

Halogen Acids

Acid	pKa	Conjugate base
Inorganic Acid		Base
*HI	-10	I ⁻
*HBr	-9	Br ⁻
*HCl	-8	Cl ⁻
HF	+3.2	F ⁻

Other Strong Inorganic Acids

Acid	pKa	Conjugate base
Inorganic acid		Base
H ₂ SO ₄	-3	HSO ₄ ⁻
*H ₂ O ⁺	-2	H ₂ O
HNO ₃	+1.4	NO ₃ ⁻

Weak Inorganic Acids

Acid	pKa	Conjugate base
Inorganic acid		Base
H ₂ S	+7	HS ⁻
*NH ₄ ⁺	+9	NH ₃
*H ₂ Si ⁺	+15	SiH ₃ ⁻
*H ₂ O	+16	HO ⁻

Organic Oxyacids, Alcohols

Acid	pKa	Conjugate base
Conjugate acid		Base
*ROH ₂ ⁺	-2	ROH
*ROH	+16	RO ⁻

ac: "R" is a generic representation for various alkyl groups. The bulk of the alkyl group impact acidity but for a ballpark pKa value +16 works.

pKa Values Acids

- The smaller the value of the pKa the more acidic the acid (stronger acid)
- The more Acidic an acid is the more stable its conjugate base.
- The less Acidic an acid is the less stable its conjugate base.
- A more stable base (a weaker base) has a more acidic conjugate acid relative to a less stable base.

Acid	pKa	Conjugate Base
Carboxylic Acid		Base
acetic acid	+3	acetate
benzoic acid	+4.1	benzoate
phenol	+10	phenoxide
4-methylphenol	-3	4-methylphenoxide
2-methylphenol	+5	2-methylphenoxide
3-methylphenol	+4.4	3-methylphenoxide
4-methylphenol	+2.5	4-methylphenoxide
2-methylphenol	+10.2	2-methylphenoxide
3-methylphenol	+10	3-methylphenoxide

Amides	Amides
(Chapter 17)	(Chapter 17)
acetamide	acetamide
benzamide	benzamide
4-methylbenzamide	4-methylbenzamide
2-methylbenzamide	2-methylbenzamide
3-methylbenzamide	3-methylbenzamide
Nitriles	Nitriles
(Chapter 17)	(Chapter 17)
acetonitrile	acetonitrile
benzonitrile	benzonitrile
4-methylbenzonitrile	4-methylbenzonitrile
2-methylbenzonitrile	2-methylbenzonitrile
3-methylbenzonitrile	3-methylbenzonitrile
Amines	Amines
(Chapter 17)	(Chapter 17)
acetamine	acetamine
benzamine	benzamine
4-methylbenzamine	4-methylbenzamine
2-methylbenzamine	2-methylbenzamine
3-methylbenzamine	3-methylbenzamine

Compound class	General structure	Functional group	Example
Alkanes (Chapters 3, 4)	R-H	None	CH ₃ CH ₂ CH ₂ CH ₃ Butane
Halalkanes (Chapters 6, 7)	R-X (X = F, Cl, Br, I)	-X	CH ₃ CH ₂ -Br Bromethane
Alcohols (Chapters 8, 9)	R-OH	-OH	CH ₃ CH ₂ -OH 1-Propanol (primary alcohol)
Ethers (Chapter 9)	R-O-R'	-O-	CH ₃ CH ₂ -O-CH ₃ Methoxyethane (ethyl methyl ether)
Thiols (Chapter 9)	R-SH	-SH	CH ₃ CH ₂ -SH Ethanesulfide
Alkenes (Chapters 11, 12)	(ROR)C=C(ROR)	C=C	CH ₃ -C=C-CH ₃ 2-Methylpropene
Alkynes (Chapter 13)	(ROR)-C≡C-(ROR)	-C≡C-	CH ₃ C≡CCH ₃ 2-Butyne
Aromatic compounds (Chapters 15, 16, 22)	(ROR)C ₆ H ₄ (ROR)	C ₆ H ₄	CH ₃ -C ₆ H ₄ -CH ₃ Methylbenzene (Toluene)
Aldehydes (Chapters 17, 18)	R-C(=O)-H	-C(=O)-H	CH ₃ CH ₂ -CHO Propanal
Ketones (Chapters 17, 18)	R-C(=O)-R'	-C(=O)-	CH ₃ CH ₂ -CO-CH ₂ CH ₃ 3-Pentanone
Carboxylic acids (Chapters 19, 20)	R-C(=O)-OH	-C(=O)-OH	CH ₃ CH ₂ -COOH Propanoic acid
Anhydrides (Chapters 19, 20)	R-C(=O)-O-C(=O)-R'	-C(=O)-O-C(=O)-	CH ₃ CH ₂ -CO-O-CO-CH ₂ CH ₃ Propanoic anhydride
Esters	R-C(=O)-OR'	-C(=O)-OR'	CH ₃ CH ₂ -COOCH ₃ Methyl propanoate

