

Acids and Bases

Overview of Acids and Bases

Acid-base Acids and Bases

Acids: Donates its proton to base (proton donor)

Base: Donates its lone pair to acid (proton acceptor)



Acid-base: (1) only in water, (2) only HCl is a true

What about organic molecules and inorganic substances?

Acid-base Acids and Bases

Acids are proton donors, Bases are proton acceptors.



What about the strength of acid-base reactions?

Is there a way to know the base protonic charge of the base?

and check for acid protonic charge of the acid?

Is there a way to know the base protonic charge of the base?

in the other way?

Remember: $\text{acid} + \text{base} \rightleftharpoons \text{conjugate acid} + \text{conjugate base}$

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Acid Strength

What does it mean "strong acid"?

Relatively speaking, the more the acid dissociates into a proton, the stronger it is.



The dissociation of the acid is a reversible reaction that is described by equilibrium constant.



Acid Strength and pKa

The Ka value of an acid (acidic) and its conjugate base (basic) are related.



The product of Ka and Kb is equal to Kw.

To simplify the equation, $\text{pKa} = -\log K_a$ and $\text{pKb} = -\log K_b$.

$$\text{pKa} + \text{pKb} = 14$$

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For the stronger the acid, the lower the pKa value.

Acids are pKa values of their conjugate base.



What makes the Acid Strong?

The strength of the acid is determined by the stability of the conjugate base.

The stronger the acid, the more stable the conjugate base.



Acids are pKa values of their conjugate base.

There are two factors to be considered when assessing the stability of the conjugate base.

(1) The first and the last factor is the **charge** to which the conjugate base is converted.

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(1) The first factor for determining the acidity is called **inductive**.

Inductive is inductive effect is the transmission of charge through atoms.

Electronegative atoms pull the negative charge and help to stabilize the conjugate base.



The more electronegative, the more electron withdrawing, the stronger the acid.



The closer the electronegative atom to the hydrogen, the stronger the acid.

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Choosing a Base to Deprotonate a Given Compound

Suppose you need to deprotonate the following compound: H_2O

Deprotonate means remove the proton (acidic proton).

First, find the pKa value: $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$

Then, the chemical equation of the conjugate base with a conjugate base (B):



The pKa of the conjugate acid must be higher than 14, so the reaction will be favored.

Find a conjugate base with a pKa value higher than 14. Acids are weak when pKa > 14.

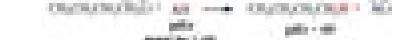


Choosing an Acid to Protonate a Given Compound

Suppose you need to protonate the following compound: OH^-

Protonate means add a proton (acidic proton). Which is a very reactive base and needs to be quenched before being disposed.

To do that, write the chemical equation of the reaction with an acid (HA):



The pKa of the acid must be lower than 14, so the reaction will be favored.

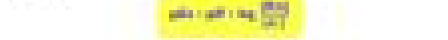
Acids are weak when pKa > 14. Acids are weak when pKa > 14.



Hammett-Hansch Equation

The equation shows whether the compound with a given pKa is an acid or base.

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Chemistry Study Guide Acids And Bases

Konstantinos Papadopoulos



Chemistry Study Guide Acids And Bases:

Basic Concepts of Chemistry, 9e Study Guide and Solutions Manual Leo J. Malone, Theodore O. Dolter, 2012-01-03
The 9th edition of Malone's Basic Concepts of Chemistry provides many new and advanced features that continue to address general chemistry topics with an emphasis on outcomes assessment. New and advanced features include an objectives grid at the end of each chapter which ties the objectives to examples within the sections, assessment exercises at the end of each section, and relevant chapter problems at the end of each chapter. A new Math Check allows quick access to the needed basic skill. The first chapter now includes brief introductions to several fundamental chemical concepts, and Chapter Synthesis Problems have been added to the end of each chapter to bring key concepts into one encompassing problem. Every concept in the text is clearly illustrated with one or more step-by-step examples. Making it Real essays have been updated to present timely and engaging real-world applications, emphasizing the relevance of the material they are learning. This edition continues the end-of-chapter Student Workshop activities to cater to the many different learning styles and to engage users in the practical aspect of the material discussed in the chapter. [Acid-Base Equilibria - Quick Chemistry Review Outline and Handout](#) E. Staff, Acid-Base Equilibria Quick Review Outline and Handout for All Students. Learn and review on the go. Use Quick Review Chemistry Notes to help you learn or brush up on the subject quickly. You can use the review notes as a reference to understand the subject better and improve your grades. Easy-to-remember facts to help you perform better. Perfect study notes for all high school and college students. 10 Pages. *Organic Chemistry Study Guide with Solutions Manual* Neil E. Schore, 2007. The guide includes chapter introductions that highlight new material, chapter outlines, detailed comments for each chapter section, a glossary, and solutions to the end-of-chapter problems presented in a way that shows students how to reason their way to the answer. [Robinson Chemistry Study Guide](#) Robinson, 1992. **Organic Chemistry, 12e Binder Ready Version Study Guide & Student Solutions Manual** T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder, 2016-04-11. This is the Student Study Guide Solutions Manual to accompany Organic Chemistry 12th Edition. The 12th edition of Organic Chemistry continues Solomons, Fryhle, Snyder's tradition of excellence in teaching and preparing students for success in the organic classroom and beyond. A central theme of the authors' approach to organic chemistry is to emphasize the relationship between structure and reactivity. To accomplish this, the content is organized in a way that combines the most useful features of a functional group approach with one largely based on reaction mechanisms. The authors' philosophy is to emphasize mechanisms and their common aspects as often as possible and at the same time use the unifying features of functional groups as the basis for most chapters. The structural aspects of the authors' approach show students what organic chemistry is. Mechanistic aspects of their approach show students how it works. And wherever an opportunity arises, the authors show students what it does in living systems and the physical world around us. **Basic Concepts of Chemistry, Study Guide** Leo J. Malone, 1989-02-21. This Third Edition revised to provide smoother transitions

