

Book Reviews

Bodo Carlowitz: Tabellarische Übersicht über die Prüfung von Kunststoffen (6. vollständig neu formulierte und erweiterte Auflage), Tabular Survey of Testing Methods for Plastics (sixth completely rephrased and enlarged edition), 100 pages, tables graphs and references.

Giesel Verlag für Publizität, Isernhagen (1992) Soft cover DM 68, -ISBN 3-9802942-0-X

During the past decade, i.e. since the fifth edition of this survey testing methods of plastics too have been considerably automated and rationalized especially by introduction of computers. This above all is the case with testing of mechanical properties.

The most essential progress consisted in the standardization of testing methods. On the basis of those comparable test results it was possible to introduce the so-called CAM-PUS catalogue of basic identifying characteristics as the basis of information obtainable from the "data-banks".

The book contains the basic methods of testing the following properties: Tensile, flexural, compressive strength, modulus of elasticity, creep test, isochronous stress/strain curves, dynamic-elastic behaviour, fatigue strength, surface hardness, impact strength, failure energy, thermodynamic properties, dimensional stability under heat, flammability, optical properties, colour, electrical properties, chemical resistance, aging by UV-radiation, weathering and heat, resistance to abrasion and wear, rheological properties of thermoplastics and thermosettings, granulometry, density, flowability, shrinkage, permeability, migration, testing of foams, films and pipes, molecular weight, characteristics of structure and transition points, easy identification of plastics. Conversion tables facilitate the use of American literature.

Addresses of national standardization committees, testing institutes, associations and institutes for further training are added.

H. Dominghaus (Dreieich)

G.W. Becker, D. Braun and L. Bottenbruch (eds.): "Kunststoff-Handbuch Bd. 3/3 Hochleistungs-Kunststoffe" (High performance plastics), 450 pages, 241 figures, 161 tables, 943 references, Carl Hanser Verlag Munich, Vienna, New York (1994). Hardcover: DM 348,-/ÖS 2.715,-/Sfr 346,- ISBN 3-446-16370-0.

Following the proven encyclopedic style of the *Kunststoff-Handbuch* (Plastics Handbook) the authors deal with chemistry, testing, properties, conversion and application of the described engineering plastics. Whilst in the volumes 3/1 and 3/2 of the *Kunststoff Handbuch* the so-called advanced polymers such as polyester, polycarbonate, polyacetals, celluloseesters and their blends were dealt with, the volume 3/3 presents the engineering plastics such as: polyarylate, polyarylsulfide, polysulfone, liquid polyester, polyimide, polyamidimide and polyetherketone.

These polymers are the result of selective work in research and development i.e. "molecular engineering" of the chemists.

In other words of the technical instructions by application engineers, end-users and research chemists. During the past decade these materials have obtained growing technical and thus commercial interest. They opened new fields of application mainly where high heat resistance and/or high mechanical strength were the imperative prerequisite.

This volume is an up-to date authoritative handbook and reference work covering all aspects connected with these new materials on the whole of what kind and of what fields it every may be. No other book gives a more comprehensive survey of the current state-of-the-art. Chemists, engineers, application technicians, converters, end-users, lecturers and graduate students will welcome this unique book.

H. Dominghaus (Dreieich)

James F. Carley (ed.): "Wittington's Dictionary of Plastics" Third Edition 568 pages, Technomic Publishing Comp. Inc. Lancaster, Basel (1993) Hardcover: Sfr. 162,- ISBN 1-56676-090-9

Since 1978 when the second edition of this dictionary appeared many of the terms of this discipline have changed in meaning or taken on additional or new meanings, a few have become obsolete, and many new terms have entered the plastics literature.

Toxicity, safety, flammability, environmental aspects, recycling concerns, new groups of materials and new processing methods have grown in importance. More basic knowledge in polymer science had to be considered in this edition too. On the other hand there was much to do to emphasize the introduction of the International System of Units in the USA, which is still now a days in half-hearted progress there.

Wherever possible the editor J.F. Carley has tried to use simple language understandable to students and workers without technical education and readers for whom English is the second language. Thus this dictionary will be used not only by experienced plastics people but by newcomers too.

H. Dominghaus (Dreieich)

Robert M. Evans: "Polyurethane Sealants, Technology and Applications" 186 pages, 54 figures, 120 tables, 218 references. Technomic Publishing Co. Inc. Lancaster, Basel (1993) Softcover Sfr. 93.-ISBN 0-87762-998-6

Polyurethanes as well as Silicones and polysulfides belong to the so-called high performance sealants. The advantages of PUR-sealants are: Excellent recovery, UV-resistance, fast curing of multicomponent and latent hardeners, negligible shrinkage, high tear and chemical resistance, $\pm 40\%$ movement capability, excellent adhesion to unprimed concrete and availability in colours. The disadvantages are discolouring of light colours, relative slow cure for one component sealant and the priming for some substrates.

