

Simple Substitution with Bromobenzene

We've learned to make alkenes, alkynes, and alcohols from alkyl halides. The same idea is used to make benzene derivatives.

Reaction:

Reaction type and reagents:

Starting material	Reagent	Product	Reaction type
Bromobenzene	NaOH	Phenol	Substitution
Bromobenzene	NaCN	Phenyl cyanide	Substitution
Bromobenzene	NaOAc	Phenyl acetate	Substitution
Bromobenzene	NaOEt	Phenyl ethyl ether	Substitution
Bromobenzene	NaOMe	Phenyl methyl ether	Substitution
Bromobenzene	NaOH	Phenol	Substitution
Bromobenzene	NaCN	Phenyl cyanide	Substitution
Bromobenzene	NaOAc	Phenyl acetate	Substitution
Bromobenzene	NaOEt	Phenyl ethyl ether	Substitution
Bromobenzene	NaOMe	Phenyl methyl ether	Substitution

Using bromobenzene as the starting material, we can make a variety of benzene derivatives. Some of these are shown in the table above. The reaction of bromobenzene with sodium hydroxide is a substitution reaction. The product is phenol. The reaction of bromobenzene with sodium cyanide is a substitution reaction. The product is phenyl cyanide. The reaction of bromobenzene with sodium acetate is a substitution reaction. The product is phenyl acetate. The reaction of bromobenzene with sodium ethoxide is a substitution reaction. The product is phenyl ethyl ether. The reaction of bromobenzene with sodium methoxide is a substitution reaction. The product is phenyl methyl ether.



Phenyl ethyl ether

Now we can make bromobenzene from benzene. The reaction of benzene with bromine and iron(III) bromide is a substitution reaction. The product is bromobenzene. The reaction of benzene with chlorine and iron(III) chloride is a substitution reaction. The product is chlorobenzene. The reaction of benzene with iodine and iron(III) iodide is a substitution reaction. The product is iodobenzene. The reaction of benzene with bromine and iron(III) bromide is a substitution reaction. The product is bromobenzene. The reaction of benzene with chlorine and iron(III) chloride is a substitution reaction. The product is chlorobenzene. The reaction of benzene with iodine and iron(III) iodide is a substitution reaction. The product is iodobenzene.

If we want to make bromobenzene from benzene, we can use the reaction of benzene with bromine and iron(III) bromide. The product is bromobenzene. The reaction of benzene with chlorine and iron(III) chloride is a substitution reaction. The product is chlorobenzene. The reaction of benzene with iodine and iron(III) iodide is a substitution reaction. The product is iodobenzene.



Phenyl methyl ether



Phenyl ethyl ether



Phenyl acetate

Pogil Functional Groups On Organic Molecules

Saul Patai



Pogil Functional Groups On Organic Molecules:

Process Oriented Guided Inquiry Learning (POGIL) Richard Samuel Moog, 2008 POGIL is a student centered group learning pedagogy based on current learning theory This volume describes POGIL s theoretical basis its implementations in diverse environments and evaluation of student outcomes **Organic Chemistry** Suzanne M. Ruder, The POGIL Project, 2015-12-29 ORGANIC CHEMISTRY Analytical Chemistry Juliette Lantz, Renée Cole, The POGIL Project, 2014-12-31 An essential guide to inquiry approach instrumental analysis Analytical Chemistry offers an essential guide to inquiry approach instrumental analysis collection The book focuses on more in depth coverage and information about an inquiry approach This authoritative guide reviews the basic principles and techniques Topics covered include method of standard the microscopic view of electrochemistry calculating cell potentials the BerriLambert atomic and molecular absorption processes vibrational modes mass spectra interpretation and much more **Functional Groups in Organic Compounds** Walter S. Trahanovsky, 1971 **Organic Functional Group Preparations** Stanley R. Sandler, Wolf Karo, 2012-12-02 Volume II describes 17 additional functional groups and presents a critical review of their available methods of synthesis with preparative examples of each Attention is especially paid to presenting specific laboratory directions for the many name reactions used in describing the synthesis of these functional groups This volume covers synthetic methods for the generation of 17 functional groups Unique features include the citation of U S and foreign patent literature and safety information Major topics discussed Ynamines Enamines Allenes Azo compounds Azoxy compounds N Nitroso compounds Practical Functional Group Synthesis Robert A. Stockland, Jr., 2015-12-18 A practical handbook for chemists performing bond forming reactions this book features useful information on the synthesis of common functional groups in organic chemistry Details modern functional group synthesis through carbon heteroelement N O P S B halogen bond forming reactions with a focus on operational simplicity and sustainability Summarizes key and recent developments which are otherwise scattered across journal literature into a single source Contains over 100 detailed preparations of common functional groups Included 25 troubleshooting guides with suggestions and potential solutions to common problems Complements the text in enhanced ebook editions with tutorial videos where the author provides an introduction to microwave assisted chemistry Review of Organic Functional Groups Thomas L. Lemke, 2003 Designed to be used as a self paced review this text outlines the functional groups common to organic chemistry reviewing the general topics of nomenclature physical and chemical properties and metabolism The text provides background material for the formal pharmacy courses in medicinal chemistry easing the transition from general organic chemistry courses required of all pre pharmacy students The Fourth Edition will include a workbook on CD ROM as well as an index on general drug metabolism Students who use this text are able to complete difficult tasks such as drawing a chemical structure or official chemical name predicting solubility of chemicals in liquids predicting and showing with chemical structures the metabolism of organic