n	Name	Formula
1	Methane	CH ₄
2	Ethane	CH ₃ CH ₃
3	Propane	CH ₃ CH ₂ CH ₃
4	Butane	CH ₃ CH ₂ CH ₂ CH ₃
5	Pentane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃
6	Hexane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
7	Heptane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
8	Octane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
9	Nonane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
10	Decane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
11	Undecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
12	Dodecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
13	Tridecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
14	Tetradecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
15	Pentadecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
16	Hexadecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
17	Heptadecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
18	Octadecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
19	Nonadecane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
20	Icosane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃



Study Guide For Organic Chemistry Laboratory Macroscopic

**Kenneth L. Williamson, Robert
Minard, Katherine M. Masters**



Study Guide For Organic Chemistry Laboratory Macroscale:

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Modern Projects and Experiments in Organic Chemistry Jerry R. Mohrig, 2003 The Manuals Modern Projects and Experiments in Organic Chemistry helps instructors turn their organic chemistry laboratories into places of discovery and critical thinking In addition to traditional experiments the manual offers a variety of inquiry based experiments and multi week projects giving students a better understanding of how lab work is actually accomplished Instead of simply following directions students learn how to investigate the experimental process itself

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Comprehensive Organic Chemistry Experiments for the Laboratory Classroom Carlos A M Afonso, Nuno R Candeias, Dulce Pereira Simão, Alexandre F Trindade, Jaime A S Coelho, Bin Tan, Robert Franzén, 2020-08-28 This expansive and practical textbook contains organic chemistry experiments for teaching in the laboratory at the undergraduate level covering a range of functional group transformations and key organic reactions The editorial team have collected contributions from around the world and standardized them for publication Each experiment will explore a modern chemistry scenario such as sustainable chemistry application in the pharmaceutical industry catalysis and material sciences to name a few All the experiments will be complemented with a set of questions to challenge the students and a section for the instructors concerning the results obtained and advice on getting the best outcome from the experiment A section covering practical aspects with tips and advice for the instructors together with the results obtained in the laboratory by students has been compiled for each experiment Targeted at professors and lecturers in chemistry this useful text will provide up to date experiments putting the science into context for the students

Microscale Organic Laboratory Dana W. Mayo, Ronald M. Pike, David C. Forbes, 2010-01-12 This is a laboratory text for the mainstream organic chemistry course taught at both two and four year schools featuring both microscale experiments and options for scaling up appropriate experiments for use in the macroscale lab It provides complete coverage of organic laboratory experiments and techniques with a strong emphasis on modern laboratory instrumentation a sharp focus on safety in the lab excellent pre and post lab exercises and multi step experiments Notable enhancements to this new edition include inquiry driven experimentation validation of the purification process and the implementation of greener processes including microwave use to perform traditional experimentation

Macroscale and Microscale Organic Experiments Kenneth L. Williamson, 2003 Williamson offers a series of experiments that encourage accurate observation and the development of deductive reasoning He places strong emphasis on safety and the disposal of hazardous waste This manual offers both macroscale conventional large scale and microscale small scale procedures for each experiment

Experimental Organic Chemistry Daniel R. Palleros, 2000-02-04 This cutting edge lab manual takes a multiscale approach presenting both micro semi micro and macroscale techniques The manual is easy to navigate with all relevant techniques found as they are needed Cutting edge subjects such as HPLC bioorganic chemistry multistep synthesis and more are presented in a clear and engaging fashion