The book deals in detail with PUR construction sealants, generic types, airport and highway sealants and test methods

followed by a chapter on prepolymers, solvents and plasticizers, the curing of sealants, latent hardeners, the rheological properties, waterproofing membranes and especially with automotive sealants, silicone coupling agents and insulated glass. Each of the nine chapters is complemented by numerous references.

This book is an exquisite and comprehensive help to chemists and engineers in research, development and application as well as to practitioners, lecturers and students.

H. Domininghaus (Dreieich)

Proceedings of the Polyurethanes World Congress 1993 October 10–13, 1993, Vancouver, B. C. Canada. 632 pages, 589 figures, 443 tables, 581 references. Technomic Publishing Comp. Inc., Lancaster, Basel (1993) Softcover: Sfr. 295,- ISBN 1-56676-079-8

The Polyurethane Divisions of the Society of Plastics Industry Inc./USA and the Society of Plastics Industry of Canada as well as the European Isocyanate Producers Association jointly sponsored this congress. The theme of that congress was: "Vancouver Spectacular by Nature, Polyurethane spectacular by Design". It reflects clearly the comprehensive technical and marketing program of this meeting.

In all nine topic specific sessions presented 80 technical papers-written by more than 250 authors- significant technical advances in polyurethane product formulations, processing equipment and end-use applications were dealt with. The appliance industry was interested to hear the latest news on the possibility of eliminating the CFCs, followed by lecturers on polyurethanes in furnishings, construction, transportation, testing, chemical advances and processing.

The comprehensive papers presented and discussed during the congress reflect the creativity of the polyurethane industry. This real "tour d'horizon" presented the state-of-the-art. This book is an indispensable help to everybody engaged in this dynamic and fast growing industry.

H. Domininghaus (Dreieich)

W. R. Salaneck, I. Lundström and B. Ranby (eds.): "Conjugated Polymers and Related Materials" The Interconnection of Chemical and Electronic Structure. 502 pages, 203 figures, 8 tables, 971 references, Oxford University Press, Oxford, New York, Tokyo (1993), Hardcover 70, ISBN 0-19-855729-9

The chemistry of processable conjugated polymers is leading to new developments and even prototype devices in the areas of electronics (LEDs and transistors), integrated circuit technology (electronic resist materials for high spatial resolution and high-technology materials (aircraft construction materials and high strength fibers). In addition to these recent applications-oriented developments, the fundamental properties such as high electrical conductivity, and non-linear effects may be of even more significance in future molecular based electronic applications.

It was the mandate of the Nobel Symposium held on 13 to 18 June 1991 in Luleå/Sweden to establish and record the state-of-the-art of the chemistry of "conducting polymers" and to place the status in the context of (at least some) related materials' sciences.

After introductory remarks on conjugated polymers the lecturers dealt with the chemical synthesis and structure of

polyacetylene, polyanilines, polypyrrole and chiral poly(2,5 bis (3,7-dimethyl-6 octenoxy)-1,4 phenylenevinylene) followed by papers on electronic structure excitations (interconnection between chemical geometry and electronic structure in conjugated polymers; solitons and polarons in ring-containing polymers; conjugation lengths and non-linear optical properties of organic polymers; metallic polyacetylene). The following chapter describes some applications in charge transport processes, optoelectronics, spectroscopies, molecular superconductors and molecular based magnets.

This volume contributes to the intensification of scientific research. Chemists, physicochemists, engineers, lecturers and graduated students will find this work very stimulating.

H. Domininghaus (Dreieich)

Y. Ohashi (ed.): "Reactivity in Molecular Crystals" 348 pages, 216 figures, 78 tables, 587 references, VCH Verlagsgesellschaft mbH, Weinheim (1993) Hardcover: 198,-Dm, ISBN 3-527-29098-2

Chemical reactions in molecular crystals have been studied extensively over the past two decades. It was found that the reactions in molecular crystals are highly selective, they proceed much more rapidly in crystals than in solutions. The chiral environment of a reaction site in a crystal can be used to produce an absolute asymmetric synthesis with quantitative enantiomeric yield and the absence of any external chiral agent. In spite of these fascinating factors the solid state reaction has not played an important role in organic synthesis. This is probably because several problems have remained unsolved: The crystal structures have to be predicted and controlled, the dynamic process of reaction in crystal must be clarified and it is not easy to prepare complex crystals containing two or more different molecules.

