

SYLLABUS FOR ADVANCED ORGANIC CHEMISTRY: SYNTHESIS
CHEMISTRY 395, 001 --- Undergraduates
CHEMISTRY 425, 001 – Graduate Students
Spring Semester, 2006
3.0 Semester Hours
Tu, Th: 5:30-6:50 p.m.; FH-105

Prerequisite: One year of elementary aliphatic and aromatic organic chemistry. Both undergraduates as well as graduate students are welcome to enroll in this course.

Suggested Textbooks to Supplement the Course Lectures:

Recommended Textbook: “Advanced Organic Chemistry: Part B -- Reactions and Synthesis”, by F.A. Carey and R.J. Sundberg, 4th Edition (Kluwer Academic / Plenum Publishers, 2001) ---- paperback: ISBN 0-306-46245-1.

Optional Reference Books: During the course survey of the use of protecting groups, you may want to read sections of “Protective Groups in Organic Synthesis,” by T.W. Greene and P.G.M. Wuts, Third Edition (John Wiley & Sons, 1999) or “Protecting Groups,” by P.J. Kocienski, 3rd Edition (Thieme, 2003). During the course survey of oxidations & reductions, rearrangements, and alkylation reactions, you may want to refer to some of the following monographs: “Advanced Organic Chemistry: Reactions, Mechanisms and Structure,” by M.B. Smith and J. March, 5th Edition (John Wiley & Sons, 2000); “Organic Synthesis,” by M.B. Smith, 2nd Edition (McGraw-Hill, 2002); “Named Organic Reactions,” by T. Laue and A. Plagens, Second Edition (John Wiley & Sons, Ltd., 2005); “Organic Syntheses Based on Name Reactions and Unnamed Reactions,” by A. Hassner and C. Stumer (Elsevier Science, 1994 ---2nd edition, 2002); “Name Reactions and Reagents in Organic Synthesis,” by B.P. Mundy, M.G. Eller, and F.G. Favalaro, Jr., Second Edition (John Wiley & Sons, Inc, 2005); and “Name Reactions: A Collection of Detailed Reaction Mechanisms,” by J.J. Li (Springer-Verlag, 2002).

[Note: You are not required to purchase a textbook for this course since lecture notes will be obtained from various chemical journals as well as from a number of recent monographs, most of which are listed in other sections of the syllabus. **No formal readings for this course will be assigned.**]

Purpose of Course: To acquaint the students with the strategy involved in designing total syntheses of complex organic compounds; the use of protecting groups in synthetic organic chemistry; and a rather extensive survey of important “name reactions” that can be classified as oxidations, rearrangements, reductions, or alkylation reactions. The latter survey will be conducted from both a mechanistic as well as a synthetic viewpoint.

Content: Topics to be discussed include the following:

I. A brief discussion of the logistics involved in planning the total synthesis of complex molecules. References: “Organic Synthesis: Concepts and Methods,” by J.-H. Fuhrhop and G.Li, Third Edition (paperback, Wiley-VCH, 2003) ---

NOTE: This new 3rd edition has been enlarged to include chapters on combinatorial chemistry and the use of the Internet for searching chemical compounds; “Organic Synthesis”, by M.B. Smith, 2nd Edition (McGraw-Hill, 2002); “Tactics of Organic Synthesis,” by Tse-Lok Ho (John Wiley & Sons, 1994); “Organic Synthesis: The Disconnection Approach”, by S. Warren (John Wiley & Sons, 2000) and “Workbook for Organic Synthesis: The Disconnection Approach,” by S. Warren (John Wiley & Sons, 1982); “Symmetry: A Basis For Synthesis Design,” by T.-L. Ho (John Wiley & Sons, 1995); “The Design of Organic Syntheses,” by S. Turner (Elsevier Scientific Publishing Co., 1976); “Organic Synthesis”, by R.E. Ireland (Prentice-Hall, Inc., 1969); “Strategies and Tactics in Organic Synthesis”, edited by T. Lindberg (Academic Press, Volume 1: 1984; Volume 2: 1988; Volume 3: 1991) --- in which three books a group of preeminent researchers discuss the chronological development of ideas and experimentation that led to the synthesis of a wide range of complex organic chemicals; “Strategies and Tactics in Organic Synthesis,” edited by M. Harmata (Elsevier, Volumes 4 and 5: 2004); “Classics in Total Synthesis II: More Targets, Strategies, Methods,” by K.C. Nicolaou and S.A. Snyder (Wiley-VCH, 2004) ---- a detailed discussion of the most impressive accomplishments in natural product total synthesis since 1990; a previous monograph entitled “Classics in Total Synthesis: Targets, Strategies, Methods,” by K.C. Nicolaou and E.J. Sorensen (VCH Publishers, 1996); “Umpeled Synthons: A Survey of Sources and Uses in Synthesis”, edited by T.A. Hase (John Wiley & Sons, 1987) -- in which book there is a discussion of the general use of synthons in planning organic syntheses as well as a detailed list of generally convenient synthons; and “The Logic of Chemical Synthesis”, by E.J. Corey and X.-M. Cheng (John Wiley & Sons, 1989) --- which outlines the basic concepts of retrosynthetic analysis and the general strategies of generating possible synthetic pathways by logical reduction of molecular complexity. **If you synthesize organic compounds**, you may also want to refer to “Dead Ends and Detours: Direct Ways to Successful Total Synthesis,” by M.A. Sierra and M.C. de la Torre (Wiley-VCH, 2005). --- In this monograph, the authors use major total syntheses to explain various problems with synthesis (e.g., unexpected reactivities of functional groups and problems due to steric properties) and recommend ways out of such dilemmas!

