

***Subject Guide***  
***Resources***  
***Polymer Chemistry***

INFO 674:

Information Resources

In

Science & Technology

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## I. Introduction:

Chemistry is derived from the Arabic *al* (the) and Greek *χυμεία* (*chumeia*) this translates into the old practice of alchemy. This literally translated into something approaching “cast or pour together.” While alchemy involved numerous beliefs encompassing astrology, astronomy, physics, metallurgy, medicine, mysticism, and art; today alchemy’s fame stems from the practice of “transmutation” or attempting to turn a metal (usually lead) into gold or silver. This ancient pre-science is found in modern culture – “Harry Potter and the Sorcerers’ Stone” directly references this through its alleged Panacea properties (ability to cure disease and prolong life indefinitely). Many “seers” believe in astrology, or predicting personal fortune or misfortune through reading the stars and biorhythms. Nostradamus’s prophesies are based on the mysticism of alchemy; today many people believe this famous man foretold many world-altering events from the rise of Hitler, the Kennedy assassination, the terror attacks of 2001, and even World War III.

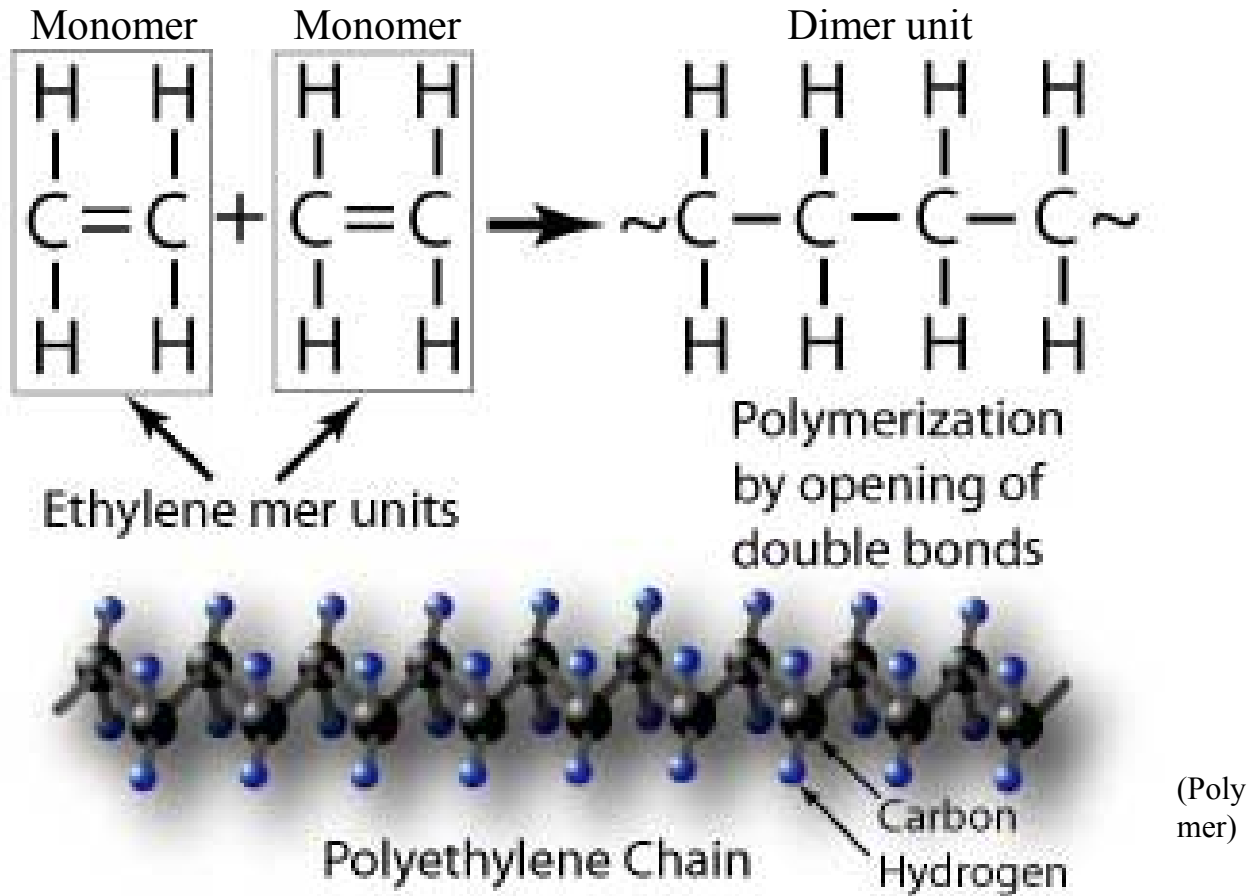
The modern field of *chemistry* is the study of matter and how the building blocks of nature, atoms, interact with each other to create the materials we know as matter, bonding abilities of atoms and molecules, and the properties of matter (which arise from this bonding). With such a tremendous scope, chemistry is divided into many sub-disciplines.

One such discipline within this broad science is *Organic Chemistry*. This branch of chemistry focuses solely upon chemicals comprised of organic compounds, or the study of structures, properties, synthesis, reactions, and compositions of molecules containing the element Carbon. Such a categorization clearly introduces a large array of fields and compounds from biological processes to the combustion and structure of different fuels. Within this broad field, sub-fields exist, such as biochemistry, heterocyclic chemistry (contain a ring with at least one heteroatom).

A polymer is a generic term referring to a long molecule. These long molecules are composed of “chains” with “groups” breaking from the central chain (see illustration below). While polymers can be organic or inorganic most common polymers are organic and hence contain a Carbon chain; those that are inorganic are usually based on a Silicon chain. This guide will primarily focus on organic polymers.

