

Chemically Modified Starch And Utilization In Food Stuffs

This volume is the continuation of a successful bookseries devoted to an increasingly vital subject: the utilization of carbohydrates as chemical raw materials. Sixteen contributions present an overview of current research thereby covering several new topics which were not dealt with in the preceeding volumes: - production and use of inulin - lactose: its manufacture and physico-chemical properties - lactic acid production and utilization - bulking agents: polydextrose - alkyl polyglucoside, a carbohydrate-based surfactant As more than sixty percent of the authors come from industry, this volume is the most practice-oriented of the series. Thus, this book will be a valuable tool for young as well as for experienced researchers working in the challenging field of upgrading renewable resources.

First published in 1982: This publication should be an invaluable tool to food technologists, dieticians, and nutritionalists, as well as to livestock producers and persons engaged in production, processing, and formulation of animal feeds.

The book summarizes the latest research on starch structures and how these structures occur during food processing and storage. Discussing the origins, multi-scale granule structures and functional properties of starch as well as starch digestion, it

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focuses on the relationship between starch structure and functionality, the phase transition mechanism, the molecular disassembly and self-assembly of starch during food processing and storage and their effects on starch digestion. As such, the book provides a comprehensive overview of starch structure and functionality for researchers and postgraduate students in the field of food chemistry, carbohydrate polymers, polymer chemistry, food ingredients and food processing as well as human nutrition and health..

Starch is a group of poly saccharides, composed of glucopyranose units joined together by glucosidric linkages. Starch is also metabolized for energy in plants and animals, and is used to produce a large number of industrial products. Starch is processed to produce many of the sugars in processed foods. The biggest industrial non food use of starch is as adhesive in the paper making process. Other important fields of starch application are textiles, cosmetic and pharmaceutical uses. Starch can be obtained from maize, sorghum, roots and tubers such as tapioca, arrow root, potatoes etc.

Starch truly serves as a multifunctional ingredient in the food industry. Starch is one of the most present biomaterials has witnessed significant developments over the years. By products are obtained in the manufacture of different types of starch such as maize gluten has a number of interesting possible uses in industry, zein (by product of corn processing) is used in the preparation of stable glass like plastics, modification of zien is used as adhesives and in the preparation of coating compositions for paper, the most

important by product from wheat starch manufacture is gluten which is used in preparing diabetic foods, for feeding cattle, thickening agent in textile printing and so on. The Global starch market is likely to get respite from deceleration in its market growth, with growth poised to receive a new lease of life in the next few years. This book basically illustrates about the properties, structures, manufacturing process explained with flowcharts and diagrams, applications of starch and its derivatives etc. The major contents of the book are structure and chemical properties of starch, chemical composition, molecular structure, starch granule properties, water sorption and granule swelling as a function of relative humidity, factors affecting starch paste properties, the oxidation of starch etc. This is a unique book, concise, up to date resource offering a valuable presentation of the subject. This book contains processes of starch and its derivatives. This book is an invaluable resource for new entrepreneurs, industrialists, consultants, libraries.

Hydrocolloids are among the most widely used ingredients in the food industry. They function as thickening and gelling agents, texturizers, stabilisers and emulsifiers and in addition have application in areas such as edible coatings and flavour release. Products reformulated for fat reduction are particularly dependent on hydrocolloids for satisfactory sensory quality. They now also find increasing applications in the health area as dietary fibre of low calorific value. The first edition of Handbook of Hydrocolloids provided professionals in the food industry with relevant practical information about the

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range of hydrocolloid ingredients readily and at the same time authoritatively. It was exceptionally well received and has subsequently been used as the substantive reference on these food ingredients. Extensively revised and expanded and containing eight new chapters, this major new edition strengthens that reputation. Edited by two leading international authorities in the field, the second edition reviews over twenty-five hydrocolloids, covering structure and properties, processing, functionality, applications and regulatory status. Since there is now greater emphasis on the protein hydrocolloids, new chapters on vegetable proteins and egg protein have been added. Coverage of microbial polysaccharides has also been increased and the developing role of the exudate gums recognised, with a new chapter on Gum Ghatti. Protein-polysaccharide complexes are finding increased application in food products and a new chapter on this topic as been added. Two additional chapters reviewing the role of hydrocolloids in emulsification and their role as dietary fibre and subsequent health benefits are also included. The second edition of Handbook of hydrocolloids is an essential reference for post-graduate students, research scientists and food manufacturers. Extensively revised and expanded second edition edited by two leading international authorities Provides an introduction to food hydrocolliods considering regulatory aspects and thickening characteristics Comprehensively examines the manufacture, structure, function and applications of over twenty five hydrocolloids "This book meets the need for a comprehensive, up-to-date review of wheat chemistry,