II. A rather extensive survey of the use of protecting groups in synthesis. References: “Protective Groups in Organic Synthesis”, by T.W. Greene and P.G.M. Wuts, Third Edition (John Wiley & Sons, 1999); “Protective Groups in Organic Chemistry”, by J.F.W. McOmie (Plenum Publishing Co., 1973); and “Protecting Groups”, by P.J. Kocienski, Third Edition (Thieme, 2003) --- a critical survey of the most frequently used protecting groups for many common functional groups.

III. A survey of important oxidation, reduction, rearrangement (both polar and pericyclic), and alkylation reactions used in synthetic organic chemistry --- many of which have become so widely used that a “name reaction” has become associated with them. Among the reactions/transformations to be discussed are: an extensive survey of the oxidation of alcohols including the “Swern oxidation” and other uses of dimethyl sulfoxide as an oxidizing agent; the Baeyer-Villiger rearrangement; the epoxidation of alkenes including the Sharpless asymmetric

epoxidation of allylic alcohols; the Favorskii rearrangement; the Ramberg-Bäcklund rearrangement; the Wittig rearrangement; the Beckmann rearrangement; the thermal rearrangement of vinylcyclopropanoids; Cope and Claisen-type rearrangements; the McMurry olefination; the Birch reduction; the acyloin condensation; the “Stork enamine synthesis”; the use of LDA (lithium diisopropylamide) to generate anions from ketones, esters and nitriles; the Simmons-Smith reaction; “Diels-Alder” reactions; an extensive survey of organocopper chemistry; the Michael reaction; the Baylis-Hillman reaction; methods to prepare olefins including the Peterson reaction and the utility of phosphorus ylids in synthesis; and a survey of reductive transformations frequently encountered in organic synthesis. References: “Advanced Organic Chemistry, Part B --- Reactions and Synthesis,” by F.A. Carey and R.J. Sundberg, 4th Edition (Kluwer Academic / Plenum Publishers, 2001); “Organic Synthesis,” by M.B. Smith, 2nd Edition (McGraw-Hill, 2002); “Name Reactions: A Collection of Detailed Reaction Mechanisms,” by J.J. Li (Springer-Verlag, 2002); “Named Organic Reactions,” by T. Laue and A. Plagens, Second Edition (John Wiley & Sons, Ltd., 2005); “Guidebook to Organic Synthesis”, by R.K. Mackie, D.M. Smith, and R.A. Aitken, Second Edition (Longman Scientific & Technical, copublished with John Wiley & Sons, 1990); “Organic Syntheses Based on Name Reactions and Unnamed Reactions”, by A. Hassner and C. Stumer (Elsevier Science, 1994 ---2nd edition, 2002); “Name Reactions and Reagents in Organic Synthesis”, by B.P. Mundy, M.G. Eller, and F.G. Favalaro, Jr., Second Edition (John Wiley & Sons, Inc., 2005); “Comprehensive Organic Synthesis: “Selectivity, Strategy and Efficiency in Modern Organic Chemistry”, edited by B.M. Trost (Pergamon Press, 1991) --- This nine-volume set containing more than 7,000 pages is the most modern, complete, and authoritative reference work published on the reactions used in organic synthesis. Volume 7 covers all methods of oxidation for use in organic synthesis, and volume 8 contains 37 chapters on methods for reducing functional groups; “Concepts of Organic Synthesis: Carbocyclic Chemistry”, by B.P. Mundy (Marcel Dekker, Inc. 1979); “Some Modern Methods of Organic Synthesis”, by W. Carruthers, 3rd Edition (Cambridge University Press, 1987); “Advanced Organic Chemistry: Reactions, Mechanisms, and Structure”, by M.B. Smith and J. March, 5th Edition (John Wiley & Sons, 2000); “Reductions in Organic Chemistry,” by M. Hudlicky, 2nd Edition (ACS Monograph Series No. 188, American Chemical Society, 1996) --- which contains a thorough review of reduction methodology, including numerous tables summarizing reducing agents and correlating them with the starting compounds and the products of reduction; “Complex Hydrides and Related Reducing Agents in Organic Synthesis”, by A. Hajos (Elsevier Science Publishing, (1979); “Reductions by the Alumino- and Borohydrides in Organic Synthesis,” by J. Seyden-Penne, 2nd Edition (Wiley-VCH Publishers, 1997) --- which gives special emphasis to the compatibility between the reduction of the functional group in question and other groups which are present in the molecule, as well as to the regio- and stereoselectivity of reductions induced by other neighboring groups; “Oxidations in Organic Chemistry”, by M. Hudlicky (ACS Monograph Series No. 186, American Chemical Society, 1990) --- which contains a discussion of oxidizing agents, oxidation of various functional groups, specific experimental procedures for oxidations, and correlation tables to show which agent is good for which type of compound; “Modern Oxidation Methods,” edited by J.-E. Backvall (Wiley-VCH, 2005); “Stereodirected Synthesis With Organoboranes,” by D.S.