Organic polymers can be found in an incredibly large number of modern materials. Proteins, bullet-proof vests, plastics, rubbers, clothing from raincoats to pantyhose all contain polymers; some paints even contain polymers.

This diagram, from the Non Destructive Testing Resource Center shows the relationship of some basic terminology used in polymer chemistry.



Polymer

## II. Commonly encountered terminology:

- 1) Organic Compound: A chemical compound or molecule containing carbon chains or rings.
- 2) Monomer: from the Greek “mono” (one) & “meros” (part) is a small molecule capable of forming repeating bonds to form polymers.
- 3) Polymer: from the Greek “poly” (many) & “meros” (part) a long molecule formed from the combination of many identical smaller molecules (monomers).
- 4) Polymerization: The bonding of two or more monomers to form a polymer.
- 5) Active Site: A region in an enzyme molecule that allows reactant ligand molecules to bond within it, “like a hand in a glove.” This lowers activation energy for the reaction.
- 6) Chain: A linear combination of the same atom.
  - a. Straight Chain: Arrangement of atoms such that each atom is linked to the one preceding and following it (with the exception of the first and final atom).
- 7) Ring: A combination of the same atom such that each atom is bonded to the preceding and following atom. The “first” and “final” are bonded together, forming a continuous ring.

## III. Library of Congress Classifications:

<u><a href="#">Polymers.</a></u>	
Classification	Subject Heading
<u><a href="#">QC173.4.P65</a></u>	Polymers (physical properties)
<u><a href="#">QD281.P6</a></u>	Polymerization, Telomerization
<u><a href="#">QD380-388</a></u>	Polymers (macromolecules) (chemical & physical properties)
<u><a href="#">QD471</a></u>	Chemical compounds – Structure and formulas
	----including isomers, mesomerism, tautomerism
<u><a href="#">TP156.P6</a></u>	Polymerization

<u><a href="#">Polymers and polymerization.</a></u>	
<u><a href="#">QD281.P6</a></u>	Organic chemistry of polymers
TA455.P58	Testing of polymers
<u><a href="#">TP156.P6</a></u>	Chemical technology of polymers
TP1080	Polymer technology

#### IV. Dewey Decimal Classifications:

Dewey Call	Topic
540	Chemistry & allied sciences
541	Physical & theoretical chemistry
	.2 Theoretical chemistry
	.3 Physical chemistry
546	Inorganic chemistry
547	Organic chemistry
	.1 Physical & theoretical organic chemistry
	.3 Analytical organic chemistry
	.7 Macromolecular and related compounds
	.8 Other organic substances
660	Chemical Engineering
668	Technology of other organic products
	.4 Plastics
	.9 Polymers
678	Elastomers & elastomer products

#### V. Encyclopedias & Handbooks:

Akovali, G. (2005). *Polymers in Construction*. Shawbury: Rapra Technology.

This new handbook is designed to provide a wealth of information on the use of plastics in construction. The chapters are all written by acknowledged experts in their fields. This book is designed to give insight both to newcomers to the industry and to personnel already working in the construction sector. (Publisher).

Alger, M.S. (1997). *Polymer Science Dictionary*. New York: Chapman & Hall.

Provides brief descriptions for terms relating to polymer science, but excludes terms dealing with polymer engineering. Entries for specific compounds often include a structure, melting or boiling point, and a brief discussion of properties and uses. For the more important polymers, data for the main mechanical properties are provided. Some biopolymers, such as selected proteins and polysaccharides, have been included. (University of Waterloo).

Beamson, G., & Briggs, D. (1992). *High Resolution XPS of Organic Polymers: the Scienta ESCA300 database*. New York: Wiley.

The database contains information from 111 pure polymers run under high energy resolution conditions but with very high signal:noise (widescan, core levels, valence band and some Auger series) together with full traceability of materials, operating conditions, sample preparation etc. All core levels have been consistently curve fitted with full details of the component binding energies/peak parameters and functional group origin provided. The sensitivity of all the polymers to radiation damage under standard conditions is also documented. (Publisher).

Beamson, G., & Briggs, D. (1992). *High Resolution XPS of Organic Polymers*. New York: Wiley.

A collection of high resolution x-ray spectra of over 100 organic polymers, recorded with a Scienta ESCA300 spectrometer. Gives survey and core regions, shake-up spectra, valence band and some Auger spectra, as well as details of sample preparation, instrument performance and operating conditions. Indexed by compound. (University of Minnesota).

Beddoes, V. (1998). *Polymer Lexicon: Acronyms and Abbreviations used in the Rubber and Plastics Industries*. Shawbury: Rapra Technology.

The 5000+ references have been compiled from the journals, books, trade magazines, reports, data sheets and directories covering rubber and plastics, which are used to create abstracts for the Rapra Abstracts Database.

The lexicon is arranged alphabetically and each entry consists of the abbreviation/acronym followed by its expanded form. The lexicon encompasses organizations, company designations, place names, units of measurement, techniques and physical and chemical terminology. The coverage is international with a special section devoted to Russian abbreviations. An additional 42 references are also given for European and American abbreviations.

This book will be invaluable to anyone with an interest in rubber and plastics who regularly reads the published literature in this field. It will also be particularly helpful to anyone who searches the Rapra Abstracts Database. (Publisher).

Beilstein, F.K. (1984). *Beilstein Handbook of Organic Chemistry, 4<sup>th</sup> ed.* Berlin: Springer.

The Beilstein Handbook is the most comprehensive source of evaluated data and references in organic chemistry, running hundreds of volumes in print. (University of California – Santa Barbara).

Brady, R.F. (2003). *Comprehensive Desk Reference of Polymer Characterization and Analysis*. Washington: American Chemical Society (2003).

