

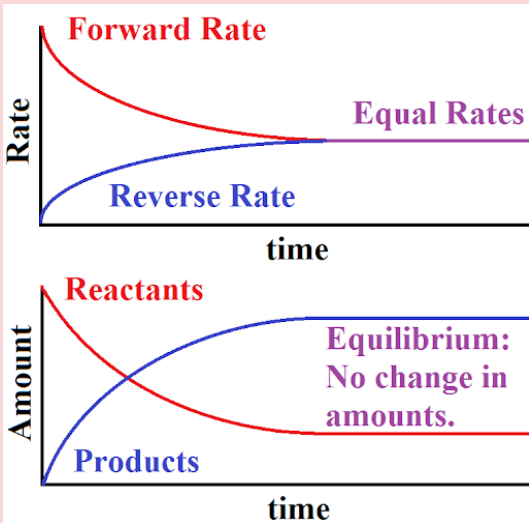
AP Chemistry Unit 8: Equilibrium

(Correlates with part of AP Chemistry CED Unit 7 Objectives found in Unit 8 booklet)

[Textbook Chapter 13 Link](#)



Directions: Complete the tasks from the checklist. If you have any issues with links or have questions, please contact your teacher!

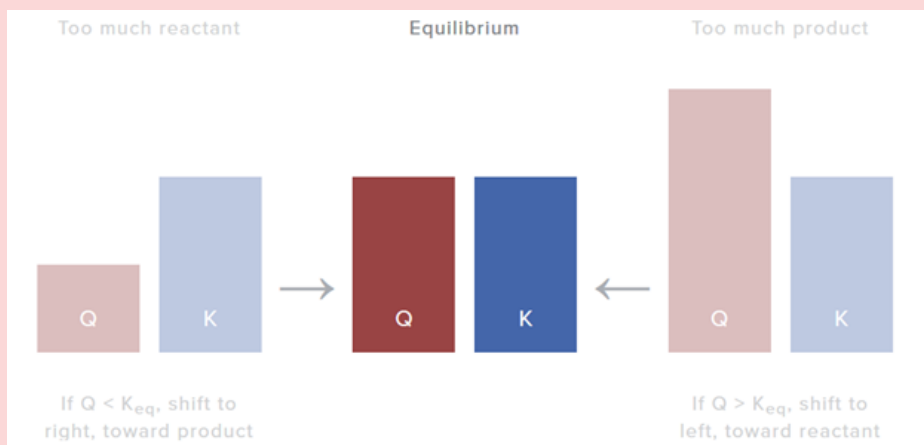
Class 0 (Thurs, 2/6) Objectives	Class 0 Tasks								
<p>1.) Connect the reversibility of a chemical process to observations.</p>  <p>2.) Calculate the equilibrium constant, K, from data (tabular, graphical, etc.) of a system at equilibrium. (“Law of Mass Action”)</p> <p>3.) Determine which chemical species has large or small concentrations at equilibrium, based on a reversible reaction having a large or small K.</p>	<p><input type="checkbox"/> REQUIRED ASSESSMENT - Units 1-7 Exam (MC = 23 pts, 40 minutes) Try YOUR best! 🍀 Good luck! 😊</p> <p>Homework:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Watch Mrs. Long's Video Notes - Equilibrium Basics (Copy notes on p. 10-15) (20 min) <input type="checkbox"/> Regents Refresher: Equilibrium (p. 6-9) & check your answers <hr/> <p>Additional Resources: Unit 8 Additional Resources</p> <ul style="list-style-type: none"> ★ Reading Guide: Text Sections 13.1-13.4 (p. 16) & check your textbook answers ★ Intro to Equilibrium Video 								
Classes 1-2 (Fri, 2/7) Objectives	Classes 1-2 Tasks								
<p>1.) Connect the reversibility of a chemical process to observations.</p> <p>2.) Calculate the equilibrium constant, K, from data (tabular, graphical, etc.) of a system at equilibrium. (“Law of Mass Action”)</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> $aA + bB \rightleftharpoons cC + dD$ $K_c = \frac{[C]_{eq}^c [D]_{eq}^d}{[A]_{eq}^a [B]_{eq}^b}$ $K_p = \frac{P_C^c P_D^d}{P_A^a P_B^b}$ <p>$K_c \gg 1$: Mixture contains mostly products $K_c \ll 1$: Mixture contains mostly reactants</p> </div> <p>3.) Determine which chemical species has large or small concentrations at equilibrium, based on a reversible reaction having a large or small K.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 50%;">If you...</th> <th style="width: 50%;">What happens to K?</th> </tr> </thead> <tbody> <tr> <td>...reverse the equation</td> <td>$K_{new} = \frac{1}{K_{original}}$</td> </tr> <tr> <td>...multiply each coefficient by N</td> <td>$K_{new} = (K_{original})^N$</td> </tr> <tr> <td>...add two different equations together</td> <td>$K_{overall} = (K_1 \times K_2)$</td> </tr> </tbody> </table>	If you...	What happens to K ?	...reverse the equation	$K_{new} = \frac{1}{K_{original}}$...multiply each coefficient by N	$K_{new} = (K_{original})^N$...add two different equations together	$K_{overall} = (K_1 \times K_2)$	<p>Period 5.1:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Warm Up <input type="checkbox"/> Equilibrium “Snowball Fight” & The Magnitude of K (p. 17-18) Data & Mrs. Long’s Note Copy <input type="checkbox"/> K & Equation Changes ➤ p. 19 <p>Period 6:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Desmos - Manipulating Equilibrium Constants <input type="checkbox"/> Check-in examples from notes p. 14 & 15 <input type="checkbox"/> Practice (p. 21) & check your answers <input type="checkbox"/> Equilibrium Basics Practice (p. 22-24) & check your answers <p>Homework:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Anything not finished in class <input type="checkbox"/> Submit this: Equilibrium Basics Checkpoint (Google Form posted on Google Classroom) <input type="checkbox"/> Reading Guide: Text Sections 13.5-13.6 (p. 25) & check your textbook answers <input type="checkbox"/> Predicting Shifts (Q vs. K) Simulation (Info on p. 26) <hr/> <p>Additional Resources: Unit 8 Additional Resources</p> <ul style="list-style-type: none"> ★ AP Daily - Introduction to Equilibrium (7 min) ★ Jeremy Krug - What is Equilibrium? ★ Jeremy Krug's Topics 7.2-7.3 Video - Writing an Equilibrium
If you...	What happens to K ?								
...reverse the equation	$K_{new} = \frac{1}{K_{original}}$								
...multiply each coefficient by N	$K_{new} = (K_{original})^N$								
...add two different equations together	$K_{overall} = (K_1 \times K_2)$								