Matteson (Springer: Heidelberg, 1995); "Organic Syntheses via Boranes", by H.C. Brown (Wiley-Interscience, 1975); "Boranes in Organic Chemistry", by H.C. Brown (Cornell University Press, 1972); "Organic Reactions in Steroid Chemistry", Volumes 1 and 2, edited by J. Fried and J.A. Edwards (Van Nostrand Reinhold Company, 1972); "Modern Synthetic Reactions", by H.O. House, 2nd Edition (W.A. Benjamin, Inc., 1972); "Conjugate Addition Reactions in Organic Synthesis", by P. Perlmutter (Pergamon Press, 1992); "Annual Reports in Organic Synthesis" --- 1970-2003 inclusive (A series of paperbacks published annually by Academic Press beginning in 1971; the most recent volume in this series was published in 2004 and covers useful synthetic advances reported in the chemical literature during 2003); "Organocopper Reagents, The Practical Approach in Chemistry Series," edited by R.J.K. Taylor (Oxford University Press, 1995); "Modern Organocopper Chemistry," edited by N. Krause (Wiley-VCH, 2002); "The Diels-Alder Reaction: Selected Practical Methods," by F. Fringuelli and A. Taticchi (Wiley, 2002); and "Modern Aldol Reactions," edited by R. Mahrwald (Wiley-VCH, 2004).

Meetings: Two "eighty minutes" evening sessions weekly. Lecture course only; no laboratory work. Students are encouraged to ask questions and supply some feedback during the lectures to make the course less formal and more meaningful.

Examinations: Three 50-minute exams covering the more important reactions discussed in the course will be given during the semester. The first exam is tentatively scheduled for Tuesday, Feb. 21; and the 2nd and 3rd exams will be administered in the latter part of March and April, respectively. There will be no final exam for this course. However, during the last 2 weeks of the semester, students registered for CHEM 425 will be required to make a 10-15 minute presentation on a "name reaction" assigned to them by the instructor and taken from the following list: the Mukaiyama aldol reaction, the Mitsunobu reaction, the Pauson-Khand annulation, the Stille cross-coupling, the Nazarov cyclization, the Biginelli pyrimidone synthesis, the Friedlander synthesis, the Negishi cross-coupling reaction, the Julia-Lythgoe olefination, the Heck reaction, the Suzuki vinyl coupling process, the Fischer indole synthesis, the Paal-Knorr pyrrole synthesis, and the Polonovsky rearrangement. These brief oral presentations should cite pertinent review articles, present a general equation and mechanism for the "name reaction," and indicate something about the scope/limitations of the transformation.

