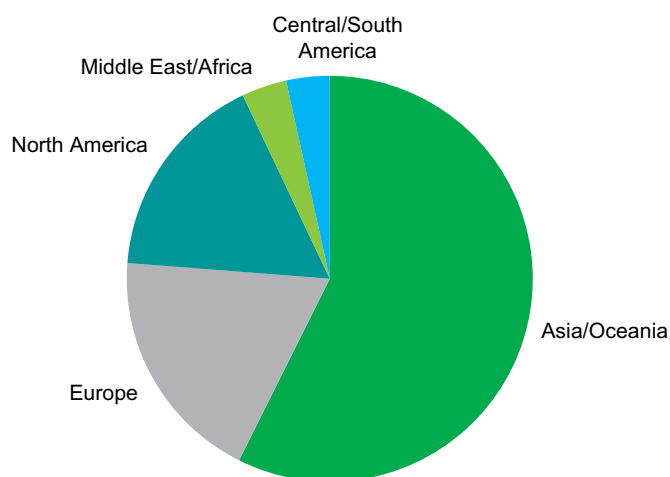
Contacts

Koon-Ling Ring • Koon-Ling.ring@ihsmarkit.com
Maria deGuzman • Maria.deguzman@ihsmarkit.com



World consumption of water-soluble polymers—2018

(excluding starches)



Source: IHS Markit

© 2019 IHS Markit

For more detailed information, see the table of contents, shown below.

IHS Markit's Specialty Chemicals Update Program – *Water-Soluble Polymers* is the comprehensive and trusted guide for anyone seeking information on this industry. This latest report details global and regional information, including



Industry structure,
operating characteristics
and regulatory
environment



Products, functions
and markets



Cost structure/
profitability



Technology changes
and emerging
substitution practices



Quantitative market
analysis and forecasts

Key benefits

IHS Markit's Specialty Chemicals Update Program – *Water-Soluble Polymers* has been compiled using primary interviews with key suppliers and organizations, and leading representatives from the industry in combination with IHS Markit's unparalleled access to upstream and downstream market intelligence and expert insights into industry dynamics, trade, and economics.

This report can help you

- Identify the competitive environment and key players
- Assess key issues facing both suppliers and their end-use customers
- Understand industry integration strategies
- Keep abreast of industry structure changes, regulatory requirements, and other factors affecting profitability
- Identify new business opportunities and threats

- Follow important commercial developments
- Recognize trends and driving forces influencing specialty chemical markets

Contents

Executive summary	16
Summary	18
Introduction	18
Functions	19
Consumption	21
Structure of the industry	29
Critical factors for success	30
Overview of the water-soluble polymer industry	31
North America	31
– Status of the industry	31
– Applications	37
– Adhesives	37
– Building products	38
– Coatings	38
– Detergents	38
– Food	38
– Mineral processing	38
– Oil field chemicals	39
– Paper	39
– Personal care products	39
– Pharmaceuticals	39
– Polymerization aids	40
– Textiles	40
– Water treatment	40
– Other	40
– Structure of the industry	40
– Mergers and acquisitions	43
– Operating characteristics	45
– Synthetic water-soluble polymers	45
– Semisynthetic water-soluble polymers	45
– Natural water-soluble polymers	45
– Government regulations	46
– Trends and opportunities	46
– Critical factors for success	48
Central and South America	49
– Status of the industry	49
– Structure of the industry	55
– Mergers and acquisitions	57
– Trends and opportunities	57
Western Europe	58

– Status of the industry	58
– Applications	64
– Building products	65
– Detergents	65
– Food	65
– Paper	66
– Water treatment	66
– Structure of the industry	66
– Synthetic water-soluble polymers	69
– Semisynthetic water-soluble polymers	70
– Natural water-soluble polymers (hydrocolloids)	70
– Operating characteristics	71
– Research and development	71
– Manufacturing and technology	71
– Government regulations	72
– Trends and opportunities	72
– Critical factors for success	73
Central and Eastern Europe	74
– Status of the industry	74
– Structure of the industry	75
– Trends and opportunities	78
Middle East and Africa	78
– Status of the industry	78
– Structure of the industry	79
– Trends and opportunities	82
Japan	82
– Status of the industry	82
– Applications	89
– Adhesives	89
– Building products	90
– Coatings	90
– Detergents	90
– Food	90
– Paper	90
– Personal care products and cosmetics	91
– Pharmaceuticals	91
– Textiles	91
– Water treatment	91
– Structure of the industry	92
– Operating characteristics	93
– Research and development	93
– Manufacturing and technology	94
– Marketing	94