Constant Expression

- ★ [Vapor Pressure & Equilibrium](#) (2 min)
- ★ AP Daily - [Direction of Reversible Reactions](#) (6 min)
- ★ AP Daily - [Magnitude of the Equilibrium Constant](#) (8 min)
- ★ AP Daily - [Properties of the Equilibrium Constant](#) (7 min)
- ★ [Jeremy Krug's Topics 7.4-7.5 Video - Magnitude of the Equilibrium Constant](#)
- ★ [Jeremy Krug - Manipulating Reactions and Its Effect on the Equilibrium Constant](#)
- ★ [Mr. Farabaugh's Topics 7.1-7.5 Video](#)
(The link to his study guide/packet that he fills out can be found below his YouTube video!)
- ★ AP Daily - [Reaction Quotient & Equilibrium Constant](#) (9 min)

Class 3 (Mon, 2/10) Objectives

- 1.) By comparing the reaction quotient, Q , with K , predict and justify the prediction as to whether a reaction will proceed towards products or reactants as equilibrium is approached.



- 2.) Given a set of initial conditions (concentrations or partial pressures) and K , use stoichiometric relationships and the law of mass action ($Q=K$ at equilibrium) to determine qualitatively and/or quantitatively the conditions at equilibrium for a system involving a single reversible reaction.

Class 3 Tasks

- Discuss AP Classroom Progress Checks for Review Credit
- "Warm Up": The Reaction Quotient, Q (p. 27)
- NOTES: Equilibrium Problems & ICE Charts - Example #1 (p. 28)
[Mrs. Long's Video Notes](#) (Watch first 8 min, ONLY)
- Work on homework

Homework:

- Equilibrium Example #1 Practice (p. 29-30) & [check your answers](#)
- Unit 1 Progress Check due by midnight on Sunday, 2/23 in AP Classroom**

Additional Resources:

[Unit 8 Additional Resources](#)

- ★ AP Daily - [Reaction Quotient & Equilibrium Constant](#) (9 min)
- ★ AP Daily - [Calculating the Equilibrium Constant](#) (8 min)
- ★ AP Daily - [Representations of Equilibrium](#) (7 min)
- ★ [Jeremy Krug - Representations of Equilibrium](#)
- ★ [Jeremy Krug - Equilibrium Practice Problems - The ICE Box Method](#)

Class 4 (Tues, 2/11) Objectives

- 4.) By comparing the reaction quotient, Q , with K , predict and justify the prediction as to whether a reaction will proceed towards products or reactants as equilibrium is approached.
- 5.) Given a set of initial conditions (concentrations or partial pressures) and K , use stoichiometric relationships and the law of mass action ($Q=K$ at equilibrium) to determine qualitatively and/or quantitatively the conditions at equilibrium for a system involving a single reversible reaction.