Bibliography: Most of the syntheses or novel reactions to be discussed in the course were reported in one of the following journals:

Org. Letters

J. Am. Chem. Soc.

J. Chem. Soc. -- Note: In 2003, the Royal Society of Chemistry in the U.K. merged two of their journals (Perkin Transactions 1 and 2) and re-named the new publication Organic & Biomolecular Chemistry)

Can. J. Chem.

Angew. Chemie, Internat. Ed. English

Tetrahedron

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Among the reference books of interest to a synthetic organic chemist are:

1. "Fiesers' Reagents for Organic Synthesis: Volumes 1 through 22 (Wiley-Interscience). Volume 1 was published in 1967 and the most recent volume (#22) was released in 2004.
2. "Comprehensive Organic Synthesis: Selectivity, Strategy and Efficiency in Modern Organic Chemistry", editor-in-chief: B.M. Trost (Pergamon Press, 1991) --- This nine-volume set containing more than 7,000 pages is the most modern, complete, and authoritative reference work published on the reactions used in organic synthesis.
3. "Organic Syntheses" (issued annually). [free website: www.orgsyn.org] Volume 81 of "Organic Syntheses" was published in 2005.
4. "Organometallic Syntheses" --- The volumes of this series present clear and reliable procedures for the preparation of important types of organometallic compounds. "Organometallic Syntheses: Volume 2 --- Nontransition-Metal Compounds", edited by J.J. Eisch (Academic Press, 1981) presents directions for the preparations of more than 85 organometallic compounds, together with a general discussion of special laboratory techniques necessary in such experimentation. Volume 4 in this series, edited by R.B. King and J.J. Eisch, was published in 1988 by Elsevier Science Publishers.
5. "Organometallics in Synthesis: A Manual," by M. Schlosser, 2nd Edition (John Wiley & Sons, Ltd. : Chichester, 2002). This "user-friendly" guide describes the use of organometallics in the synthetic organic laboratory. It also provides numerous detailed procedures for using organometallics in synthesis.
6. "Transition Metals for Organic Synthesis: Building Blocks and Fine Chemicals, Two-Volume Set," edited by M. Beller and C. Bolm, Second Edition (Wiley-VCH, 2005). --- This two-volume set presents the current state of the art in transition metal chemistry/organic synthesis. Volume 1 discusses processes that involve formation of carbon-carbon bonds. Volume 2 surveys oxidations and reductions.
7. "Transition Metal Reagents & Catalysts: Innovations in Organic Synthesis," by J. Tsuji (Wiley, 2001).
8. "Handbook of Organopalladium Chemistry for Organic Synthesis," a two-volume set edited by E. Negishi (Wiley, 2002).
9. "New Pathways for Organic Synthesis: Practical Applications of Transition Metals", by H.M. Colquhoun, J. Holton, D.J. Thompson, and M.V. Twigg (Plenum Press, 1984) -- This book provides those engaged in the preparation of pharmaceuticals, herbicides, etc. with a practical guide to the application of transition metals in organic synthesis. A considerable number of transition metal-based procedures are discussed -- arranged according to the nature of the organic

