

# Chemical Equilibrium



## Chapter Pacing Guide

Please note that this pace is based on completing selected sections of the text in 90 classes, approximately 90 minutes each. Refer to the Course Planning Guide on page xvii of this booklet for a complete list of time allotments assigned to each section. Less time can be allocated for each chapter if you plan to teach all 26 chapters.

| Period | Content                                      |
|--------|--|
| 0.5    | 18.1 Equilibrium: A State of Dynamic Balance |
| 0.5    | 18.2 Factors Affecting Chemical Equilibrium  |
| 1.5    | 18.3 Using Equilibrium Constants             |
| 0.5    | Review and Assessment                        |

# Equilibrium: A State of Dynamic Balance

pages 559–568

**Key:** SE = Student Edition,  
TWE = Teacher Wraparound Edition,  
TCR = Teacher Classroom Resources

**National Science Content Standards:** UCP.3, UCP.4; A.1; B.3, B.4; E.2; G.3

**Georgia QCC:** 1, 1.2, 2.1, 3.1, 4, 10, 12.1, 12.3

## Objectives

- **Recognize** the characteristics of chemical equilibrium.
- **Write** equilibrium expressions for systems that are at equilibrium.
- **Calculate** equilibrium constants from concentration data.

## Lesson Resources

- \_\_\_\_\_ Section Focus Transparency 68 and Master
- \_\_\_\_\_ Math Skills Transparency 28 and Master
- \_\_\_\_\_ Teaching Transparency 53 and Master
- \_\_\_\_\_ *Study Guide for Content Mastery*, pp. 103–104  
TCR

- \_\_\_\_\_ **Cosmic Chemistry Videodisc**, Disc 1, Side 2; Disc 2, Side 3; Disc 3, Side 6; Disc 4, Side 8
- \_\_\_\_\_ *Using the Internet in the Science Classroom*, TCR
- \_\_\_\_\_ Chemistry Web site: [ga.science.glencoe.com](http://ga.science.glencoe.com)

## Multimedia Resources

- \_\_\_\_\_ **Chemistry Interactive CD-ROM**, Section 18.1 Animation and Video
- \_\_\_\_\_ **MindJogger Videoquizzes**, Ch. 18
- \_\_\_\_\_ **Guided Reading Audio Program**, Section 18.1

## Optional Resources

- \_\_\_\_\_ *Challenge Problems*, p. 18 TCR
- \_\_\_\_\_ *Small-Scale Laboratory Manual*, pp. 57–60 TCR
- \_\_\_\_\_ *Solving Problems: A Chemistry Handbook*, Section 18.1 TCR
- \_\_\_\_\_ *Spanish Resources* 18.1 TCR

## Lesson Plan

| Activity   | Resources   | Suggested Time |
|--|---|----------------|
| <b>Classroom Management</b> <ul style="list-style-type: none"> <li>• Display the Section Focus Transparency and have students answer the questions.</li> <li>• Distribute the corrected Chapter 17 tests.</li> </ul>   | Section Focus Transparency 68 and Master                    | 5 minutes      |
| <b>Core Lesson</b> <ul style="list-style-type: none"> <li>• Introduce Section 18.1 with the Discovery Lab.</li> <li>• Teach the main concepts of Section 18.1.</li> </ul>  | SE, p. 559<br>TWE, pp. 559–568                              | 30 minutes     |
| <b>In-Class Check</b> <ul style="list-style-type: none"> <li>• Complete the Check for Understanding strategy.</li> </ul>   | TWE, p. 567   | 5 minutes      |
| <b>Homework</b> <ul style="list-style-type: none"> <li>• Have students complete Section 18.1 Assessment.</li> <li>• Have students answer the questions in the Portfolio feature.</li> <li>• Ask students to complete the Reteach strategy.</li> <li>• Assign relevant questions from Chapter 18 Assessment.</li> </ul> | SE, p. 568<br>TWE, p. 566<br>TWE, p. 567<br>SE, pp. 590–593 | 5 minutes      |

[total = 45 minutes]

# Factors Affecting Chemical Equilibrium

pages 569–574

**Key:** SE = Student Edition,  
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**National Science Content Standards:** UCP.3, UCP.4; A.1; B.3, B.4, B.6; E.2; G.3

**Georgia QCC:** 1, 1.2, 3.1, 9.6, 10, 10.1

## Objectives

- **Describe** how various factors affect chemical equilibrium.
- **Explain** how Le Châtelier’s principle applies to equilibrium systems.