This book is a practical manual for those who analyze polymers. Self-contained chapters describe when a technique should be selected, explain its basic principles, describe how instruments are constructed and operated, and teach how the data obtained relate to molecular structure and physical properties. Many clear illustrations are included. Implicit memory refers to a change in task performance due to an earlier experience that is not consciously remembered. (Publisher).

"This book will be a valuable resource of information not only for general polymer scientists, but also for experienced characterization researchers who need a quick reference on major characterization techniques. Graduate students who are enrolled in upper-level graduate classes in polymer chemistry, physics, and materials science will benefit greatly from having access to this book."--*Polymer News*, V.V. Tsukruk

Brandolini, A.J. (2000). *NMR Spectra of Polymers and Polymer Additives*. New York: Marcel-Dekker.

This practical reference compiles nearly 400 fully assigned NMR spectra of some 300 polymers and polymer additives representing all major classes of materials—polyolefins, styrenics, acrylates, methacrylates, vinyl polymers, elastomers, polyethers, polyesters, polyamides, silicones, cellulose, polyurethanes, plasticizers, and antioxidants. Highlighting commercially significant polymers with data that are predominately <sup>13</sup>C spectra, as well as <sup>1</sup>H, <sup>19</sup>F, <sup>29</sup>Si, and <sup>31</sup>P spectra, where appropriate, and organized by chemical structure, each entry in *NMR Spectra of Polymers and Polymer Additives* provides: common and trade names, material applications, and syntheses, commentary on spectra features, sample preparation, chemical-shift summary tables, standard analyses, a list of typical experimental conditions, literature references. (Publisher).

Brandup, J., Immergut, E.H. (1999). *Polymer Handbook*. New York: Wiley.

This reference brings together all the data needed in theoretical and experimental polymer research and offers fundamental, validated property data of polymeric material, including nomenclature rules, data and constants, solid state and solution properties, abbreviations and acronyms.

Brown, R. (1999). *Handbook of Polymer Testing Physical Methods*. (ebook) New York: Marcel-Dekker.

This comprehensive handbook provides virtually all currently used techniques for measuring and testing the physical properties of polymers. It covers all the main polymer classes, including rubber, plastics, foams, textiles, coated fabrics, and composites; compares approaches to testing in different branches of the polymer industry; presents the fundamental principles regulating each property; addresses resistance to degradation, nondestructive testing, tests for processability, standardization of adhesion testing; and more. Highly recommended. (CHOICE).

From the Preface: "It is essential for design, specification, and quality control to have data covering the physical properties of materials. The different characteristics and behavior of materials dictate that particular test procedures be developed, and often standardized, for each material type. Polymers, especially, have unique properties that require their own measurement techniques..."

Target Audience: Plastics, polymer, chemical, and design engineers; polymer and materials scientists; polymer physicists and technologists; and upper-level students in these disciplines.

Cheremisinoff, N.P. (2001). *Condensed Encyclopedia of Polymer Engineering Terms*. Boston: Butterworth-Heinemann.

This reference book provides a comprehensive overview of the nature, manufacture, structure, properties, processing, and applications of commercially available polymers. The main feature of the book is the range of topics from both theory and practice, which means that physical properties and applications of the materials concerned are described in terms of the theory, chemistry and manufacturing constraints which apply to them. (Publisher).

Target Audience: Materials scientists, engineers, and designers--students (reference) and professionals Manufacturing and process engineers/designers and industrial chemists

Cheremisinoff, N.P. (1989). *Handbook of Polymer Science and Technology*. New York: M. Dekker.

A 4-volume set covering polymer synthesis and properties (vol 1), performance properties of plastics and elastomers (vol 2), applications and processing operations (vol 3), composites and specialty applications (vol 4).

Elliott, E. (1990). *Polymers and People: An Informal History*. Philadelphia, PA: Beckman Center for the History of Chemistry.

*Polymers and People* will introduce you to those who first discovered the long-chain structure of polymer molecules, the building blocks that give polymers their special properties and utility. You will learn of the first syntheses of those special products of human ingenuity, plastics, and of the simple,

artful devices through which scientists only later understood their formation. The discussion next focuses on a turning point in the development of polymer science: the challenge of creating synthetic rubber during World War II. But *Polymers and People* is not just a history lesson. It illustrates how today's plastics are fashioned and how polymers will shape our future. (Chemical Heritage Foundation).

- Hamid, S.H. (2000). *Handbook of Polymer Degradation*. New York: Marcel-Dekker.  
This eminently practical reference covers recent advances in polymer degradation and stabilization. Focusing on the basics of photo- and biodegradability, as well as environmental issues engendered by increased use of polymers in many industries, this book exhaustively examines the lifecycle of polymers from the most current theoretical and practical perspectives. Containing over 2,500 references, tables, structures, equations, and drawings, the Handbook of Polymer Degradation, Second Edition provides a wealth of up-to-date information for environmental, health, and materials scientists; polymer, plastics, and chemical engineers; and upper-level undergraduate and graduate students in these disciplines. (Society of Plastics Engineers).
- Hummel, D.O. (1966). *Infrared Spectra of Polymers in the Medium and Long Wavelength Regions*. New York: Interscience Publishers.
- Kroschwitz, J.I. (1999). *Kirk-Othmer Concise Encyclopedia of Chemical Technology*. New York: Wiley.
- Kroschwitz, J., & Mark, H. (2004). *Encyclopedia of Polymer Science and Technology*. New York: Wiley-Interscience.
- Mark, J.E. (1996). *Physical Properties of Polymers Handbook*. Woodbury, NY: AIP Press, Woodbury, N.Y., 1996.
- Mark, J.E. (1999). *Polymer Data Handbook*. New York: Oxford University Press.
- Riande, E., & Diaz-Calleja, R. (2004). *Electrical Properties of Polymers*. New York: Marcel Dekker.
- Salamone, J.C. (1996). *Polymeric Materials Encyclopedia*. Boca Raton: CRC Press.
- Salamone, J.C. (1999). *Concise Polymeric Materials Encyclopedia*. Boca Raton: CRC Press.
- Silverstein, R.M. (2005). *Spectrometric Identification of Organic Compounds, 7<sup>th</sup> edition*. Hoboken, NJ: John Wiley & Sons.
- Turi, E.A. (1981). *Thermal Characterization of Polymeric Materials*. New York: Academic Press.
- Washburn E.W. (1930). *International Critical Tables of Numerical Data, Physics, Chemistry and Technology*. New York: McGraw-Hill book company (for the National Research Council).