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processing and uses. It provides the reader with extensive new information on wheat components that will be useful in better commercial utilization of wheat and the formulation of new and upgraded wheat-based food products. The book serves as a one-volume information resource for all those involved in the research, development, formulation, and evaluation of wheat-based food products. From the Authors' Preface Wheat continues to be one of the world's most important grains, especially as a food, where the unique properties of its products can be utilized to advantage. It provides an excellent example of a natural product from which a wide range of useful by-products can be made. This book discusses the components of the wheat kernel, which provide interesting examples of study of carbohydrate and protein chemistry, as well as lipids, minerals and vitamins. This book should serve as a useful reference for the cereal chemist, as well as chemists and food technologists in those industries in which by-products of flour are used, e.g., the confectionery industry in which modified starches and starch syrups are used. In addition, nutritionists, dieticians, and many kinds of researchers will find chapters of interest. Particular attention is given to particle-size determinations, an important area in food processing, and to the role of wheat proteins in gluten intolerance and wheat allergy. . . . Both the milling of wheat and flour quality are discussed in order to give the reader an idea of the distribution of the major components and the importance of proper size reduction. The book also has a chapter on wet milling of wheat flour . . . and chapters on the properties and uses of wheat

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starch, starch syrups, and chemically modified wheat starch.

Pulp and Paper Industry: Chemicals features in-depth and thorough coverage of Chemical additives in the Pulp and Paper Industry. It discusses use of Enzymes "Green Chemicals" that can improve operations in pulp and paper, describes Chemicals demanded by the end user and many key and niche players such as Akzo Nobel NV, Eka Chemicals AB, Ashland, Inc., BASF, Buckman Laboratories International, Inc., Clariant, Cytec Industries, Inc., Enzymatic Deinking Technologies, LLC, ERCO Worldwide, FMC Corporation, Georgia-Pacific Corporation, Georgia-Pacific Chemicals LLC, Imerys SA, Momentive Specialty Chemicals, Inc., Novozymes, Kemira Chemicals, Nalco Holding Company, Omya AG, Solvay AG, and Solvay Chemicals, Inc.. Paper and pulp processing and additive chemicals are an integral part of the total papermaking process from pulp slurry, through sheet formation, to effluent disposal. Environmental concerns, increased use of recycled waste paper as a replacement for virgin pulp, changes in bleaching and pulping processes, increased efficiency requirements for the papermaking process, limits on effluent discharge as well as international competitiveness have greatly impacted the paper and pulp chemical additive market. This book features in-depth and thorough coverage of Chemical additives in Pulp and Paper Industry. Detailed and up-to-date coverage of

Chemicals in Pulp and Paper Industry Authoritative, thorough, and comprehensive content on a wide variety of Enzymes "Green Chemicals" Comprehensive list of Paper and Pulp Related Chemicals Comprehensive list of all Pulp and paper Suppliers Comprehensive Indexing

Recently, supercritical fluids have emerged as more sustainable alternatives for the organic solvents often used in polymer processes. This is the first book emphasizing the potential of supercritical carbon dioxide for polymer processes from an engineering point of view. It develops a state-of-the-art overview on polymer fundamentals, polymerization reactions and polymer processing in supercritical carbon dioxide. The book covers topics in a multidisciplinary approach starting from polymer chemistry and thermodynamics, going through monitoring, polymerization processes and ending with polymer shaping and post-processing. The authors are internationally recognized experts from different fields in polymer reaction engineering in supercritical fluids. The book was initiated by the Working Party on Polymer Reaction Engineering of the European Federation of Chemical Engineering and further renowned international experts.