Class 4 Tasks

- NOTES: Equilibrium Problems & ICE Charts - Examples #2-3 (p. 31, 33)
[Mrs. Long's Video Notes](#) (Start at 8:00 & watch to end)
- Work on homework

Homework:

- Equilibrium Example #2 Practice (p. 32) & [check your answers](#)
- Equilibrium Example #3 Practice (p. 34, [Text p. 646 #57](#)) & [check your answers](#)
- Unit 1 Progress Check due by midnight on Sunday, 2/23 in AP Classroom**

Additional Resources:

[Unit 8 Additional Resources](#)

- ★ AP Daily - [Calculating Equilibrium Concentrations Video 1](#) (8 min); [Video 2](#) (6 min)
- ★ AP Daily - [Representations of Equilibrium](#) (7 min)
- ★ [Bozeman Science - Equilibrium](#)
- ★ [Jeremy Krug - Equilibrium Practice Problems - The ICE Box Method](#)
- ★ [Jeremy Krug - Working with Very Small Equilibrium Constants - The 5% Rule](#)

Class 5 (Wed, 2/12) Objectives

- 4.) By comparing the reaction quotient, Q , with K , predict and justify the prediction as to whether a reaction will proceed towards products or reactants as equilibrium is approached.
- 5.) Given a set of initial conditions (concentrations or partial pressures) and K , use stoichiometric relationships and the law of mass action ($Q=K$ at equilibrium) to determine qualitatively and/or

Class 5 Tasks

- Google Slides Review
 - Get out scrap paper or white board, calculator, & Ref Sheet
- Go over exam**
- Work on homework/quiz review!

Homework:

- Equilibrium Quiz Practice (p. 35-41) & [check your answers](#)

quantitatively the conditions at equilibrium for a system involving a single reversible reaction.

Quiz during Period 6 tomorrow! (up through p. 41)

REMINDER: [ANY past content is FAIR GAME!](#)

Any booklet practice not yet completed

Unit 1 Progress Check due by midnight on Sunday, 2/23 in AP Classroom

Additional Resources: [Unit 8 Additional Resources](#)

★ AP Daily - Calculating Equilibrium Concentrations
[Video 1 \(8 min\)](#); [Video 2 \(6 min\)](#)

★ AP Daily - [Representations of Equilibrium \(7 min\)](#)

★ [Bozeman Science - Equilibrium](#)

★ [Jeremy Krug - Equilibrium Practice Problems - The ICE Box Method](#)

★ [Jeremy Krug - Working with Very Small Equilibrium Constants - The 5% Rule](#)

Classes 6-7 (Thurs, 2/13) Objectives

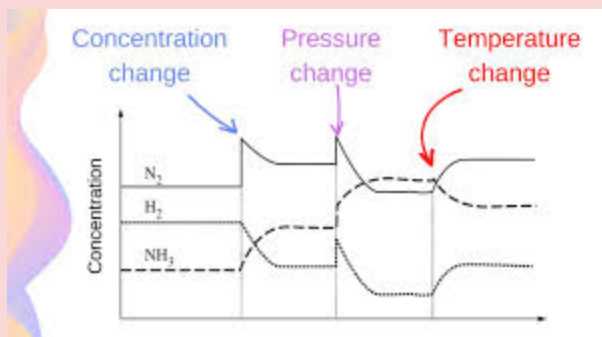
Classes 6-7 Tasks

4.) By comparing the reaction quotient, Q , with K , predict and justify the prediction as to whether a reaction will proceed towards products or reactants as equilibrium is approached.

5.) Given a set of initial conditions (concentrations or partial pressures) and K , use stoichiometric relationships and the law of mass action ($Q=K$ at equilibrium) to determine qualitatively and/or quantitatively the conditions at equilibrium for a system involving a single reversible reaction.

6.) Connect Le Châtelier's Principle to the Q and K comparison by explaining the effects of stress on Q and K .