- product or the synthetic transformation (e.g., oxidation, reduction, cyclization reactions, alkylations, etc.) being carried out. A chapter is also included on the preparation and handling of transition metal catalysts.
10. "Main Group Metals in Organic Synthesis," a two-volume set edited by H. Yamamoto and K. Oshima (Wiley-VCH, 2004).
 11. "Handbook of Combinatorial Chemistry," a two-volume set edited by K.C. Nicolaou, R. Hanco, and W. Hartwig (Wiley, 2002). This two-volume set covers virtually everything you would need to know about compound library design and synthesis --- including the general basics. ---- "Combinatorial chemistry" involves the synthesis (in a parallel manner) and screening of very large collections, or libraries, of distinct molecular entities.
 12. "Organic Reactions" (a multi-volume set of reference books). Volume 65 of "Organic Reactions" was published in 2005.
 13. "Survey of Organic Syntheses", Volumes 1 and 2, by C.A. Buehler and D.E. Pearson (Wiley-Interscience, 1970, 1977).
 14. "Organic Functional Group Preparations" Volumes 1, 2, and 3, by S.R. Sandler and W. Karo (Academic Press). The 2nd edition of Volume 1 in this series was published in 1983; the 2nd edition of Volume 2 appeared in 1986; and the 2nd edition of Volume 3 was printed in 1989.
 15. "Synthetic Organic Chemistry", by R.B. Wagner and H.D. Zook (John Wiley & Sons, 1953).
 16. "Compendium of Organic Synthetic Methods", Volumes 1 and 2, by I.T. Harrison and S. Harrison (Wiley-Interscience, 1971, 1974); Volume 3, by L.S. Hegedus and L.G. Wade, Jr., (Wiley-Interscience, 1977); Volumes 4 and 5, by L.G. Wade, Jr. (Wiley-Interscience, 1980, 1984); Volumes 6, 7, 8, 9, 10, and 11 by M.B. Smith (Wiley-Interscience, 1988, 1992, 1995, 2000, 2002, and 2003).
 17. "Organic Solvents: Physical Properties and Methods of Purification," Fourth Edition, by J.A. Riddick, W.B. Bunger, and T.K. Sakano (Wiley-Interscience, 1986).
 18. "Catalytic Hydrogenation in Organic Syntheses," by P.N. Rylander (Academic Press, 1979).
 19. "Hydrogenation Methods," by P. Rylander (Academic Press, 1990) -- The aim of this book is to give the reader quick access to what can be done using catalytic hydrogenation and how to do it. Appropriate choices of catalyst, solvent, and reaction conditions are illustrated throughout the book.
 20. "Handbook of Heterogenous Catalytic Hydrogenation for Organic Synthesis," by S. Nishimura (Wiley: Chichester, 2001). This handbook consists of 13 chapters; each chapter describes the hydrogenation of a particular type of functional group.
 21. "Theilheimer's Synthetic Methods of Organic Chemistry" (a multi-volume set of reference books containing highly condensed data on reactions of preparative significance; volume 67 was published in 2005).
 22. "Stereoselective Synthesis: Workbench Edition" (Houben-Weyl, Methods of Organic Chemistry; Thieme Publishers, 1997). --- This 10-volume paperback set of reference books offers a comprehensive, critical survey of the entire literature of stereoselective chemistry.
 23. "Stereoselective Synthesis: A Practical Approach," 2nd Edition, by M. Nogradi (VCH Publishers, 1995). This book, which contains numerous figures and

- tables, covers a wide variety of subjects relating to stereoselective synthesis, including reductions with chiral hydride donors, stereoselective epoxidations, and "acyclic stereoselection". Other monographs of interest to those engaged in asymmetric synthesis are: "Principles of Asymmetric Synthesis," by R.E. Gawley and J. Aube (Pergamon, 1996) and "Asymmetric Methodology in Organic Synthesis," by D.J. Ager and M.B. East (CRC Press, 1996).
24. BEST SYNTHETIC METHODS -- a continuing series of books published by Academic Press. Some of the newer volumes in this series are: "Indoles," by R.J. Sundberg (1996); "Sulfur Reagents in Organic Synthesis," by P. Metzner and A. Thuillier (1994); "Organolithium Methods," by B. Wakefield (1988); "Silicon Reagents in Organic Synthesis", by E.W. Colvin (1988); and "Palladium Reagents in Organic Synthesis", by R.F. Heck (1990). See: J. Org. Chem. Vol. 50, No. 12, June 14, 1985, page 4A for specific details concerning the first three volumes in this series.
 25. "Vogel's Textbook of Practical Organic Chemistry", Fifth Edition (John Wiley & Sons, 1989) --- This book is a comprehensive (>1500 pages) reference work on experimental procedures (including spectroscopy) for organic chemists.
 26. "Advanced Practical Organic Chemistry," Second Edition, by M. Casey, J. Leonard, B. Lygo, and G. Procter (Blackie Academic & Professional, 1994). This book is a guide covering most up-to-date techniques and "tricks of the trade" used in organic synthesis. Specific topics include: general laboratory equipment, purification of solvents, handling of compressed gases, typical workup and characterization procedures, and special procedures such as photolysis and ozonolysis. It also includes reactivity tables for common oxidizing and reducing agents.
 27. "The Laboratory Companion: A Practical Guide to Materials, Equipment and Technique," by G.S. Coyne (Wiley, 1997). This guide provides complete coverage of all commonly used lab equipment.
 28. "Comprehensive Organic Transformations: A Guide to Functional Group Preparations," 2nd Edition, by R.C. Larock (John Wiley & Sons, 1999). This excellent reference book provides a comprehensive, highly condensed, systematic collection of useful synthetic methodology. All transformations have been organized according to the functional group being synthesized.
 29. Beilstein: This multi-volume set of reference books lists all the known organic compounds reported in the literature during its period of coverage. For each compound, the following information is provided: all names; the molecular formula; the structural formula, all methods of preparation, all important physical properties, chemical and biological properties, and references to the original literature.
 30. "Preparative Carbohydrate Chemistry," edited by S. Hanessian (Marcel Dekker, Inc., 1996).
 31. "The Practice of Peptide Synthesis," Second Edition, by M. Bodanszky and A. Bodanszky (Springer-Verlag, 1994).
 32. "Phase Transfer Catalysis: Fundamentals, Applications, and Industrial Perspectives", by C.M. Starks, C.L. Liotta, and M.E. Halpern (Chapman & Hall, 1994).
 33. "Microwaves in Organic Synthesis," edited by A. Loupy (Wiley-VCH, 2003).