Starch is the main source of energy to humans, but starch today has other roles in food, packing and pharmaceutical industries like filler, emulsion stabilizer, coating, etc. The native form of starch has application limitations on broad range

of temperature, pH and stability, among others, required on several industrial applications. The alternative way is modified starch to improve its properties and uses on several industrial fields. The book explores the use of physical and, chemical modifications and even the unusual modification using ionizing radiation on several sources of starch, the effect of them on the properties and application fields of modified starch.

This dissertation, "Raman and FT-IR Spectroscopic Investigation of Chemically Modified Starches" by Yuen-fan, Poon, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: Abstract of thesis entitled RAMAN AND FT-IR SPECTROSCOPIC INVESTIGATION OF CHEMICALLY MODIFIED STARCHES submitted by Poon Yuen Fan for the degree of Doctor of Philosophy at The University of Hong Kong in August 2005 Raman and infrared (IR) spectroscopy were evaluated for use in rapid determination of the level of modification of a variety of chemically-modified starch samples. The two spectroscopic methods were compared in terms of

accuracy, choice and preference of which method to use, the detection limit and the ease of performing the test. -1 The 1736 cm band found in both Raman and IR spectra can be used as a marker -1 band for acetylated starch samples. Similarly, a 761 cm marker band for CHPTAC -1 cationic modified starches and a 1667 cm marker band for octenylsuccinylated starches were found in the Raman spectra. These bands increase in intensity as the amount of chemical modification increases. The level of octenylsuccinylation could be easily measured using Raman spectroscopy but not IR. This can be explained by the symmetric vibration within an octenylsuccinylated starch molecule, resulting in a cancellation of the change in dipole moment. Attention should be paid to the symmetry of the functional group before applying Raman or IR spectroscopy for the determination of the level of modification. FT-Raman, FT-IR spectroscopy and Raman microscopy were used to investigate the substitution ratio within two subpopulations of starch granules: large and small (referred to in the literature as A- or B type in small-grain cereals with well-known bimodal size distribution). From FT-Raman and FT-IR spectroscopy, the area ratio differed between the subpopulations, indicating varying reactivity and heterogeneous modification. The Raman microscopy results indicated that small potato granules were slightly more reactive than large granules after acetylation. Similar reactivity was found

for subpopulations of wheat and barley granules towards octenylsuccinylation as well as for wheat and waxy wheat granules towards cationization. The degree of heterogeneous modification was examined by plotting the substitution ratio against the surface area of granules. For octenylsuccinylation, results of the percentage of deviation indicated that the reagent first reacted on the peripheral region of granules, then diffused into the granule matrix and reacted in the bulk. Scanning electron microscopy (SEM) was used to correlate the granular structure to the reactivity of starch granules and the effect of specific chemical modification on granular size and shape. Raman and IR spectroscopy can be used to optimize the routine measurement of the level of modification. Which technique should be used depends on the type of modification. In addition, the study of the relative reactivity of subpopulations can help to minimize the cost for reagent and handling of effluent water produced during the modification process, as exact amounts of reagent can be added. There is also potential to mix or substitute subpopulations of particular size class with similar reactivity to enlarge the range of functionalities of modified starch. DOI: 10.5353/th_b3617610 Subjects: Starch - Analysis Raman spectroscopy Infrared spectroscopy

This book provides comprehensive and up-to-date knowledge relating to the morphological, structural, and functional characteristics of tuber starches,

particularly in relation to their applications in food and industry. In recent years there has been significant progress and extensive research conducted on tropical root starches and especially on some of the lesser known tuber crop starches. There has also been a shift towards using biomaterials in place of synthetic materials in various applications. As researchers investigate the availability of natural products with similar properties, starch has been identified as a reliable alternative to these synthetic materials. The book is a valuable resource for researchers and students, plant breeders, and commercial producers working with, or considering working with, tropical tuber starches.