7.) Use Le Châtelier's Principle to predict the direction of shift from possible stresses on a system in equilibrium.



8.) Use Le Châtelier's Principle to design a set of conditions to optimize a desired outcome, such as product yield or color change.

Period 5.1:

Warm Up

Questions from Equilibrium Quiz Practice? (p. 35-41)

Submit this: Q & Equilibrium Problems Checkpoint (Google Form posted on Google Classroom)

Period 6:

QUIZ (Text Sections 13.1-13.6, 10 pts, 23 min)

Work on homework

Intro LeChatelier's Principle (p. 46)

Homework:

Regents Refresher: LeChatelier's Principle (p. 42-45) & [check your answers](#)

[Start Desmos - Q vs. K & LeChatelier's Principle](#) (due the class after break)

Unit 1 Progress Check due by midnight on Sunday, 2/23 in AP Classroom

Additional Resources: [Unit 8 Additional Resources](#)

★ Reading Guide: Text Section 13.7 (p. 54) & [check your textbook answers](#)

Class 8 (Fri, 2/14) Objectives

Class 8 Tasks

6.) Connect Le Châtelier's Principle to the Q and K comparison by explaining the effects of stress on Q and K .

7.) Use Le Châtelier's Principle to predict the direction of shift from possible stresses on a system in equilibrium.

8.) Use Le Châtelier's Principle to design a set of conditions to optimize a desired outcome, such as product yield or color change.

NOTES: LeChatelier's Principle (p. 46-53)

[Mrs. Long's Video Notes \(20 min.\)](#) & [Google Slide Show](#)

Lab # 9 Introduction - Colors of the Rainbow & Equilibrium

Work on homework

Homework/February Break Work:

Complete the Pre-Lab

[Desmos - Q vs. K & LeChatelier's Principle](#)

LeChatelier's Principle Practice (p. 55-57) & [check your answers](#)

Past AP FRQ Questions (p. 58-60) & [check your answers](#)

Start the Unit 8 Test Set (p. 61) & [check your answers](#)

Exam on Wednesday, 2/26!

[RH Unit 8 Review - AP Classroom Progress Check \(Google Form\)](#)

REMINDER: [ANY past content is FAIR GAME!](#)

Unit 1 Progress Check due by midnight on Sunday, 2/23 in AP Classroom

Additional Resources: [Unit 8 Additional Resources](#)

★ Reading Guide: Text Section 13.7(p. 54) & [check your textbook answers](#)

★ AP Daily - Introduction to Le Chatelier's Principle

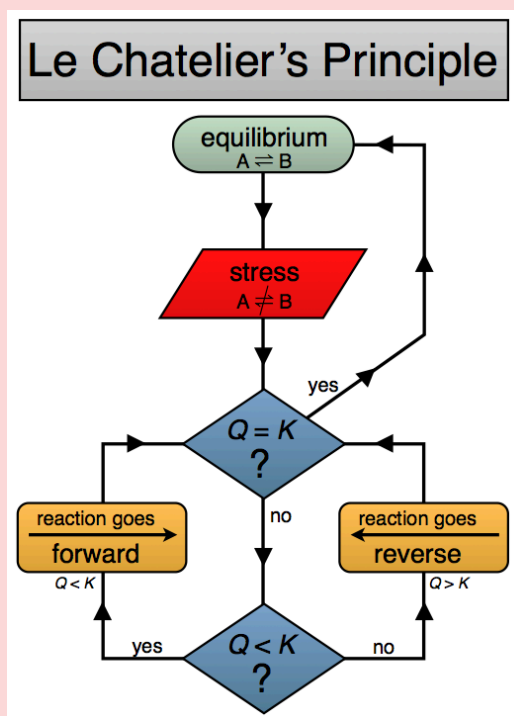


- ★ [Video 1](#) (10 min); [Video 2](#) (5 min); [Video 3](#) (7 min)
- ★ AP Daily - Reaction Quotient & Le Chatelier's Principle [Video 1](#) (7 min); [Video 2](#) (9 min)
- ★ [Jeremy Krug - LeChatelier's Principle](#)
- ★ [Jeremy Krug - Reaction Quotient & LeChatelier's Principle](#)
- ★ [LeChatelier's Principle Video](#)
- ★ [Sciencegeek.net: LeChatelier's principle predictions with feedback](#)

Class 9 (Mon, 2/24) Objectives

Class 9 Tasks

6.) Connect Le Châtelier's Principle to the Q and K comparison by explaining the effects of stress on Q and K.



