



CHEMISTRY

CHEAT SHEET

EQUILIBRIUM

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Chemical Equilibrium occurs when the concentrations of the chemical species remain the same with time (dynamic equilibrium). Equilibrium reactions are represented by the symbol \rightleftharpoons .

<p>What is Equilibrium?</p> <p>Chemical Equilibrium occurs when the concentrations of the chemical species remain the same with time (dynamic equilibrium). Equilibrium reactions are represented by the symbol \rightleftharpoons.</p> <p>Equilibrium is a dynamic process. It is not a static state. The reaction is still occurring, but the concentrations of the reactants and products are constant.</p> <p>Equilibrium is reached when the rate of the forward reaction is equal to the rate of the reverse reaction.</p>	<p>Equilibrium Constant</p> <p>For a general reaction:</p> $aA + bB \rightleftharpoons cC + dD$ <p>The equilibrium constant, K_c, is defined as:</p> $K_c = \frac{[C]^c [D]^d}{[A]^a [B]^b}$ <p>where $[A]$, $[B]$, $[C]$, and $[D]$ are the concentrations of the reactants and products at equilibrium.</p>	<p>Graph showing concentration vs. time for a reaction reaching equilibrium. The concentration of reactants decreases and the concentration of products increases until they reach a constant value.</p>												
<p>Equilibrium Constant, K_c</p> <p>The equilibrium constant, K_c, is a measure of the extent of a chemical reaction. It is defined as the ratio of the concentrations of the products to the concentrations of the reactants at equilibrium.</p> <p>For a general reaction:</p> $aA + bB \rightleftharpoons cC + dD$ <p>The equilibrium constant, K_c, is defined as:</p> $K_c = \frac{[C]^c [D]^d}{[A]^a [B]^b}$ <p>where $[A]$, $[B]$, $[C]$, and $[D]$ are the concentrations of the reactants and products at equilibrium.</p>	<p>Equilibrium Constant, K_c</p> <table><tr><th>Equilibrium Constant, K_c</th><th>Meaning</th></tr><tr><td>$K_c > 1$</td><td>Concentration of products is greater than concentration of reactants.</td></tr><tr><td>$K_c = 1$</td><td>Concentration of products is equal to concentration of reactants.</td></tr><tr><td>$K_c < 1$</td><td>Concentration of reactants is greater than concentration of products.</td></tr></table>		Equilibrium Constant, K_c	Meaning	$K_c > 1$	Concentration of products is greater than concentration of reactants.	$K_c = 1$	Concentration of products is equal to concentration of reactants.	$K_c < 1$	Concentration of reactants is greater than concentration of products.				
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<p>Equilibrium Constant, K_p</p> <p>The equilibrium constant, K_p, is a measure of the extent of a chemical reaction. It is defined as the ratio of the partial pressures of the products to the partial pressures of the reactants at equilibrium.</p> <p>For a general reaction:</p> $aA + bB \rightleftharpoons cC + dD$ <p>The equilibrium constant, K_p, is defined as:</p> $K_p = \frac{P_C^c P_D^d}{P_A^a P_B^b}$ <p>where P_A, P_B, P_C, and P_D are the partial pressures of the reactants and products at equilibrium.</p>	<p>Equilibrium Constant, K_p</p> <table><tr><th>Equilibrium Constant, K_p</th><th>Meaning</th></tr><tr><td>$K_p > 1$</td><td>Partial pressure of products is greater than partial pressure of reactants.</td></tr><tr><td>$K_p = 1$</td><td>Partial pressure of products is equal to partial pressure of reactants.</td></tr><tr><td>$K_p < 1$</td><td>Partial pressure of reactants is greater than partial pressure of products.</td></tr></table>		Equilibrium Constant, K_p	Meaning	$K_p > 1$	Partial pressure of products is greater than partial pressure of reactants.	$K_p = 1$	Partial pressure of products is equal to partial pressure of reactants.	$K_p < 1$	Partial pressure of reactants is greater than partial pressure of products.				
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<p>Le Chatelier's Principle: the effect of changing conditions on equilibrium</p> <table><tr><th>Condition</th><th>Effect on Equilibrium</th><th>Example</th></tr><tr><td>Concentration</td><td><ul style="list-style-type: none">Increasing concentration of a reactant will shift the equilibrium to the right.Increasing concentration of a product will shift the equilibrium to the left.</td><td>$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$<p>Increasing concentration of N_2 will shift the equilibrium to the right, producing more NH_3.</p></td></tr><tr><td>Pressure</td><td><ul style="list-style-type: none">Increasing pressure will shift the equilibrium to the side with fewer moles of gas.Decreasing pressure will shift the equilibrium to the side with more moles of gas.</td><td>$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$<p>Increasing pressure will shift the equilibrium to the right, producing more NH_3.</p></td></tr><tr><td>Temperature</td><td><ul style="list-style-type: none">Increasing temperature will shift the equilibrium to the endothermic side.Decreasing temperature will shift the equilibrium to the exothermic side.</td><td>$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$<p>Increasing temperature will shift the equilibrium to the left, producing less NH_3.</p></td></tr></table>			Condition	Effect on Equilibrium	Example	Concentration	<ul style="list-style-type: none">Increasing concentration of a reactant will shift the equilibrium to the right.Increasing concentration of a product will shift the equilibrium to the left.	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ <p>Increasing concentration of N_2 will shift the equilibrium to the right, producing more NH_3.</p>	Pressure	<ul style="list-style-type: none">Increasing pressure will shift the equilibrium to the side with fewer moles of gas.Decreasing pressure will shift the equilibrium to the side with more moles of gas.	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ <p>Increasing pressure will shift the equilibrium to the right, producing more NH_3.</p>	Temperature	<ul style="list-style-type: none">Increasing temperature will shift the equilibrium to the endothermic side.Decreasing temperature will shift the equilibrium to the exothermic side.	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ <p>Increasing temperature will shift the equilibrium to the left, producing less NH_3.</p>
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Chemistry Equilibrium Study Guide

Iris Stovall



Chemistry Equilibrium Study Guide:

Study Guide for Chemical Principles [by] Steven S. Zumdahl Steven S. Zumdahl, Paul B. Kelter, 1995 The Study Guide reflects the unique problem solving approach taken by the Chemical Principles text The new edition of the Study Guide includes many new worked out examples *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 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 **Study Guide and Solutions Manual for Seager/Slabaugh's Chemistry for Today** Seager/Slabaugh, 2004 The fifth edition of the Study Guide and Student Solutions Manual has been updated to reflect all of the changes to the text This ancillary tests the student on the learning objectives in each chapter and provides answers to all of the even numbered end of chapter exercises New additional activities have been added to include a review of each section of the chapter and a section entitled Tying It All Together with a Laboratory Application *Fundamentals of Chemistry, Study Guide* James E. Brady, John R. Holum, 1988-04-20 This Third Edition of the widely used fundamentals textbook for science majors maintains the conversational writing style that made the previous editions so popular while including up to date treatments of important and current topics Emphasizes descriptive chemistry chemical reactions and properties while maintaining a solid treatment of chemical principles Common chemicals are used whenever possible as examples in both theoretical discussions and in problems and exercises Incorporates many pedagogical aids each chapter begins with a brief table of contents and each section begins with a preview of topics covered Chapters include frequent margin comments figures and photographs

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Chemistry Equilibrium Study Guide Book Review: Unveiling the Magic of Language

In a digital era where connections and knowledge reign supreme, the enchanting power of language has become much more apparent than ever. Its capability to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Chemistry Equilibrium Study Guide**," published by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound effect on our existence. Throughout this critique, we shall delve to the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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