Biopolymers from Renewable Resources is a compilation of information on the diverse and useful polymers derived from agricultural, animal, and microbial sources. The volume provides insight into the diversity of polymers obtained directly from, or derived from, renewable resources. The beneficial aspects of utilizing polymers from renewable resources, when considering synthesis, processing, disposal, biodegradability, and overall material life-cycle issues, suggests that this will continue to be an important and growing area of interest. The individual chapters provide information on synthesis, processing and properties for a variety of polyamides, polysaccharides, polyesters and polyphenols. The reader will have a single volume that provides a resource from

which to gain initial insights into this diverse field and from which key references and contacts can be drawn. Aspects of biology, biotechnology, polymer synthesis, polymer processing and engineering, mechanical properties and biophysics are addressed to varying degrees for the specific biopolymers. The volume can be used as a reference book or as a teaching text. At the more practical level, the range of important materials derived from renewable resources is both extensive and impressive. Gels, additives, fibers, coatings and films are generated from a variety of the biopolymers reviewed in this volume. These polymers are used in commodity materials in our everyday lives, as well as in specialty products.

This book is a comprehensive examination of various types of modified starches and their industrial applications, with an emphasis on their chemical and physical properties. Numerous photographs, illustrations, graphs, chemical formulas and equations further detail this informative text, which is intended for researchers and practitioners in the wet and dry milling industries, as well as the paper, food, textile, adhesive, and other industries utilizing starches.

Glycostructures play a highly diverse and crucial role in a myriad of organisms and systems in biology, physiology, medicine, and bioengineering and technology. Only in recent years have the tools been developed to partly

understand the highly complex functions and chemistry behind them. In this set the editors present up-to-date information on glycostructures, their chemistry and chemical biology, in the form of a comprehensive survey. The text is accompanied by over 2000 figures, chemical structures and reaction schemes and more than 9000 references. The accompanying CD-ROM enables, besides text searches, searches for structures, schemes, and other information.

This book covers the fundamentals in a most logical and clear manner for science and engineering students to follow as well as researchers from different disciplines. The main objective is to summarize in a fairly comprehensive manner most of the recent technical accomplishments in the area of surface modification of biopolymers for different applications. The book will be organized so that it provides most relevant and realistic information on surface modification of biopolymers for different applications ranging from automotive materials, toxic ion removal, biomedical material development, to defense applications, and more. Included in this book will be more than 20 chapters. This book is of interest to materials and biomaterials scientists and engineers, polymer chemists, biochemists, and biotechnologists. It introduces an overview of the developments made in the area of surface modification of biopolymers. Critical issues and suggestions for future research avenues are discussed, underscoring the roles of

materials scientists and researchers for the future of these new “green” materials.

The third edition of this long-serving successful reference work is a 'must-have' reference for anyone needing or desiring an understanding of the structure, chemistry, properties, production and uses of starches and their derivatives. * Includes specific information on corn, wheat, potato, rice, and new chapters on rye, oat and barley (including waxy barley) starches * Covers the isolation processes, properties, functionalities, and uses of the most commonly used starches. * Explores the genetics, biochemistry, and physical structure of starches * Presents current and emerging application trends for starch

Starch in Food: Structure, Function and Applications, Second Edition, reviews starch structure, functionality and the growing range of starch ingredients used to improve the nutritional and sensory quality of food. The new edition is fully updated and brings new chapters on starch and health, isolation, processing and functional properties of starch. Part One illustrates how plant starch can be analyzed and modified, with chapters on plant starch synthesis, starch bioengineering and starch-acting enzymes. Part Two examines the sources of starch, from wheat and potato, to rice, corn and tropical supplies. Part Three looks at starch as an ingredient and how it is used in the food industry, with

chapters on modified starches and the stability of frozen foods, starch-lipid interactions and starch-based microencapsulation. Part Four covers starch as a functional food, investigating the impact of starch on physical and mental performance, detecting nutritional starch fractions and analyzing starch digestion. The book is a standard reference for those working in the food industry, especially to starch scientists, food researchers, post-docs, practitioners in the starch area and students. Completely revised and updated with an overview of the latest developments in isolation, processing, functional properties and health attributes of starch Reviews starch structure and functionality Extensive coverage of the growing range of starch ingredients Examines how starch ingredients are used to improve the nutritional and sensory quality of food