- 7.) Use Le Châtelier's Principle to predict the direction of shift from possible stresses on a system in equilibrium.
- 8.) Use Le Châtelier's Principle to design a set of conditions to optimize a desired outcome, such as product yield or color change.



- Warm Up - LeChat Demo
- Lab #9 - Colors of the Rainbow & Equilibrium - Data Collection

Homework:

- Lab #9** Google Form by 7:30am Wednesday and paper by 3pm Wednesday!
- Submit this:** LeChatelier's Principle Checkpoint (Google Form posted on Google Classroom)
- Continue the Unit 8 Test Set (p. 61) & [check your answers](#)
- Exam during Period 6 on Wednesday, 2/26!**
- [RH Unit 8 Review - AP Classroom Progress Check \(Google Form\)](#)
- REMINDER: [ANY past content is FAIR GAME!](#)
- REMINDER: Unit 2 Progress Check due by midnight on Sunday, 3/2 in AP Classroom**

Additional Resources: [Unit 8 Additional Resources](#)

- ★ Reading Guide: Text Section 13.7(p. 54) & [check your textbook answers](#)
- ★ AP Daily - Introduction to Le Chatelier's Principle [Video 1](#) (10 min); [Video 2](#) (5 min); [Video 3](#) (7 min)
- ★ AP Daily - Reaction Quotient & Le Chatelier's Principle [Video 1](#) (7 min); [Video 2](#) (9 min)
- ★ [Jeremy Krug - LeChatelier's Principle](#)
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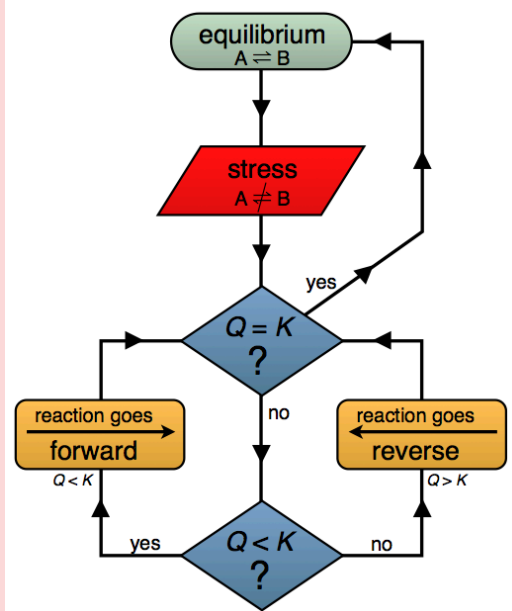
Class 10 (Tues, 2/25) Objectives

Class 10 Tasks

6.) Connect Le Châtelier's Principle to the Q and K comparison by explaining the effects of stress on Q and K.

- 5 Minute Madness - LeChatelier's Principle
- Lab #9 - Colors of the Rainbow & Equilibrium - Analysis
- Last 10 min - go over quiz

Le Chatelier's Principle



- 7.) Use Le Châtelier's Principle to predict the direction of shift from possible stresses on a system in equilibrium.
- 8.) Use Le Châtelier's Principle to design a set of conditions to optimize a desired outcome, such as product yield or color change.



Homework:

- Submit this: Lab #9** Google Form by 7:30am **TOMORROW** and paper by 3pm **TOMORROW!**
- Exam during Period 6 tomorrow!**
21 points total (8 MC, 3 SA); You will have 40 min to complete this exam
- Finish Unit 8 Test Set (p. 61) & [check your answers](#)
- REMINDER: Unit 2 Progress Check due by midnight on Sunday, 3/2 in AP Classroom**

Additional Resources: [Unit 8 Additional Resources](#)

- [RH Unit 8 Review - AP Classroom Progress Check \(Google Form\)](#)
- REMINDER: [ANY past content is FAIR GAME!](#)

Classes 11-12 (Wed, 2/26) Objectives

All Unit 8 Objectives!



Classes 11-12 Tasks

Period 5.1:

- AP Secured Questions
- Work on Test Set/Review

Period 6:

- REQUIRED ASSESSMENT - Unit 8 Exam (21 pts, 40 min)**

21 points total (8 MC, 3 SA); You will have 40 min to complete this exam

Try YOUR best! 🍀 Good luck! 😊

- Lab #9 paper due by 3pm!**
- Start Unit 9: Acids & Bases
- Unit 2 Progress Check due by midnight on Sunday, 3/2 in AP Classroom**