– Profitability and cost structure	94
– Trends and opportunities	96
– Critical factors for success	97
China	97
– Status of the industry	97
– Applications	103
– Adhesives	103
– Building products	103
– Coatings	104
– Detergents	104
– Food	104
– Oil field chemicals	104
– Paper	104
– Personal care products	104
– Pharmaceuticals	104
– Polymerization aids	104
– Textiles	105
– Water treatment	105
– Structure of the industry	105
– Operating characteristics	107
– Trends and opportunities	107
– Critical factors for success	108
Other Asia and Oceania	108
– Status of the industry	108
– Structure of the industry	109
– Trends and opportunities	112
– Synthetic water-soluble polymers	112
– Polyacrylamides and copolymers	112
– Polyacrylic acids and copolymers	113
– Polyvinyl alcohol	113
– Polycarboxylate ethers for concrete admixtures	113
– Natural water-soluble polymers	113
– Gelatin	113
– Guar gum and psyllium seed gum	114
Synthetic water-soluble polymers	115
Polyacrylamides	115
– Products and functions	115
– Consumption and market segments	116
– World summary	116
– North America	117
– Markets	117
– Market participants	120
– Prices	122

– Critical factors for success	122
– Central and South America	122
– Markets	122
– Market participants	123
– Europe	123
– Markets	124
– Market participants	126
– Prices	129
– Future trends and strategic issues	129
– Middle East and Africa	130
– Markets	130
– Market participants	130
– Japan	130
– Markets	130
– Market participants	131
– Prices	133
– Future trends and strategic issues	133
– China	133
– Markets	133
– Market participants	135
– Prices	136
– Future trends and strategic issues	136
– Other Asia	136
– Markets	136
– Market participants	136
Polyacrylic acid and copolymers	137
– Products and functions	137
– Consumption and market segments	139
– World summary	139
– North America	140
– Markets	140
– Market participants	142
– Prices	143
– Critical factors for success	144
– Central and South America	144
– Western Europe	144
– Markets	144
– Market participants	146
– Prices	148
– Central and Eastern Europe	148
– Japan	148
– Markets	148
– Market participants	149

– Prices	150
– Future trends and strategic issues	150
– China	151
– Markets	151
– Market participants	151
– Prices	152
– Future trends and strategic issues	152
– Other Asia	153
– Markets	153
– Market participants	153
Polyethylene glycols	154
– Products and functions	154
– Chemical intermediates	155
– Pharmaceuticals and personal care products	155
– Surface-active agents/detergents	156
– Other	156
– Consumption and market segments	156
– World summary	156
– North America	157
– Markets	157
– Market participants	159
– Prices	160
– Future trends and strategic issues	160
– Central and South America	160
– Western Europe	160
– Markets	160
– Market participants	163
– Prices	164
– Future trends and strategic issues	165
– Central and Eastern Europe	165
– Markets	165
– Market participants	165
– Middle East and Africa	166
– Markets	166
– Market participants	166
– Japan	166
– Markets	166
– Market participants	167
– Prices	168
– Future trends and strategic issues	168
– China	169
– Markets	169
– Market participants	170

– Prices	171
– Future trends and strategic issues	172
– Other Asia	172
– Markets	172
– Market participants	172
Polyvinyl alcohol	174
– Products and functions	174
– Consumption and market segments	175
– World summary	175
– North America	176
– Markets	176
– Market participants	177
– Prices	178
– Critical factors for success	178
– Central and South America	178
– Western Europe	178
– Markets	178
– Market participants	180
– Prices	181
– Central and Eastern Europe	182
– Markets	182
– Market participants	182
– Middle East and Africa	183
– Japan	184
– Markets	184
– Market participants	185
– Prices	186
– Future trends and strategic issues	186
– China	186
– Markets	186
– Market participants	187
– Prices	188
– Other Asia	188
– Markets	188
– Market participants	188
Polyvinylpyrrolidone	189
– Products and functions	189
– Consumption and market segments	190
– World summary	190
– North America	191
– Markets	191
– Market participants	193
– Prices	193