Developments in potato chemistry, including identification and use of the functional components of potatoes, genetic improvements and modifications that increase their suitability for food and non-food applications, the use of starch chemistry in non-food industry and methods of sensory and objective measurement have led to new and important uses for this crop. Advances in Potato Chemistry and Technology presents the most current information available in one convenient resource. The expert coverage includes details on findings related to potato composition, new methods of quality determination of

potato tubers, genetic and agronomic improvements, use of specific potato cultivars and their starches, flours for specific food and non-food applications, and quality measurement methods for potato products. * Covers potato chemistry in detail, providing key understanding of the role of chemical compositions on emerging uses for specific food and non-food applications * Presents coverage of developing areas, related to potato production and processing including genetic modification of potatoes, laboratory and industry scale sophistication, and modern quality measurement techniques to help producers identify appropriate varieties based on anticipated use * Explores novel application uses of potatoes and potato by-products to help producers identify potential areas for development of potato variety and structure

Pearl millet is mainly used for animal and poultry feed. It is the principal source of energy, protein, vitamins, minerals and contains many phenolic compounds, which are a good source of natural antioxidants. Pearl millet is a rich source of bioactive compounds and contains phytates and polyphenols. Owing to high nutritional and phytochemical properties, it has gained considerable attention as a botanical dietary supplement in many functional foods. Pearl Millet: Properties, Functionality and Its Applications provides comprehensive knowledge on nutritional and non-nutritional aspects of pearl millet. It covers recent research on

pearl millet and provides information to improve the property and shelf life of flour, as well as the starch, and their uses in various food products. Features: Reviews structure, functional and antioxidant properties in pearl millet flour Deals with the latest developments in modification of native starch Provides information in enhancing shelf life and its utilization in phytochemical-rich product development Covers updated information for grain science professionals and food technologists

One of the most significant challenges facing mankind in the twenty-first century is the development of a sustainable global economy. Within the scientific community, this calls for the development of processes and technologies that will allow the sustainable production of materials from renewable natural resources. Plant material, in particular lignin, is one such resource. During the annual production of about 100 million metric tons of chemical wood pulps worldwide, approximately 45 and 2 million metric tons/year of kraft lignin and lignosulfonates, respectively, are also generated. Although lignosulfonates have found many applications outside the pulp and paper industry, the majority of kraft lignin is being used internally as a low-grade fuel for the kraft pulping operation. A surplus of kraft lignin will become available as kraft mills increase their pulp production without expanding the capacity of their recovery boilers that utilize lignin as a

fuel. There is a tremendous opportunity and an enormous economic incentive to find better uses of kraft lignin, lignosulfonates and other industriallignins. The pulp and paper industry not only produces an enormous amount of lignins as by products of chemical wood pulps, but it also utilizes about 10 million metric tons of lignin per year as a component of mechanical wood pulps and papers.

Mechanical wood pulps, produced in a yield of 90-98% with the retention of lignin, are mainly used to make low-quality, non-permanent papers such as newsprint and telephone directories because of the light-induced photooxidation of lignin and the yellowing of the papers.

Starches for Food Application: Chemical, Technological and Health Properties examines the scientific, technological and nutritional knowledge of different types of starches, including their production and application in food, health and the environment. The book covers the links between biosynthesis, structure and the environmental impact on processing and nutrition. In addition, it covers starch identification and evaluation methods, along with production methodologies for food application, new sources of starch, modified starches for food application, and the relationship between starch, nutrition and health. Covers all aspects of starch in relation to foods, i.e., from the production and modification of starch, to the function and application of starch in food Offers a practical reference guide

that compiles information on new sources of starch in food, starch application, modification and new starches for health benefits Brings scientific, technological and nutritional knowledge of starch for food applications to bridge the gap between health and environment

This work focuses on the experience of a Brazilian cassava starch agro-industry in developing its technological capabilities since 1917, when it was first established. Its main purpose is to explore how the process of technological progress which occurred along with that industrialization, especially regarding the starch industry, has been determined by the following variables: I) the pattern of capital accumulation, II) the capability of the related technical base to both the promotion or absorption of technological changes, and III) firms' strategies towards innovation.