Washburn, E.W. (1986). *International Critical Tables of Numerical Data, Physics, Chemistry and Technology*. Ann Arbor: University Microfilm International (UMI).

Whelan, T. (1994). *Polymer Technology Dictionary*. New York: Chapman & Hall.

Wohlfarth, C. (2004). *CRC Handbook of Thermodynamic Data of Aqueous Polymer Solutions*. Boca Raton: CRC Press.

\*Also available online through ENGnetBASE\*

Wohlfarth, C. (2005). *CRC Handbook of Thermodynamics Data of Polymer Solutions at Elevated Pressures*. Boca Raton: CRC Press.

\*Also available online through ENGnetBASE\*

## VI. Abstracts, Indexes:

CA Abstracts. The American Chemical Society. Citation to worldwide literature from 1967 to present, also available as online database (CA Search).

CA Index Terms. The American Chemical Society.

O'Neil, Maryadele J. (2001). *The Merck Index: an Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck Research Laboratories.

[Searching for chemical information site](#) (good advice while working online)

[Sigma-Aldrich, Inc.](#) Excellent company offering online search engine containing CAS numbers and properties of vast number of materials.

## VII. Dictionaries:

[Polymer Chemistry Glossary](#)

[http://www.ktf-split.hr/glossary/en\\_index.html](http://www.ktf-split.hr/glossary/en_index.html)

(Financed by the Croatian Ministry of Science and Technology)

Beilstein, Friedrich K. (1979). *Beilstein Dictionary, German-English: for the Users of the Beilstein Handbook of Organic chemistry*. Heidelberg: Springer, 1979.

## VIII. Databases:

[Beilstein Crossfire](#): Search chemical reactions, structures, citations; contains over: 8 million compounds, 9 million reactions, 2 million citations, also includes abstracts and bioactive compounds.

[Chemical Abstracts](#) (ChemFinder) (requires VPN, Software & subscription)

<http://www.cas.org>

- Journals
- Patents

- Substructures
- Reactions

[Polymer Searching](#) overview (CAS): Tips and tricks to searching Chemical Abstracts for polymers.

[CSA Technology Database](#) (Advanced Polymer Abstracts)

<http://www.csa.com/factsheets/ema-polymers-set-c.php>

- Uses
- Manufacturing
- Properties
  - Thermoset resins
  - Thermoplastic resins
  - Advanced plastics
- Subset of Engineered Abstracts Database

Resource designed for libraries serving information to science researchers, engineers, and scientists.

[Derwent](#)

<http://www.isiknowledge.com>

- Index Chemicus: text & substructure searchable database  
>200,000 chemicals added per year
- Current Contents Connect: bibliographic database on 8,000+ scholarly journals
- Current Chemical Reactions: latest synthetic models reported in leading organic chemistry journals.
- Thomas Patent Store: original world-wide patent documents
- Web of Science: current & retrospective multidisciplinary information, abstracts, cited references from 8500 high impact international research journals.
- Derwent World Patents Index: Searches over 13 million unique patent records over 41 countries with expert analysis.

[Dialog](#) (descriptions are directly from respective file's blue-sheet)

Beilstein Abstracts [#393](#)

The **Beilstein Abstracts** database is a companion to File 390, **Beilstein Facts** and to File 391, **Beilstein Reactions**. **Beilstein Abstracts** includes bibliographic citations to the original literature from which the Facts and Reactions are extracted.

Beilstein Facts [#390](#)

**Beilstein Facts** is a very comprehensive structure and factual database in organic chemistry. It includes structures and properties for about 9 million heterocyclic, acyclic and isocyclic compounds covered in the chemical literature published from 1771 onwards. From 2000 onward, biomolecules, mixtures and polymers are also included.

Beilstein Reactions [#391](#)

**Beilstein Reactions**, a companion file to **Beilstein Facts**, File 390, and **Beilstein Abstracts**, File 393, consists of the preparations and chemical reactions associated with the substances in File 390.

CA Search - Chemical Abstracts (1967 – present) [#399](#)

The **CA SEARCH<sup>®</sup>: Chemical Abstracts<sup>®</sup>** database includes over 17 million citations to the worldwide literature of chemistry and its applications from 1967 forward. CA SEARCH corresponds to the bibliographic information and complete indexing found in the print Chemical Abstracts<sup>®</sup> published by CAS<sup>®</sup> (Chemical Abstracts Service). The controlled vocabulary CA General Subject Index Headings, related general subject terminology from the CA Index Guide, and CAS<sup>®</sup> Registry Numbers, each with its modifying phrase are included. Chemical substances are represented by CAS<sup>®</sup> Registry Numbers, unique numbers assigned to each specific chemical compound: corresponding substance information may be searched in the DIALOG chemical substance files such as CHEMSEARCH<sup>™</sup> (File 398). All records from the 8th Collective Index (CI) period forward are contained in File 399; Files 308-314 contain records from the individual CI periods as indicated in the File Data.

