



ADVANCES IN FOOD RESEARCH

Volume 12

C. O. Chichester

Copyrighted material

ADVANCES IN FOOD RESEARCH

VOLUME 12

Edited by

C. O. CHICHESTER

*University of California
Davis, California*

E. M. MRAK

*University of California
Davis, California*

G. F. STEWART

*University of California
Davis, California*

Editorial Board

E. C. BATE-SMITH

W. H. COOK

M. A. JOSLYN

S. LEPKOVSKY

EDWARD SELTZER

P. F. SHARP

W. M. URBAIN

J. F. VICKERY



1963

ACADEMIC PRESS, New York and London

COPYRIGHT © 1963, BY ACADEMIC PRESS INC.

ALL RIGHTS RESERVED.

NO PART OF THIS BOOK MAY BE REPRODUCED IN ANY FORM,
BY PHOTOSTAT, MICROFILM, OR ANY OTHER MEANS, WITHOUT
WRITTEN PERMISSION FROM THE PUBLISHERS.

ACADEMIC PRESS INC.

111 Fifth Avenue, New York, New York 10003

United Kingdom Edition published by
ACADEMIC PRESS INC. (LONDON) LTD.
Berkeley Square House, London W.1

LIBRARY OF CONGRESS CATALOG CARD NUMBER: 48-7808

PRINTED IN THE UNITED STATES OF AMERICA

UTILIZATION OF SYNTHETIC GUMS IN THE FOOD INDUSTRY

BY MARTIN GLICKSMAN

Technical Center, General Foods Corporation, Tarrytown, N. Y.

I. Introduction	284
A. Economic Background	284
B. Cellulose Derivatives	287
C. Completely Synthetic Gums	289
II. Microcrystalline Cellulose (Avicel)	290
A. Background	290
B. Food Applications	291
III. Sodium Carboxymethylcellulose (CMC)	294
A. Background	294
B. Properties	295
C. Dairy Applications	297
D. Bakery Applications	302
E. Salad Dressings, Sauces, and Gravies	305
F. Confectionery	307
G. Dietetic Foods	308
H. Processed Foods	310
I. Dry Package Mixes	311
J. Food Preservation Applications	312
K. Miscellaneous	313
IV. Methylcellulose and Hydroxypropylmethylcellulose	314
A. Background	314
B. Properties	316
C. Bakery Products	317
D. Dietetic Foods	320
E. Dehydrated Foods	322
F. Frozen Foods	324
G. Edible Protective Coatings	327
H. Miscellaneous	327
V. Other Cellulose Derivatives	328
A. Hydroxyethylcellulose (HEC)	328
B. Ethylcellulose (EC)	330
C. Ethylhydroxyethylcellulose (EHEC)	331
D. Carboxymethylhydroxyethylcellulose (CMHEC)	331
E. Klucel—Mixed Cellulose Ether	332
VI. Polyvinylpyrrolidone (PVP)	333
A. Background	333
B. Properties	334
C. Food Applications	336

VII. Carbopol	340
A. Background	340
B. Properties	342
C. Applications	344
VIII. Gantrez An	346
A. Background	346
B. Properties	347
C. Applications	348
IX. Polyox	349
A. Background	349
B. Preparation	350
C. Properties	351
D. Applications	353
X. Research Needs	357
References	359

I. INTRODUCTION

A. ECONOMIC BACKGROUND

Gums or hydrophilic colloids have been used in foods and in the food industry for hundreds of years to impart various functional properties to food products and thereby enhance over-all palatability and acceptability. The term "gum" has often been used incorrectly and ambiguously and has been applied to various rubbers, resins, etc., in the paint, rubber, and oil industries. In the food industry, the term "gum" is more specifically defined as any material that can be dissolved or dispersed in a water medium to give viscous or mucilaginous solutions or dispersions.

In the past, most gums were natural materials derived from seaweed extracts, tree and bush exudates, plant seed flours, and similar sources, and were almost all polysaccharides or mixtures of polysaccharides. Today a new and growing category of gums, which is still in its infancy, is that of the synthetic gums. Although synthetic gums are currently only a small fraction of the total gum market, comprising about 100,000,000 pounds of the total 3,000,000,000 pounds of water-soluble gums sold domestically (Anonymous, 1961a), they are steadily pressing at the position of the natural gums and enlarging their foothold in the field as newer and better gums become available.

Proponents of synthetic gums point to the giant advances of organic chemistry and feel that, as silk was replaced by nylon, rubber by neoprene, waxes by plastics, so the natural gum polymers are targets for the synthetic organic chemist. Although exact duplications may not be possible, or even desirable, sufficient of the functional properties can be reproduced synthetically to create marketing opportunities for these new materials.

As starting materials, the synthetic chemist has available two of

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.