34. "Encyclopedia of Reagents for Organic Synthesis," edited by L.A. Paquette (John Wiley & Sons, 1995). This 8-volume reference set of books reviews approximately 3,500 reagents. It compares a reagent's specific properties with those of other reagents capable of similar chemistry and also gives a "pros and cons" assessment of each reagent --- including its exemplary transformations. The most important and useful reagents in this 8-volume encyclopedia have now been selected and, based on classification, can be found in 4 volumes, which are available for separate purchase (John Wiley & Sons, 1999). These four volumes are: "Oxidizing and Reducing Agents," edited by S.D. Burke and R.L. Danheiser; "Acidic and Basic Reagents," edited by H.J. Reich and W.J. Roush; "Activating Agents and Protecting Groups," edited by A.J. Pearson and W.J. Roush; and "Reagents, Auxiliaries and Catalysts for C-C Bonds," edited by R.M. Coates and S.E. Denmark.
35. "Handbook of Reagents for Organic Synthesis: Reagents for Solid-Phase Reactions," edited by P. Wipf (John Wiley & Sons, 2004).
36. "Handbook of Reagents for Organic Synthesis: Reagents for High-Throughput Solid-Phase and Solution-Phase Organic Synthesis," edited by P. Wipf (John Wiley & Sons, Ltd., 2005). The topics in this reference book cover a range from polymer-supported reagents to resins and linkers to techniques in molecular imprinting.
37. "Handbook of Reagents for Organic Synthesis: Chiral Reagents for Asymmetric Synthesis," edited by L.A. Paquette (John Wiley & Sons, Ltd., 2003). This handbook provides indispensable information about many of the optically active reagents and catalysts presently in use.
38. "Comprehensive Organic Functional Group Transformations," edited by A.R. Katritzky, O. Meth-Cohn, and C.W. Rees (Elsevier Science, 1995). This seven-volume set of books presents the vast subject of organic synthesis in terms of the introduction and interconversion of functional groups. "Comprehensive Organic Functional Group Transformations II, Volumes 1-7," edited by A.R. Katritzky and R.J.K. Taylor (Elsevier, 2004) ---- a comprehensive review of the synthetic literature between 1995-2003.
39. "The Chemistry of Heterocycles": Structure, Reactions, Syntheses, and Applications, 2nd Edition, by T. Eicher and S. Hauptmann (Wiley-VCH, 2003). All important aspects of heterocyclic chemistry are presented in a clear manner in this 572-page paperback.
40. "Name Reactions in Heterocyclic Chemistry," edited by J.J. Li (John Wiley & Sons, Inc., 2005).
41. "Science of Synthesis: Houben-Weyl --- Methods of Molecular Transformations," a 48-volume set (approx 35,000 pages) published by Thieme starting in October 2000. The last volume will not be published until 2008. This comprehensive reference is intended to be a source for selecting reliable organic and organometallic synthetic methods --- both classical (e.g., from the 1800's!) and recent.
42. "The Comprehensive e-Book of Named Organic Reactions and Their Mechanisms," by E. Kruiswijk (The Chemical Bookstore: Aberaman, U.K., 2005). This lengthy book (1,980 pages!) attempts to discuss every "named reaction" --- no matter how

obscure. As such, it provides a valuable resource for deeper searching of approx. 1300 named reactions. For more information, see:
<http://www.namedorganicreactions.co.uk>.

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If you want to access review articles of interest to synthetic organic chemists (covering more than 18,000 review articles in the literature since 1970 to the present time), "Synthesis Reviews" is a free database you can access at: www.thieme-chemistry.com. For literature resources available in most scientific libraries, refer to: "Library Handbook for Organic Chemists," by A. Poss (Chemical Publishing, New York, N.Y. 2000).