Chapman and Hall Chemical Database [#303](#)

The **Chapman & Hall Chemical Database (CHCD)**, formerly HEILBRON, the chemical properties database, represents the complete text of several chemical dictionaries from Chapman and Hall. CHCD is a source database of chemical identification, physical-chemical properties, use, hazard, and key reference data to the world's more important chemical substances, as selected by a panel of experts. CHCD provides chemical substance identification through searching physical and/or chemical

properties, compound variants, derivative names, synonyms, CAS<sup>®</sup> Registry numbers, molecular formulae and molecular weight, biological source statements, use/importance data, melting point, freezing point, boiling point, solubility, relative density, optical rotation, and dissociation constants, as well as providing suppliers and toxicity data.

Chemical Safety Newsbase [#317](#)

**Chemical Safety NewsBase** (CSNB) provides information on the hazardous effects of chemicals and processes encountered by workers in industry and laboratories. The database also covers microbiological and radiation hazards encountered in the workplace. Each record contains an informative abstract. Chemical substances are indexed separately and CAS<sup>®</sup> Registry Numbers are provided when available.

CHEMSEARCH [#398](#)

The chemical substance files on DIALOG, **CHEMSEARCH**<sup>™</sup>, File 398, and **CHEMNAME**<sup>®</sup>, File 301, are non-bibliographic files of chemical substances registered through Chemical Abstracts Service. Each record describes a single chemical entity, and contains the CAS<sup>®</sup> Registry Numbers, molecular formula, CA Substance Index Name(s), available synonyms, complete ring data, and other chemical substance information.

CHEMTOX online [#337](#)

The **CHEMTOX**<sup>®</sup> **Online** database is a collection of environmental, health, and safety data for chemical substances that have properties that either cause them to be addressed by legislation or regulation, or make them potential candidates for legislation or regulation.

Derwent Chemical Resource [#355](#)

**Derwent Chemistry Resource (DCR)** offers structure searching and various other substance identification and indexing data of the chemical structures indexed from update 199916 forward within **Derwent World Patents Index**<sup>®</sup> (**DWPI**) (Files 350, 351, and 352) and the **Derwent Drug File (DDF)** (Files 377, 376, 912, and 913).

Index Chemicus [#302](#)

**Index Chemicus** focuses on current awareness of new compounds and reports with over 200,000 new compounds and synthetic intermediates added each year, with coverage of over 2.4 million structures published in the literature since 1993. Covering the world's leading organic chemistry journals, *Index Chemicus* is a text- and substructure-searchable database. It serves as both a compound database and a current awareness tool, providing full graphical summaries, complete bibliographic information, and author abstracts for the papers it covers.

Material Safety Data Sheets (MSDS) [#332](#)

**Material Safety Data Sheets - OHS™** is a comprehensive collection of material safety data sheets on more than 54,512 chemicals, including pure substances and mixtures. The data sheets are prepared and formatted in accordance with the ANSI Z400.1 standard, which is a 16 section format that has been adopted by the Chemical Manufacturers Association (CMA), the International Labor Organization, and other major organizations. The data sheets help organizations satisfy regulatory and safety laws, provide employee right-to-know information, respond to chemical emergencies, and have the information available to safely handle hazardous waste.

The Merck Index Online [#304](#)

**The Merck Index Online<sup>SM</sup>** is the online version of the monographs in the printed 13th Edition of *The Merck Index* (a U.S. publication, Whitehouse Station, N.J., USA), an internationally recognized, one-volume encyclopedia of chemicals, drugs, and biologicals. Each monograph in the encyclopedia (each record in the database) discusses a single chemical entity or a small group of very closely-related compounds. Updates contain material not yet available in print.

Polymer Online [#322](#)

**Polymer Online** is the online version of the Second Edition of the *Encyclopedia of Polymer Science and Engineering*, published by John Wiley and Sons, Inc. The database provides coverage of polymer science and engineering, including materials, methods, and the latest advances in macromolecular science. Natural and synthetic polymers, plastics, fibers, elastomers, and processing are all included in the scope of the database.

RAPRA: Rubber and Plastics [#323](#)

**RAPRA: Rubber and Plastics** is dedicated exclusively to rubbers, plastics, adhesives, and polymeric composites. The database comprises a large collection of carefully produced, extensively indexed summaries covering a wide range of subjects encompassing technical, academic, commercial, and marketing aspects of the rubber and plastics industries.

SciSearch – a Cited Reference Science Database (1974-1989) [#434](#)

SciSearch<sup>®</sup>: A Cited Reference Science Database is an international, multidisciplinary index to the literature of science, technology, biomedicine, and related disciplines produced by Thomson (ISI<sup>®</sup>). SciSearch contains all of the records published in the *Science Citation Index<sup>®</sup>* (SCI<sup>®</sup>), plus additional records in engineering technology, physical sciences, agriculture, biology, environmental sciences, clinical medicine, and the life sciences. SciSearch indexes all significant items (articles, review papers, meeting abstracts, letters, editorials, book reviews,

correction notices, etc.) from more than 6,100 international scientific and technical journals.

SciSearch – a Cited Reference Science Database (1990- ) [#34](#)

Wilson Applied Science & Technology Abstracts [#99](#)

**Wilson Applied Science & Technology Abstracts** provides comprehensive abstracting and indexing of more than 400 core English-language scientific and technical publications. Non-English-language periodicals are indexed if English abstracts are provided. Periodical coverage includes trade and industrial publications, journals issued by professional and technical societies, and specialized subject periodicals, as well as special issues such as buyers' guides, directories, and conference proceedings.

Wilson Surface Coatings Abstracts [#31](#)

**World Surface Coatings Abstracts™**, produced by the PRA Coatings Technology Centre, Teddington, United Kingdom, provides comprehensive coverage of paints, coatings, pigments, inks, and adhesives. All aspects of the coatings industry are covered, from company profiles and statistics to physical properties to the latest research. The database corresponds to the printed publication: *World Surface Coatings Abstracts*. Each year about 10,000 new records are added to the file with intensive coverage of patents, conference proceedings, books, legislation, reports, journal articles, and standards in the fields of paint and surface coating technology and related subjects.