Microscale and Macroscale Techniques in the Organic Laboratory Donald L. Pavia, Gary M. Lampman, George S. Kriz, Randall G. Engel, 2002 The well known and tested organic chemistry laboratory techniques of the two best selling organic chemistry lab manuals INTRODUCTION TO ORGANIC LABORATORY TECHNIQUES A SMALL SCALE APPROACH and INTRODUCTION TO ORGANIC LABORATORY TECHNIQUES A MICROSCALE APPROACH 3 e are now assembled in one textbook Professors can use any experiments alongside MICROSCALE AND MACROSCALE TECHNIQUES IN THE ORGANIC LABORATORY Experiments can be selected and assembled from the two Pavia organic chemistry lab manuals from professors homegrown labs or even competing texts The 375 page hardcover book serves as a reference for all students of organic chemistry With clearly written prose and accurately drawn diagrams students can feel confident setting up and running organic labs

Organic Chemistry Laboratory Charles E. Bell, 1997 *Subject Guide to Children's Books in Print* 1997 Bowker Editorial Staff, R R Bowker Publishing, 1996-09

Operational Organic Chemistry John W. Lehman, 2009 This comprehensive lab companion provides enough theory to help students understand how and why an operation works but emphasizes the practical aspects of an operation to help them perform the operation successfully in the lab The new 4th edition contains a new introductory section Chemistry and the Environment which includes a discussion of the principles of green chemistry Several green experiments have been added and some experiments from the previous editions have been revised to make them greener

The Organic Chem Lab Survival Manual, A Student's Guide to Techniques James W. Zubrick, 2008 Written for the laboratory that accompanies the sophomore junior level courses in Organic Chemistry Zubrick provides students with a valuable guide to the basic techniques of the Organic Chemistry lab The book will help students understand and practice good lab safety It will also help students become familiar with basic instrumentation techniques and apparatus and help them master the latest techniques such as interpretation of infrared spectroscopy The guide is mostly macroscale in its orientation Publisher's website

Microscale Techniques for the Organic Laboratory Dana W. Mayo, Peter K. Trumper, Ronald M. Pike, 2001-06-29 Written for the mainstream sophomore junior level Organic Chemistry course offered at both two and four year schools this manual focuses upon implementing microscale techniques into the laboratory

Subject Guide to Books in Print, 1997

Introduction to Organic Laboratory Techniques Donald L. Pavia, 1999 This edition features the successful format that has characterized the previous editions It includes essays that add relevance and interest to the experiments and emphasis on the development of the important laboratory techniques the use of spectroscopy and instrumental methods of analysis a section featuring conventional scale experiments and methods and a wide selection of well tested and well written experiments

Introduction to Green Chemistry John Andraos, Albert S. Matlack, 2022-03-09 Interest in green chemistry and clean processes has grown so much in recent years that topics such as fluorous biphasic catalysis metal organic frameworks and process intensification which were barely mentioned in the First Edition have become major areas of research In addition

government funding has ramped up the development of fuel cells and biofuels This reflects the evolving focus from pollution remediation to pollution prevention Copiously illustrated with more than 800 figures the Third Edition provides an update from the frontiers of the field It features supplementary exercises at the end of each chapter relevant to the chemical examples introduced in each chapter Particular attention is paid to a new concluding chapter on the use of green metrics as an objective tool to demonstrate proof of synthesis plan efficiency and to identify where further improvements can be made through fully worked examples relevant to the chemical industry

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Experimental Organic Chemistry Jerry R. Mohrig, 1999

This laboratory manual seeks to provide a balance between the approaches of microscale and macroscale **Books in Print**, 1991

Organic Chemistry Laboratory I Christopher Callam, 2007-01-03

[Complete Preparation for the MCAT](#) Williams & Wilkins Review, 1998-04 Here is the most respected test prep book for the Medical College Admission Test you can buy featuring an active learning approach for a better understanding of the exam s content and a better chance for success Unique to this guide are coverage of all recent changes in the MCAT plus a step by step plan for sharpening cognitive skills developing problem solving skills and critical thinking This thorough guide replaces expensive test preparation courses while giving students exactly what they need to get ready for the MCAT

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