## Lesson Resources

- \_\_\_\_\_ Section Focus Transparency 69 and Master Teaching Transparency 54 and Master
- \_\_\_\_\_ *ChemLab and MiniLab Worksheets*, pp. 69–72 TCR
- \_\_\_\_\_ *Study Guide for Content Mastery*, pp. 105–106 TCR

- \_\_\_\_\_ **Guided Reading Audio Program**, Section 18.2
- \_\_\_\_\_ *Using the Internet in the Science Classroom*, TCR
- \_\_\_\_\_ Chemistry Web site: [ga.science.glencoe.com](http://ga.science.glencoe.com)

## Multimedia Resources

- \_\_\_\_\_ **Chemistry Interactive CD-ROM**, Section 18.2 Demonstration
- \_\_\_\_\_ **MindJogger Videoquizzes**, Ch. 18

## Optional Resources

- \_\_\_\_\_ *Laboratory Manual*, pp. 137–140 TCR
- \_\_\_\_\_ *Small-Scale Laboratory Manual*, pp. 61–64 TCR
- \_\_\_\_\_ *Solving Problems: A Chemistry Handbook*, Section 18.2 TCR
- \_\_\_\_\_ *Spanish Resources* 18.2 TCR

## Lesson Plan

| Activity  | Resources   | Suggested Time |
|---|---|----------------|
| <b>Classroom Management</b> <ul style="list-style-type: none"> <li>• Display the Section Focus Transparency and have students answer the questions.</li> <li>• Have students check homework answers.</li> </ul>   | Section Focus Transparency 69 and Master<br>TWE, pp. 566, 567, 568, 590–593 | 5 minutes      |
| <b>Discussion</b> <ul style="list-style-type: none"> <li>• Answer any questions about homework.</li> </ul>  | TWE, pp. 566, 567, 568, 590–593   | 5 minutes      |
| <b>Core Lesson</b> <ul style="list-style-type: none"> <li>• Teach the main concepts of Section 18.2.</li> </ul>   | TWE, pp. 569–574  | 10–15 minutes  |
| <b>In-Class Check</b> <ul style="list-style-type: none"> <li>• Reinforce Section 18.2 concepts using the Portfolio Assessment.</li> <li>• Complete the Check for Understanding and Reteach strategies.</li> </ul>   | TWE, p. 574<br>TWE, p. 574  | 15–20 minutes  |
| <b>Homework</b> <ul style="list-style-type: none"> <li>• Have students complete Section 18.2 Assessment.</li> <li>• Divide students into groups of two and have each group complete the Performance Assessment.</li> <li>• Assign relevant questions from Chapter 18 Assessment.</li> </ul> | SE, p. 574<br>TWE, p. 571<br><br>SE, pp. 590–593                            | 5 minutes      |

[total = 45 minutes]

# Using Equilibrium Constants

 pages 575–585**Key:** SE = Student Edition,  
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TCR = Teacher Classroom Resources**National Science Content Standards:** UCP.3, UCP.4; A.1, A.2;  
B.2, B.3, B.4, B.6; E.1, E.2; F.1, F.6**Georgia QCC:** 1, 1.2, 2, 2.1, 3.1, 4, 8.1, 9.1, 9.2, 9.3, 9.4, 9.6, 10, 10.1,  
10.2, 10.3, 15.4, 16.2

## Objectives

- **Determine** equilibrium concentrations of reactants and products.
- **Calculate** the solubility of a compound from its solubility product constant.
- **Explain** the common ion effect.

## Lesson Resources

- \_\_\_\_\_ Section Focus Transparency 70 and Master
- \_\_\_\_\_ Math Skills Transparency 29 and Master
- \_\_\_\_\_ *ChemLab and MiniLab Worksheets*, pp. 70–72  
TCR
- \_\_\_\_\_ *Study Guide for Content Mastery*, pp. 107–108  
TCR

## Multimedia Resources

- \_\_\_\_\_ **MindJogger Videoquizzes**, Ch. 18
- \_\_\_\_\_ **Guided Reading Audio Program**, Section 18.3

- \_\_\_\_\_ **Cosmic Chemistry Videodisc**, Disc 1, Side 2
- \_\_\_\_\_ *Using the Internet in the Science Classroom*, TCR
- \_\_\_\_\_ Chemistry Web site: [ga.science.glencoe.com](http://ga.science.glencoe.com)