Indiana University, [Chemistry Acronym Database](#)

<http://www.oscar.chem.indiana.edu/cfdocs/libchem/acronyms/acronymsearch.html>

Searchable database of acronyms used in chemistry. This database can be search by acronym or keyword.

[Ingenta](#)

<http://www.ingentaconnect.com>

A database containing in-depth articles, multidisciplinary with excellent polymer / monomer resources from a large number of diverse sources

[Liquid Crystals Database](#)

<http://www.eevl.ac.uk/lcd>

- Journals (niche & mainstream)
- Magazines
- Books
- Videos
- Conference Proceedings

<http://www.eevl.ac.uk/vts/index.htm>

- Liquid Crystal Database web tutorial

[Macromolecular Structure Database](#) (European Bioinformatics Institute)

- This database contains a large array of resources, publications, educational resources and databases.

[MeSH](#): NLM's controlled vocabulary used to index Medline & PubMed.

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>

[NMRshiftDB](#): Web database for organic structures and their nuclear magnetic resonance (NMR) spectra. It allows for spectrum prediction (currently only for carbon) as well as for searching spectra, structures and other properties. Last not least, it features peer-reviewed submission of datasets by its users. The NMRShiftDB software is open source, the data is published under an open content license.

[Polymer Library](#) (formerly Rapra Abstracts)

<http://www.csa.com/factsheets/rapra-set-c.php>

Database dedicated to rubbers, plastics, adhesives, polymeric composites.

- 796,000+ records (1972-present)
- 500+ journals (30 countries)
- Patent information

Updated biweekly

Document delivery: most available via photocopy from Rapra library

[PubChem](#): Provides information about biological activities of small molecules (monomers).

<http://pubchem.ncbi.nlm.nih.gov/>

[PubMed](#): US National Institute of Health's free digital archive of biomedical and life sciences journal literature.

<http://www.ncbi.nlm.nih.gov>

[ResearchNow](#): Easy to use multidisciplinary database, including chemistry, chemical engineering.

<http://researchnow.bepress.com/>

[Thomas Register of American Manufacturers](#):

Database contains industrial directory, company information, industrial product news, services, CAD drawings, and industrial products.

[Spectral Database for Organic Compounds](#) ([National Institute of Advanced Industrial Science and Technology \(AIST\)](#)): SDBS is an integrated spectral database system for organic

compounds, which includes 6 different types of spectra under a directory of the compounds. The six spectra are as follows, an electron impact Mass spectrum (EI-MS), a Fourier transform infrared spectrum (FT-IR), a  $^1\text{H}$  nuclear magnetic

resonance (NMR) spectrum, a  $^{13}\text{C}$  NMR spectrum, a laser Raman spectrum, and an electron spin resonance (ESR) spectrum.

[Worldwide Protein Databank](http://www.wwpdb.org): publicly available free sources macromolecular structural data comprised of three member depositors, processors, and distributors (USA, Europe, Japan).

<http://www.wwpdb.org>

IX. Organizations: (items in quotes are from the organizations defined objectives)

[Adhesion Society](#) – society dedicated to the dissemination of adhesion (glues / tapes, etc) information through journals, meeting minutes, and conferences.

[American Chemical Society](#) (ACS): “The American Chemical Society is a self-governed individual membership organization that consists of more than 158,000 members at all degree levels and in all fields of chemistry. The organization provides a broad range of opportunities for peer interaction and career development, regardless of professional or scientific interests.”

[American Chemical Society](#) -- [Division of Polymer Chemistry](#): Division of the American Chemical Society dedicated to Polymer research and information dissemination.

[American Institute of Chemists](#): “Its objectives shall be to advance the chemical professions in the United States and other countries; to promote and protect the public welfare by establishing high professional standards of practice for these professions; and to promote the professional, social, and/or economic interests of its members for the benefit of society at large.”

[Association for Aerosol Research](#): “Underlying every applied problem in aerosols is a base of scientific knowledge which has been built up over the last hundred years. With the growing importance of aerosols in various disciplines -biology, chemistry, medicine, physics, technology, meteorology, and others- the interdisciplinarity of aerosol research requires a forum for all scientists with an interest in aerosol problems.”

[Chemical Heritage Foundation](#): Organization dedicated to the history of chemistry. They provide print and online journals, some by subscription, and others free.

[Emulsion Polymers Institute](#): Institute sponsored out of Lehigh University (Bethlehem, PA) dedicated: “To develop and carry out broad-based fundamental and applied research in the area of polymer colloids & to educate scientists and engineers in the polymer colloids field for industrial and academic careers”

[European Federation of Chemical Engineering \(English\)](#) (Polymer working group): “Our aim is to promote research and technical advances in the areas of chemical engineering, biotechnology and environmental protection. ... Experts from science, business, and government departments cooperate in working parties and subject divisions.”

[International Union of Pure and Applied Chemists](#): “The International Union of Pure and Applied Chemistry (IUPAC) serves to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of Mankind. As a scientific, international, non-governmental and objective body, IUPAC can address many global issues involving the chemical sciences.”

[Organic Reactions Catalysis Society](#): “a forum for the presentation and discussion of the use of catalysis as applied to organic synthesis.”

[Royal Australian Chemical Institute](#) (RACI): “gateway to what is happening in chemistry in Australia.”

[Royal Australian Chemical Institute – Polymer Chemistry Division](#): Dedicated to the advancement of both theory and practice of polymer science.

[Society of Plastic Engineers](#) (SPE): Promoting scientific and engineering knowledge related to plastics.

[University of Wollongong: Intelligent Polymer Research Institute](#): “IPRI is recognized internationally as a pioneer in Intelligent Polymer Research.”