Carbohydrates in Food, Third Edition provides thorough and authoritative coverage of the chemical analysis, structure, functional properties, analytical methods, and nutritional relevance of monosaccharides, disaccharides, and polysaccharides used in food. Carbohydrates have become a hot topic in the debate about what to eat. This new edition includes increased treatment of resistant starch, dietary fiber, and starch digestion, especially in relation to different diets, suggesting that carbohydrate consumption should be reduced.

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New to the Third Edition: Explains how models for starch molecules have been improved recently leading to clearer understanding Discusses the growing interest in new sources of carbohydrates, such as chitosan and fructans, because of their function as prebiotics Features the latest developments on research into dietary fiber and starch digestion Carbohydrates in Food, Third Edition combines the latest data on the analytical, physicochemical, and nutritional properties of carbohydrates, offering a comprehensive and accessible single source of information. It evaluates the advantages and disadvantages of using various analytical methods, presents discussion of relevant physicochemical topics that relate to the use of carbohydrates in food that allow familiarity with important functional aspects of carbohydrates; and includes information on relevant nutritional topics in relation to the use of carbohydrates in food.

History and future expectation of starch use; Economics and future of the starch industry; Genetics and physiology of starch development; Enzymes in the hydrolysis and synthesis of starch; Starch oligosaccharides: linear, branched, and cyclic; Molecular structure of starch; Organization of starch granules; Fractionation of starch; Gelatinization of starch and mechanical properties of starch pastes; Starch derivatives: production and uses; Chemicals from starch;

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Corn and sorghum starches: production; Tapioca, arrowroot, and sago starches: production; Potato starch: production and uses; Wheat starch: production, modification, and uses; Rice starch: production, properties, and uses; Acid-modified starch: production and uses; Starch in the paper industry; Applications of starches in foods; Starch and dextrins in prepared adhesives; Glucose - and fructose-containing sweeteners from starch; Industrial microcospy of starches; Photomicrographs of starches.

Starch is both a major component of plant foods and an important ingredient for the food industry. Starch in food reviews starch structure and functionality and the growing range of starch ingredients used to improve the nutritional and sensory quality of food. Part one illustrates how plant starch can be analysed and modified, with chapters on plant starch synthesis, starch bioengineering and starch-acting enzymes. Part two examines the sources of starch, from wheat and potato to rice, corn and tropical supplies. The third part of the book looks at starch as an ingredient and how it is used in the food industry. There are chapters on modified starches and the stability of frozen foods, starch-lipid interactions and starch-based microencapsulation. Part four covers starch as a functional food, investigating the impact of starch on physical and mental performance, detecting nutritional starch fractions and analysing starch digestion. Starch in food is a standard reference book for those working in the food industry. Reviews starch structure and functionality Extensive coverage of the growing range of

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starch ingredients Examines how starch ingredients are used to improve the nutritional and sensory quality of food

Completely revised and expanded to reflect the latest advancements in the field, Polysaccharides: Structural Diversity and Functional Versatility, Second Edition outlines fundamental concepts in the structure, function, chemistry, and stability of polysaccharides and reveals new analytical techniques and applications currently impacting the cosmetic, medicinal, chemical, and biochemical industries. The authoritative book discusses polysaccharides utilized in medical applications such as polysaccharide-based hydrogels, polysialic acids, proteoglycans, glycolipids, and anticoagulant polysaccharides; renewable resources for the production of various industrial chemicals and engineering plastics polysaccharides; and more.

This bulletin tells the story of utilization research in the Department of Agriculture--of its problems and some of its achievements, and its prospects for the future.

This book is about the chemical properties of starch. The book is a rich compendium driven by the desire to address the unmet needs of biomedical scientists to respond adequately to the controversy on the chemical properties and attendant reactivity of starch. It is a collective endeavor by a group of editors and authors with a wealth of experience and expertise on starch to aggregate the influence of qualitative and quantitative morphological, chemical, and genetic properties of starch on its functionalities, use, applications, and health benefits. The chemical properties of starch

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are conferred by the presence, amount and/or quality of amylose and amylopectin molecules, granule structure, and the nature and amounts of the lipid and protein molecules. The implication of this is comprehensively dealt with in this book.

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