functional groups predicting and showing instabilities with chemical structures *Organic Functional Group Preparations* Stanley R. Sandler, Wolf Karo, 2013-10-22 *Organic Functional Group Preparations* Volume III describes 13 organic functional groups and presents a critical review of their available methods of synthesis with preparative examples of each. The book puts special attention to the presentation of specific laboratory directions for the many name reactions used in describing the synthesis of these functional groups. Each chapter deals with the preparation of a given functional group by various reaction types: condensation, elimination, oxidation, reduction, and a variety of starting materials. Acetals and ketals, anhydrides, and thiohydroxamic acids are some of the organic functional groups described in the text. Organic chemists will find the book invaluable.

Organic Functional Group Preparations Bozzano G. Luisa, 2012-12-02 *Organic Chemistry* Second Edition Volume I *Organic Functional Group Preparations* provides a convenient and useful source of reliable preparative procedures for the most common functional groups. This book discusses the preparations of each group that are subdivided into different reaction types including elimination, condensation, and oxidation and reduction reactions. Organized into 21 chapters, this edition begins with an overview of the reduction methods that allow the preparation of hydrocarbon of known structure. This text then explores the acid-catalyzed thermal elimination of water from alcohols, which is a common laboratory method for the preparation of olefins. Other chapters consider the two most significant synthetic methods for introducing an acetylenic group into the molecule, which involve the elimination of hydrogen halides. This book discusses as well the importance of oxidation reactions. The final chapter deals with sulfonation reactions. This book is a valuable resource for organic chemists and research workers.

Patai's 1992 Guide to the Chemistry of Functional Groups Saul Patai, 1992-04-08 *Patai's 1992 Guide to the Chemistry of Functional Groups* Saul Patai, The Hebrew University of Jerusalem, Israel. Ever since the publication of the first volume of *The Chemistry of Functional Groups* in 1964, the Patai series has acted as an essential reference source to many researchers. By the end of 1991, the series consisted of 50 titles bound in 73 volumes containing nearly 900 chapters written by over 1250 authors. The aim of this Guide, as was that of the previous edition, is to present sufficient material on each of the published chapters to allow the researcher to decide whether these chapters are relevant and useful for his or her purpose and thus worth pursuing in full. For those who are familiar with only selected volumes from the series, the cross-referencing between complementary and related chapters from different volumes will be invaluable. The Guide is fully indexed by both subject and author, thus making it an essential reference tool for all organic chemists.

Organic Functional Group Analysis George H. Schenk, 2016-06-23 *Organic Functional Group Analysis: Theory and Development* attempts to symbolize the growth in functional groups analysis by using handpicked methods. Those methods are positioned to represent as many functional groups as possible. The book begins with the author referencing books about a quantitative organic analysis. Majority of the first few chapters highlight the oximation and carbonyl method, which support portions of Chapter 2, and the book's second half. The book then discusses the hydroxyl, amino, and alkoxysilanes groups. Chapters 3 and 4

showcase the strong analytical advantages in using base catalysis and acid catalysis with the same anhydride while Chapters 5 6 and 7 illustrate extremely useful functional group methods that have received impetus from research The next chapters talk about the quantitative ring opening method and Diels Alder addition method Succeeding studies are about various compounds and its relevant subtopics The text provides a very great reference for undergraduates and postgraduates of chemistry and its affiliated studies Name Reactions of Functional Group Transformations Jie Jack Li, E. J.

Corey, 2007-07-09 This practical well organized reference delves deeply into functional group transformations to provide all the detailed information that researchers need Topics are organized into the following sections oxidation reduction asymmetric synthesis and functional group manipulations Each section includes a description of the functional group transformation the historical perspective mechanisms variations and improvements on the reaction synthetic utilities and applications for the reaction experimental details and references to the primary literature Contributors are well known and respected for their work on the specific name reactions **Protective Groups in Organic Chemistry** J.