[University of Waterloo: Institute for Polymer Research](#): “The Institute carries out applied and fundamental research in areas that are of vital interest to the plastics, coatings, adhesives and elastomers industries.”

## X. Portals:

[POLYMER CHEMISTRY HYPERTEXT](#): “An educational resource compiled by students of Professor Stoffer at the Chemistry Department of the University of Missouri- Rolla.”

[PSIGate](#): PSIGate (Physical Sciences Information Gateway) is the physical sciences hub of the Resource Discovery Network ([RDN](#)). PSIGate provides **free access to high quality Internet resources** for students, researchers and practitioners in the physical sciences, specifically in: astronomy, chemistry, earth sciences, materials science, physics, and general science.

## XI. Directories:

[Division of Polymer Chemistry - American Chemical Society](#):

[C&EN: CHEMISTRY HIGHLIGHTS 2002 - POLYMER CHEMISTRY](#)

[C&EN: CHEMISTRY HIGHLIGHTS 2001 - POLYMER CHEMISTRY](#)

[Swain Library: Polymer Chemistry Resources](#)

[The Macrogalleria - a cyberwonderland of polymer fun](#)

[Chemistry - Organic - Polymer Chemistry](#)

[Chemistry - Polymers](#)

[ETH - D-MATL - POLYCHEM - Polymer Chemistry](#)

## **XII. Multimedia:**

Journal of Chemical Education: [Viscosity of Polymer Solutions](#)

[Martindale's Calculators](#): Collection of calculators, applets, programs on numerous subjects, including polymer chemistry

## **XIII. Educational:**

[The Macrogalleria](#): a Cyberwonderland of Polymer Fun!

[Kids' Macrogalleria](#): a Cyberwonderland of Polymer Fun for kids!

[ChemTutor Excalibur](#): Inexpensive tutoring software in organic chemistry

Chemistry Lecture Notes: [Organic Chemistry Help](#)

[Polymer Chemistry Hypertext](#): An educational resource compiled by students of Professor Stoffer at the Chemistry Department of the University of Missouri-Rolla.

Society of Plastic Engineer's [educational resource manual](#)

## **XIV. Conferences:**

[Society of Plastics Engineers](#): Site listing conferences held by this organization.

## **XV. Textbooks:**

Carraher, Jr., Charles E., Seymour / Carraher's Polymer Chemistry (6<sup>th</sup> Ed. Rev. and Expanded): Undergraduate Chemistry: A Series of Textbooks. Marcel Dekker, April 2003.  
(ISBN: 0824708067)

Odian, George. Principles of Polymerization (4<sup>th</sup> Ed.). Wiley, John & Sons, Inc., 2004.  
(ISBN: 0471274003)

Sorenson, Wayne R., et al. Preparative Methods of Polymer Chemistry. Wiley, John & Sons, Inc., 2001.  
(ISBN: 0471589926)

[Gordon, William L.](#) Emeritus Professor of Physics, [Case Western Reserve University](#).  
[Polymers and Liquid Crystals](#).

## **XVI. E-Books:**

- Elliott, E. (1990). *Polymers and People: An Information History*. Philadelphia, PA: Beckman Center for the History of Chemistry.  
<http://www.chemheritage.org/EducationalServices/Polymers+People/PREFACE.html>
- [Gordon, W.L.](#) Emeritus Professor of Physics, [Case Western Reserve University](#).  
[Polymers and Liquid Crystals](#).

### **Knovel Library (Polymer Chemistry)**

- Amjad, Z. (2002). *Water Soluble Polymers: Solution Properties and Applications*. New York: Kluwer Academic Publishers.
- Bastioli, C. (2005). *Handbook of Biodegradable Polymers*. Shrewsbury: Rapra Technology.
- Benedikt, G.M. (1999). *Metallocene Technology in Commercial Applications*. Brookfield, CT: Society of Plastics Engineers.
- Carraher, C.E., Jr. (2002). *Functional Condensation Polymers*. New York: Kluwer Academic Press.
- Irfan, M.H. (1998). *Chemistry and Technology of Thermosetting Polymers in Construction Applications*. Boston: Kluwer Academic Press.
- Loadman, M.J.R. (1998). *Analysis of Rubber and Rubber-Like Polymers, 4<sup>th</sup> edition*. Boston: Springer-Verlag.
- Mezaki, R.; Ma, G. (1997). *Rate Equations of Polymerization Reactions*. Toronto-Scarborough: ChemTec Pub.
- Polowinski, S. (1997). *Template Polymerization*. Toronto: Chemtec Pub.
- Rao, N.S. (2004). *Design Formulas for Plastics Engineers, 2<sup>nd</sup> edition*. Cincinnati: Hanser Gardner Publications.
- Swift, G.; Carraher, C.E. (1997). *Polymer Modification*. New York: Plenum Press.
- Throne, J.L. (1996). *Technology of Thermoforming*. Cincinnati: Hanser Gardner Publications.
- Ward, I.M.; Coates, P.D. (2000). *Solid Phase Processing of Polymers*. Cincinnati: Hanser Gardener Publications.

## **XVII. Newsgroups:**

sci.polymers: newsgroup with wide scope in polymer chemistry.