– Western Europe	193
– Markets	193
– Market participants	194
– Prices	195
– Future trends and strategic issues	195
– Japan	195
– Markets	195
– Market participants	196
– Prices	196
– China	196
– Markets	196
– Market participants	197
– Prices	198
– Future trends and strategic issues	198
Polyamines and polyethyleneimines	198
– Products and functions	198
– Consumption and market segments	199
– World summary	199
– North America	201
– Markets	201
– Market participants	202
– Prices	202
– Central and South America	202
– Western Europe	203
– Markets	203
– Market participants	204
– Japan	204
– Markets	204
– Market participants	205
– Prices	205
Quaternary ammonium polymers	206
– Products and functions	206
– Consumption and market segments	206
– World summary	206
– North America	207
– Markets	207
– Market participants	208
– Prices	208
– Central and South America	208
– Western Europe	209
– Markets	209
– Market participants	209
– Japan	210

– Markets	210
– Market participants	210
– China	211
Other synthetic water-soluble polymers	211
– Products and functions	211
– Associative thickeners	211
– Carboxypolymethylene (carbomer)	211
– Polyvinyl methyl ether–maleic anhydride (PVM-MA)	212
– Consumption and market segments	212
– World summary	212
– North America	213
– Markets	213
– Market participants	214
– Western Europe	215
– Markets	215
– Market participants	215
– Japan	216
– Carboxypolymethylene (carboxyvinyl polymer)	216
– Polyvinyl methyl ether–maleic anhydride	216
– Associative thickeners	217
– China	217
Semisynthetic water-soluble polymers	219
Products and functions	219
– Carboxymethylcellulose	219
– Hydroxyethylcellulose and derivatives	220
– Methylcellulose and derivatives	221
– Other cellulose ethers	221
– Ethylcellulose	221
– Hydroxypropylcellulose	221
Industry characteristics	222
Consumption and market segments	222
– World summary	222
– Carboxymethylcellulose	224
– North America	224
– Food	225
– Oil field	225
– Personal care products/pharmaceuticals	226
– Paper	227
– Detergents	227
– Textiles	227
– Other	228
– Central and South America	228
– Western Europe	229

– Technical CMC	229
– Purified CMC	232
– Central and Eastern Europe	234
– Middle East and Africa	234
– Japan	235
– Pharmaceuticals and cosmetics	236
– Building materials	236
– Fishery feed binders	236
– Paper	236
– Textiles	236
– Food	236
– Other	237
– China	237
– Other Asia and Oceania	238
– Methylcellulose and derivatives and other cellulose ethers	239
– North America	239
– Methylcellulose and derivatives	239
– Hydroxyethylcellulose and derivatives	240
– Other cellulose ethers	242
– Central and South America	243
– Western Europe	244
– Methylcellulose and derivatives	244
– Hydroxyethylcellulose and ethyl hydroxyethylcellulose	246
– Central and Eastern Europe	247
– Middle East and Africa	248
– Japan	248
– Construction products	249
– Pharmaceuticals and personal care products	249
– Other	249
– China	250
– Other Asia and Oceania	250
Market participants	251
– North America	251
– Central and South America	252
– Western Europe	253
– Central and Eastern Europe	257
– Middle East and Africa	259
– Japan	261
– China	262
– Other Asia and Oceania	265
Prices	267
– United States	267
– Western Europe	267

– Japan	269
– China	269
– Other Asia	269
Future trends and strategic issues	270
– North America	270
– Western Europe	271
– Japan	272
– China	272
– Other Asia and Oceania	272
Natural water-soluble polymers	273
Products and functions	273
– Microbial fermentation products	273
– Xanthan gum	273
– Other fermentation products	273
– Curdlan	273
– Diutan gum	273
– Gellan gum	274
– Pullulan	274
– Scleroglucan (sclerotium gum)	274
– Plant-derived hydrocolloids	274
– Fruit extracts (pectin)	274
– Grain and root extracts (including starches)	274
– Native and modified starches	275
– Konjac	275
– Seaweed extracts	276
– Agar	276
– Alginates	276
– Carrageenan	277
– Furcellaran	277
– Seed extracts	277
– Guar gum and derivatives	277
– Locust bean gum	278
– Other seed extracts	278
– Tree and shrub exudates	279
– Gum arabic	279
– Gum ghatti	279
– Gum karaya	279
– Gum tragacanth	280
– Animal-derived hydrocolloids	280
– Casein and caseinates	280
– Gelatin	280
Consumption and market segments	281
– World summary	281