This volume includes part of the results obtained in some projects in the field, i.e. it describes how to predict the crystal structure on the basis of molecular mechanics and molecular dynamics. The second chapter shows how to analyse the dynamic process of the solid state reactions with physicochemical techniques such as X-ray diffraction electron microscope, followed by the observation of the dynamic process mainly with X-ray crystal structure analysis. The fourth chapter discusses how to prepare organic compounds in solid-to-solid reactions. The following chapters focus on the stereoselective photoreactions in organic crystals and the recognition in organic crystals.

The knowledge of the state-of-the-art of this pioneering forwardlooking techniques will be a great help to chemists, physicochemists and engineers engaged in research and development.

H. Domininghaus (Dreieich)

Marck W. Urban: "Vibrational Spectroscopy of Molecules and Macro-molecules on Surfaces", 384 pages, 117 figures, 92 tables, 993 references. John Wiley & Sons, Inc. (1993) New York, Chichester, Brisbane, Toronto, Singapore. Hardcover £ 49,50 ISBN 0-471-52815-3

Surfaces of materials are always complex mixtures of molecules, macromolecules and their structural arrangements. Vibrational spectroscopy meets these requirement criteria. It is one of the most versatile spectroscopic methods

of surface analysis being as nondestructive as one desires. UV-or mass spectroscopy do not fit into this context.

After an introductory chapter on the fundamentals of vibrational spectroscopy the vibrational features of molecules adsorbed on surfaces the infrared and the Raman spectroscopy are dealt with. A chapter on vibrations of small molecules on surfaces (hydrogen, carbonmonoxide, carbon dioxide, nitrogen, water and hydroxyl groups, ammonia, hydrocarbons such as alkenes, alkynes, saturated and aromatic hydrocarbons follow. Other chapters describe the adsorption on metal surfaces, the vibrational features of inorganic macromolecules, the bonding on polymeric surfaces, surfaces interfaces and interfacial regions follow as well as a chapter on colloidal interfaces and thin films on surfaces. The appendix presents point groups and bound predictions.

Graduate students, postdoctoral fellows, research chemists and physico-chemists will appreciate the help offered to improve their scientific knowledge of this very important subject in the years to come.

H. Domininghaus (Dreieich)

Kevlar Aramid Fiber, by H. H. Yang, 200 pages, 100 figures, 54 tables and 132 references. John Wiley & Sons Chichester, New York, Brisbane, Toronto, Singapore (1992) Hardcover £ 39,95. ISBN 0-471-93765-7

After publication of his book "Aromatic High Strength Fiber" the author came to the conclusion that advances in polycondensation techniques, condensation polymers and liquid polymers the new book would provide the most useful information to material science. As an employee of DuPont the author has been engaged in the development of Kevlar aramid fiber since the early days.

Chapter 1 presents a brief history of the discovery of anisotropic polymers and the fiber spinning process which led to the development of Kevlar. The basic concept of forming high strength, high modulus fiber from anisotropic solution and manufacturing processes are introduced.

Chapter 2 deals with the physical and chemical properties of Kevlar fiber products, followed by a presentation on fine structure and failure mechanism of Kevlar fiber in chapter 3.

Chapter 4 covers the processing of woven and nonwoven fabrics of Kevlar fiber. Enduses are described in chapter 5 and finally chapter 6 presents a comparison of Kevlar and other high performance fibers. Chemist in research, development and production as well as engineers interested in the manifold possibilities of application of aramid fibers will appreciate this comprehensive unique book. It offers complete information to lecturers and students.

H. Domininghaus (Dreieich)

Korrosionsschutz durch Beschichtungen und Überzüge auf Metallen (Neue und bewährte Verfahren für Konstruktion und Fertigung) Corrosion protection by coating and surface treatment of metals (new and well-tried methods of design and manufacture): W.D. Kaiser and E. Moeller (eds). 2930 pages, more than 1000 graphs, figures (partly colour photos)

and tables. Three volumes (loose leaf binder) WEKA Fachverlag, Morellstr. 33, D-86159 Augsburg (1994), DIN A5, Hardcover DM 248,- ISBN 3-8111-7450-9

Keeping in mind that by 30% of all corrosion damages could be avoided all chemists, engineers and practitioners engaged in design, construction, operation and maintenance of production plants, public utilities and transportation will be thankful that shortly after the first publication of this book (1990) now the revised and completed second edition has been published. Completed by such actual topics as environment protection, design regarding corrosion, quality assurance and industrial safety taking into account corrosion protection.