\*Other groups do exist, however they are currently unpopulated and contain only garbage advertisements.\*

## **XVIII. Listservs:**

Polyed-1 ([owner-polyed-1@ecnet.net](mailto:owner-polyed-1@ecnet.net))

High Performance Polymers ([hip-1@scas.sagepub.co.uk](mailto:hip-1@scas.sagepub.co.uk))

Journal of Bioactive and Compatible Polymers ([jbc-1@scas.sagepub.co.uk](mailto:jbc-1@scas.sagepub.co.uk))

Polymer Blends, Alloys & Interpenetrating Polymer Networks  
([pba-1@scas.sagepub.co.uk](mailto:pba-1@scas.sagepub.co.uk))

Polymer-related discussions and announcements ([polymer@techunix.technion.ac.il](mailto:polymer@techunix.technion.ac.il))

## **IXX. Major Journals:** (information on journals from Ulrich's)

- Advances in Polymer Science. (Book Series).
  - ISSN: 0065-3195
  - Start: 1958
- Advances in Polymer Technology.
  - ISSN: 0730-6679
  - Start: 1981
- American Chemical Society Division of Polymer Chemistry Meetings Papers
  - Available through American Chemical Society.
- Annual Book of A.S.T.M Standards. Volume 06.03. Paint - Pigments, Drying Oils, Polymers, Resins, Naval Stores, Cellulosic Esters, and Ink Vehicles.
  - ISSN: 0066-0361
  - Start: (not listed)
- Applied Polymer Symposium. Papers.
  - ISSN: 0066-5517
  - Start: 1965
  - Status: Ceased

James Gilbert  
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Subject Guide  
Polymer Chemistry

- Benchmark Papers in Polymer Chemistry
  - ISSN: (not provided)
  - Start: 1978
  - Status: Ceased
  
- Biopolymers.
  - ISSN: 0006-3525
  - Start: 1946
  
- CA Selects. Polymer Degradation
  - ISSN: 0734-8835
  - Start: (not provided)
  
- Carbohydrate polymers.
  - ISSN: 0144-8617
  - Start: 1981
  
- Colloid and polymer science
  - ISSN: 0303-402X
  - Start: 1906
  
- Designed Monomers and Polymers.
  - ISSN: 1385-772X
  - Start: 1998
  
- European polymer journal.
  - ISSN: 0014-3057
  - Start: 1965
  
- Journal of applied polymer science.
  - ISSN: 0021-8995
  - Start: 1946
  
- Journal of applied polymer science. Applied Polymer Symposium.
  - ISSN: 0271-9460
  - Start: 1965
  
- Journal of macromolecular science: Part A (Pure and Applied Chemistry).
  - ISSN: 1060-1325
  - Start: 1964
  
- Journal of macromolecular science: Part B (Physics).
  - ISSN: 0022-2348
  - Start: 1962

- Journal of macromolecular science: Part C (Polymer Reviews).
  - ISSN: 1532-1797
  - Start: 1961
  
- Journal of polymer science: Part A (Polymer Chemistry)
  - ISSN: 0887-624X
  - Start: 1946
  
- Journal of polymer science: Part B (Polymer Physics)
  - ISSN: 0887-6266
  - Start: 1946
  
- Journal of Polymer Science. Symposia Proceedings.
  - ISSN: 0360-8905
  - Start: 1946
  
- Journal of Polymers and the Environment
  - ISSN: 1566-2543
  - Start: 1994
  
- Macromolecular chemistry and physics.
  - ISSN: 1022-1352
  - Start: 1947
  
- Macromolecular theory and simulation.
  - ISSN: 1022-1344
  - Start: 1992
  
- Macromolecules.
  - ISSN: 0024-9297
  - Start: 1968
  
- New Polymeric Materials
  - ISSN: 0169-6424
  - Start: 1987
  - Status: Merged (with: Designed Monomers and Polymers)
  
- Plstichem
  - ISSN: 0129-5195
  - Start: 1969

- Polymer.
  - ISSN: 0032-3861
  - Start: 1960
  
- Polymer bulletin.
  - ISSN: 0170-0839
  - Start: 1978
  
- Polymer Communications (Chinese Journal of Polymer Science).
  - ISSN: 0256-7679
  - Start: 1983
  
- Polymer Contents
  - ISSN: 0883-153X
  - Start: 1984
  
- Polymer Degradation and Stability.
  - ISSN: 0141-3910
  - Start: 1979
  
- Polymer Gels and Networks.
  - ISSN: 0966-7822
  - Start: 1992
  - Status: Ceased
  
- Polymer International (formerly: British Polymer Journal)
  - ISSN: 0959-8103
  - Start: 1969
  
- Polymer journal.
  - ISSN: 0032-3896
  - Start: 1970
  
- [Polymer preprints](#).
  - ISSN: 0032-3934
  - Start: 1960
  
- Polymer Science Series A (formerly: Polymer Science USSR)
  - ISSN: 0965-545X
  - Start: 1959
  
- Polymer Science Series B (formerly: Polymer Science USSR)
  - ISSN: 1560-0904
  - Start: 1995

- Polymer Science Series C Chemistry Reviews
  - ISSN: 1811-2382
  - Start: 2000
- Polymer Science USSR (continued as: Polymer Science Series A & B).
- Polymer Testing
  - ISSN: 0142-9418
  - Start: 1980
- Polymeric Materials Science and Engineering (formerly: Organic Coatings and Applied Polymer Science Proceedings)
  - ISSN: 0743-0515
  - Start: (not provided)
- Polymer Composites
  - ISSN: 0272-8397
- Polymers and Polymer Composites (formerly: replaces in part Composite Polymers)
  - ISSN: 0967-3911
  - Start: 1988
- Recent Research Developments in Macromolecules.
  - ISSN: (not listed)
  - Start: (not listed)
- Rubber chemistry and technology.
  - ISSN: 0035-9475
  - Start: 1928

## **XX. Nomenclature & Chemical Names:**

*Compendium of macromolecular nomenclature.* Research Triangle Park, NC: IUPAC.

IUPAC definitions and rules for naming polymer molecules, assemblies, solutions, and crystals

*Glossary of Terms Used in Theoretical Organic Chemistry (IUPAC Recommendations 1998).*  
Research Triangle Park, NC: IUPAC.

## **XXI. RSS Feeds:**