McOmie, 2012-12-06 During the past decade there has been a great increase in the use of protective groups especially in the synthesis of large and complex organic molecules Perhaps the greatest activity has been in the peptide field where such triumphs as the total synthesis of insulin and of bovine ribonuclease molecular weight 13 700 have been achieved

Correspondingly more protective groups have been devised for the protection of amino and imino groups than for any other functional group There are many reviews and books on the synthesis of peptides but there has been no general survey of protective groups since my 1 own review in 1963 At that time the five main methods for the removal of protective groups involved acid or base hydrolysis reduction oxidation or thermal elimination reactions Recent advances include the use of photo sensitive and metal ion sensitive protective groups and the attachment of functional groups to reactive polymers as a method of protection during the solid phase synthesis of peptides and polynucleotides Another interesting development is the design and use of protective groups with a built in safety catch which can be released by a specific chemical reaction so that an otherwise stable bond is made labile at the appropriate moment thereby allowing the protective group to be removed under very mild conditions My own interest in protective groups dates from 1944 when as a student I gave two lectures on the subject and produced an 11 page review including 70 references Protecting Groups Philip J. Kocienski, 1994 The

didactic presentation of the material makes this book an essential bench top tool not only for specialists in organic chemistry but also for students diol carbonyl carboxyl amine special emphasis placed on deprotection conditions applied to complex structures where selectivity is a prime issue transformations accompanied by key experimental details examples from the recent literature span a wide domain of organic synthesis over 500 schemes aid visual retrieval end of chapter list reviews which amplify topics covered Comprehensive Organic Functional Group Transformations Alan R. Katritzky, Gordon W.

Kirby, Otto Meth-Cohn, Charles Wayne Rees, 2003-03-21 In this Volume containing 24 chapters devoted to carbon attached by

single bonds to two heteroatoms the reader will find several chapters reviewing the synthesis of familiar functional groups notably acetals dithioacetals aminals and the various mixed species The derivatives with tetracoordinated saturated carbon are described in Part I and those eg ketene acetals of tricoordinated carbon in Part II However the treatment is comprehensive and the authors have uncovered much fascinating chemistry concerning less familiar groups including some like geminal halohydrins halo amines and diols that are often unstable Again a surprisingly large number of compounds having two metals attached to the same carbon have been located in the literature and the abundance of phosphorus derivatives eg those with geminal nitrogen functions reflects their importance as biologically active species and as intermediates in synthesis Part III consists of a single short chapter describing dicoordinate carbon carbenes and examples of carbon cations anions and radicals Here the treatment is deliberately selective since throughout the work as a whole emphasis is placed on the synthesis of isolable species rather than the transient intermediates of organic reactions

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Comprehensive Organic Functional Group Transformations Alan R. Katritzky, Christopher J. Moody, Otto Meth-Cohn, Charles Wayne Rees, 2003-03-21 This Volume which is in three parts includes some of the most important functional groups of organic chemistry Part I deals with the synthesis of carboxylic acids and their derivatives acid halides esters amides etc together with their imino thio seleno and telluro analogues Part II covers cumulenes such as isocyanates isothiocyanates carbodiimides and related compounds whilst Part III deals with triply bonded functional groups The Chemistry of the Cyano Group Zvi Rappoport, 1970 The most complete resource in functional group chemistry Patai's *Chemistry of Functional Groups* is one of chemistry's landmark book series in organic chemistry An indispensable resource for the organic chemist this is the most comprehensive reference available in functional group chemistry Founded in 1964 by the late Professor Saul Patai the aim of Patai's *Chemistry of Functional Groups* is to cover all the aspects of the chemistry of an important functional group in each volume with the emphasis not only on the functional group but on the whole molecule

The Chemistry of Double-Bonded Functional Groups, Supplement A, Part 1 Saul Patai, 1977-04-05 The most complete resource in functional group chemistry Patai's *Chemistry of Functional Groups* is one of chemistry's landmark book series in organic chemistry An indispensable resource for the organic chemist this is the most comprehensive reference available in functional group chemistry Founded in 1964 by the late Professor Saul Patai the aim of Patai's *Chemistry of Functional Groups* is to cover all the aspects of the chemistry of an important functional group in each volume with the emphasis not only on the functional group but on the whole molecule *Comprehensive Organic Functional Group Transformations II*, 2004-12-16 *Comprehensive Organic Functional Group Transformations II* COFGT II will provide the first point of entry to the literature for all scientists interested in chemical transformations Presenting the vast subject of organic

synthesis in terms of the introduction and interconversion of all known functional groups COFGT II provides a unique information source documenting all methods of efficiently performing a particular transformation Organised by the functional group formed COFGT II consists of 144 specialist reviews written by leading scientists who evaluate and summarise the methods available for each functional group transformation Also available online via ScienceDirect featuring extensive browsing searching and internal cross referencing between articles in the work plus dynamic linking to journal articles and abstract databases making navigation flexible and easy For more information pricing options and availability visit www.info.sciencedirect.com By systematically treating each functional group in turn the work also identifies what is not known thus pointing the way to new research areas Follows the systematic layout of the successful 1995 COFGT reference work based on the arrangement and bonding of hetero atoms around a central carbon atom The work will save researchers valuable time in their research as each chapter is written by experts who have critically read and reviewed the literature and presented the best methods of forming every known functional group

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