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Organic Chemistry, 5e Student Study Guide and Solutions Manual David R. Klein,Laurie S. Starkey,2025-03-04 Success in organic chemistry requires mastery in two core aspects fundamental concepts and the skills needed to apply those concepts and solve problems With Organic Chemistry Student Study Guide and Solutions Manual 5th Edition students can learn to become proficient at approaching new situations methodically based on a repertoire of skills These skills are vital for successful problem solving in organic chemistry **The Complete Chemistry Study Guide and Note Cards and MCAT**

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Study Guide & Solutions Manual Pamela Mills,Amina El-Ashmawy,2003-04-14 Designed to help students understand the material better and avoid common mistakes Also includes solutions and explanations to odd numbered exercises

Essential Concepts of Chemistry Study Guide James R. Braun,Sherman,1999 **Chemistry, Study Guide** James E. Brady,John R. Holum,1993-02-11 Offers accurate lucid and interesting explanations of basic concepts and facts of chemistry while helping students develop skills in analytical thinking and problem solving Students are taught in a variety of ways to think of skills as tools that can be used to solve complex problems Several aids are included to help focus and inspire student interest frequent reference to common chemicals in commercial products numerous photographs of reactions in chapter practice exercises following worked examples **Organic Chemistry, Study Guide and Solutions Manual** T. W. Graham

Solomons,Craig B. Fryhle,2000 On the cover of this book is a Pacific yew tree found in the ancient forests of the Pacific Northwest The bark of the Pacific yew tree produces Taxol found to be a highly effective drug against ovarian and breast cancer Taxol blocks mitosis during eukaryotic cell division The supply of Taxol from the Pacific yew tree is vanishingly small however A single 100 year old tree provides only about one dose of the drug roughly 300 mg For this reason as well as the

spectacular molecular architecture of Taxol synthetic organic chemists fiercely undertook efforts to synthesize it Five total syntheses of Taxol have thus far been reported Now a combination of isolation of a related metabolite from European yew needles and synthesis of Taxol from that intermediate supply the clinical demand This case clearly demonstrates the importance of synthesis and the use of organic chemistry It s just one of the many examples used in the text that will spark the interest of students and get them involved in the study of organic chemistry **Chemistry, Study Guide** Bernice G. Segal, Peter S. Shenkin, 1989-02-14 This Second Edition of the first year chemistry text known for its clarity of exposition and its large number of illustrative worked problems contains a more rigorous treatment of electrochemistry chemical equilibrium and thermochemistry Worked examples now number over 300 and exercises over 1460 **Clinical Chemistry Study Guide** Norbert W. Tietz, Tietz, 1987 Organic Chemistry Study Guide & Problems Book Brent L. Iverson, 1998 Companion to Organic chemistry 2nd ed by William H Brown Provides a detailed section by section overview of the major points covered in the text All of the problems from the text are reprinted here with detailed stepwise solutions

Embracing the Melody of Appearance: An Psychological Symphony within **Chemistry Study Guide Acids And Bases**

In some sort of used by monitors and the ceaseless chatter of quick conversation, the melodic elegance and mental symphony created by the prepared term often disappear into the background, eclipsed by the persistent sound and interruptions that permeate our lives. But, nestled within the pages of **Chemistry Study Guide Acids And Bases** a wonderful literary value overflowing with organic feelings, lies an immersive symphony waiting to be embraced. Crafted by a masterful musician of language, that fascinating masterpiece conducts viewers on an emotional journey, skillfully unraveling the concealed melodies and profound affect resonating within each cautiously constructed phrase. Within the depths with this poignant analysis, we shall examine the book is central harmonies, analyze its enthralling writing design, and submit ourselves to the profound resonance that echoes in the depths of readers souls.

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