– North America	283
– Markets	283
– Starches	284
– Agar	284
– Alginates	285
– Carrageenan	285
– Casein and caseinates	286
– Gelatin	286
– Guar gum and derivatives	286
– Gum arabic	288
– Locust bean gum	288
– Pectin	288
– Xanthan gum	289
– Other	290
– Market participants	290
– Native and modified starches	290
– Gelatin	292
– Other hydrocolloids	293
– Prices	297
– Trends, issues and opportunities	298
– Critical factors for success	299
– Central and South America	300
– Markets	300
– Market participants	301
– Native and modified starches	301
– Gelatin	303
– Other hydrocolloids	304
– Prices	305
– Western Europe	306
– Overview	307
– Animal feed	309
– Cosmetics industry	309
– Food industry	309
– Paper manufacturing	310
– Other industrial uses	310
– Consumption and markets	310
– Starches	312
– Specialty hydrocolloids	314
– Market participants	320
– Starches	320
– Specialty hydrocolloids	323
– Prices	327
– Future trends and strategic issues	328

– Critical factors for success	329
– Central and Eastern Europe	330
– Consumption and markets	330
– Market participants	330
– Prices	332
– Middle East and Africa	333
– Consumption and markets	333
– Market participants	334
– Prices	334
– Japan	335
– Markets	335
– Starch	336
– Agar	336
– Alginates	336
– Carrageenan	337
– Casein and caseinates	337
– Gelatin	337
– Guar gum	338
– Gum arabic	338
– Locust bean gum	338
– Pectin	338
– Xanthan gum	338
– Other polymers	339
– Market participants	339
– Starch and its derivatives	339
– Other	340
– Prices	342
– Future trends and strategic issues	343
– Critical factors for success	344
– China	344
– Markets	344
– Native and modified starch	344
– Agar, alginates, and carrageenan	345
– Casein	345
– Gelatin	345
– Guar gum and derivatives	345
– Pectin	346
– Xanthan gum	346
– Other	346
– Market participants	346
– Starch	346
– Gelatin	348
– Xanthan gum	348

– Other	349
– Prices	352
– Trade	352
– Future trends and strategic issues	353
– India	353
– Markets	353
– Market participants	355
– Prices	359
– Future trends and strategic issues	362
– Other Asia and Oceania	363
– Markets	363
– Market participants	364
– Prices	373
– Future trends and strategic issues	377
Additional resources	378
Revisions	380

IHS Markit Customer Care

CustomerCare@ihsmarkit.com

Americas: +1 800 IHS CARE (+1 800 447 2273)

Europe, Middle East, and Africa: +44 (0) 1344 328 300

Asia and the Pacific Rim: +604 291 3600

Disclaimer

The information contained in this report is confidential. Any unauthorized use, disclosure, reproduction, or dissemination, in full or in part, in any media or by any means, without the prior written permission of IHS Markit or any of its affiliates ("IHS Markit") is strictly prohibited. IHS Markit owns all IHS Markit logos and trade names contained in this report that are subject to license. Opinions, statements, estimates, and projections in this report (including other media) are solely those of the individual author(s) at the time of writing and do not necessarily reflect the opinions of IHS Markit. Neither IHS Markit nor the author(s) has any obligation to update this report in the event that any content, opinion, statement, estimate, or projection (collectively, "information") changes or subsequently becomes inaccurate. IHS Markit makes no warranty, expressed or implied, as to the accuracy, completeness, or timeliness of any information in this report, and shall not in any way be liable to any recipient for any inaccuracies or omissions. Without limiting the foregoing, IHS Markit shall have no liability whatsoever to any recipient, whether in contract, in tort (including negligence), under warranty, under statute or otherwise, in respect of any loss or damage suffered by any recipient as a result of or in connection with any information provided, or any course of action determined, by it or any third party, whether or not based on any information provided. The inclusion of a link to an external website by IHS Markit should not be understood to be an endorsement of that website or the site's owners (or their products/services). IHS Markit is not responsible for either the content or output of external websites. Copyright © 2019, IHS Markit®. All rights reserved and all intellectual property rights are retained by IHS Markit.