## Optional Resources

- \_\_\_\_\_ *Laboratory Manual*, pp. 141–144 TCR
- \_\_\_\_\_ *Solving Problems: A Chemistry Handbook*,  
Section 18.3 TCR
- \_\_\_\_\_ *Spanish Resources 18.3* TCR
- \_\_\_\_\_ *Supplemental Problems*, p. 27 TCR

## Lesson Plan

| Activity  | Resources   | Suggested Time |
|---|---|----------------|
| <b>Classroom Management</b> <ul style="list-style-type: none"> <li>• Display the Section Focus Transparency and have students answer the questions.</li> <li>• Have students check homework answers.</li> </ul>   | Section Focus Transparency 70 and Master<br>TWE, pp. 571, 574, 590–593            | 5 minutes      |
| <b>Discussion</b> <ul style="list-style-type: none"> <li>• Answer any questions about homework.</li> </ul>  | TWE, pp. 571, 574, 590–593  | 5 minutes      |
| <b>Core Lesson</b> <ul style="list-style-type: none"> <li>• Teach the main concepts of Section 18.3.</li> <li>• Have students read the ChemLab and follow the procedure.</li> </ul>   | TWE, pp. 575–585<br>SE, pp. 586–587   | 70–80 minutes  |
| <b>In-Class Check</b> <ul style="list-style-type: none"> <li>• Have students complete the Skill Assessment for the ChemLab.</li> <li>• Reinforce Section 18.3 concepts using the Skill Assessment.</li> <li>• Have students complete the Skill Assessment.</li> <li>• Complete the Check for Understanding and Reteach strategies.</li> <li>• Answer questions on Chapter 18 to prepare students for the test.</li> </ul> | TWE, p. 587<br>TWE, p. 585<br>TWE, p. 581<br>TWE, pp. 584–585<br>TWE, pp. 558–593 | 40–50 minutes  |
| <b>Homework</b> <ul style="list-style-type: none"> <li>• Have students complete Section 18.3 Assessment.</li> <li>• Assign relevant questions from Chapter 18 Assessment.</li> <li>• Assign supplemental problems to prepare students for the test.</li> </ul>  | SE, p. 585<br>SE, pp. 590–593<br>Supplemental Problems, p. 27 TCR                 | 5 minutes      |

[total = 135 minutes]

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## Assessment Resources

- \_\_\_\_\_ *Chapter Assessment*, Ch. 18 TCR
- \_\_\_\_\_ *Performance Assessment in the Science Classroom*, TCR
- \_\_\_\_\_ *Alternate Assessment in the Science Classroom*, TCR
- \_\_\_\_\_ *Reviewing Chemistry: Mastering the Georgia QCC*, TCR

## Multimedia Resources

- \_\_\_\_\_ **MindJogger Videoquizzes**, Ch. 18
- \_\_\_\_\_ **TestCheck Software**, Ch. 18
- \_\_\_\_\_ **Chemistry Interactive CD-ROM**, Ch. 18 quiz
- \_\_\_\_\_ **Vocabulary PuzzleMaker Software**, Ch. 18

| Activity  | Resources   | Suggested Time |
|---|---|----------------|
| <b>Classroom Management</b> <ul style="list-style-type: none"> <li>• Have students check homework answers.</li> </ul>   | <i>TWE</i> , pp. 585, 590–593<br><i>Supplemental Problems</i> , p. 27<br><i>TCR</i> | 5 minutes      |
| <b>Reviewing the Chapter</b> <ul style="list-style-type: none"> <li>• Answer any questions about homework.</li> <li>• Answer any final questions about Chapter 18.</li> </ul>   | <i>Supplemental Problems</i> , p. 27<br><i>TCR</i><br><i>TWE</i> , pp. 558–593      | 5 minutes      |
| <b>Assessment</b> <ul style="list-style-type: none"> <li>• Distribute the test and allow students to work quietly.</li> </ul>   | <i>Chapter Assessment</i> , pp. 103–108<br><i>TCR</i>                               | 30–35 minutes  |
| <b>Closing</b> <ul style="list-style-type: none"> <li>• As students complete the test, have them read the Chapter 19 Opener.</li> <li>• If students have time, let them explore the Chemistry Online for Chapter 19.</li> </ul> | <i>SE</i> , p. 594<br><br><b>ga.science.glencoe.com</b>                             | 0–5 minutes    |

[total = 45 minutes]