The first part deals with definition and implication of corrosion and corrosion protection, fundamentals, kinds of corrosion and general methods of protection. The second part describes the different steps of protection by organic coatings (preparation of metal surfaces including the special methods for different metals, the formulae of organic coating formation and drying of films and applications, followed by non-metallic and metallic coatings. The third volume presents the test methods, help to select the appropriate protection method, corrosion protection in practice, industrial safety, environmental care as well as typical corrosion damages: their reasons and prevention.

Chemists, engineers, designers, application technicians, endusers, lecturers and graduate students of technology will welcome this unique and comprehensive book as an inexhaustible guide.

H. Domininghaus (Dreieich)

Industrielle Organische Chemie, Bedeutende Vor- und Zwischenprodukte (Industrial Organic Chemistry, Significant Basic and Intermediate Materials): K. Weissermel and H.-J. Arpe, 496 pages, 47 tables, 232 references. VCH Verlagsgesellschaft mbH. Weinheim, New York, Basel, Cambridge, Tokyo (1994) Hardcover DM 128,- ISBN 3-527-28634-9

Scientists in chemistry and physics as well as chemists and engineers in research and practice will be thankful that shortly after the publication of the fourth English edition last year now the fourth edition in German appeared. After so many new informations, recent figures and data it was a must.

Here some of the chapters: Aspects of the energy and raw-material supply, basic products of industrial synthesis, olefines, acetylene, 1,3 diolefines, synthesis of carbonmonoxide, oxidation products of ethylene, alcohols, vinyl-halogen and vinyl-oxygen compounds, components for polyamides, conversion-products of benzene, oxidation products of xylene and naphthalene. The appendix contains flow sheets of production, product schemes, definitions of characteristic properties, abbreviations of company names, general and special references.

This book gives a distinctive and clear survey of this complex field of chemical activity. It is a great help to chemists and engineers in research and production as well as to students of chemical technology.

H. Domininghaus (Dreieich)

Clusters and Colloids, G. Schmid (ed.): 555 pages, 232 figures, 41 tables, 1414 references. VCH Verlagsgesellschaft mbH, Weinheim, New York, Basel, Cambridge, Tokyo (1994) Hardcover DM 248,-; £ 99,- ISBN 3-527-29043-5

Ten leading authors give a comprehensive overview of the rapidly growing field of cluster and colloid science. Development highlights and actual situation are elucidated. The broadness of this field is documented by chapters with mainly theoretical background others where physics of small particle size dominate or in which synthesis of clusters and colloids are described. Syntheses, physical and chemical properties, first applications and structures of these nano sized particles are treated (electronic structure of metal clusters and cluster compounds, clusters in ligand shells, clusters in cages, discrete and condensed transition metal clusters in solids, the chemistry of transition metal colloids and perspectives).

Questions like these are answered: How many metal atoms must a particle have to exhibit metallic properties; How can large specific surfaces of clusters and colloids be employed in catalysts; How can metal clusters be introduced into solid hosts and which effects are responsible for transition from isolated to condensed clusters? The book is intended for scientists working in research and practice who wish to gain insight into special areas of the world of small metal particles; it is addressed to advanced students in physics, chemistry or materials sciences as well.

H. Domininghaus (Dreieich)

Linear and Nonlinear Optical Properties of Molecules. George H. Wagnière: 195 pages, 26 figures, 1 table, 93 references. VCH Verlagsgesellschaft mbH Weinheim copublished with Helvetica Chemica Acta Publishers Basel (1993) Hardcover DM 88,- £ 35,50 ISBN 3-527-29045-1

The text of this book originated from research and teaching on natural optical activity, magnetic optical activity and molecular nonlinear optics, combined with quantum chemical calculations. It is not meant as a detailed review but rather as a systematic enumeration of linear and nonlinear optical effects. Some of them are well-known for a long time, others have only recently been detected or just predicted. The emphasis lies more on the interrelation between the different effects than on the details of their theory and observation: General aspects of elastic scattering of radiation by matter; linear and nonlinear elastic scattering; scattering and refraction in static fields; molecular orientation in static fields; optical effects giving rise to induced static fields; absorption and emission; inelastic scattering and the Raman Effect.

The main part of the text is followed by 18 appendices containing more quantitative information. They are accessible to readers with elementary knowledge of quantum mechanics and electrodynamics.

The book focusses on molecular properties. This unique approach and the consequent use of graphs for relating facts facilitate working with this book. They make it an invaluable source of information also for the advanced reader.

H. Domininghaus (Dreieich)