

# How to Use the CD-ROM



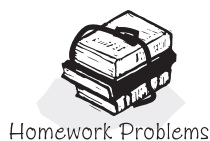
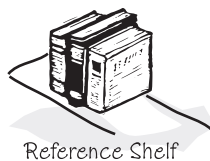
The primary purpose of the CD-ROM is to serve as an enrichment resource. The benefits of using the CD-ROM are fourfold:

1. To facilitate different student learning styles  
*[www.engin.umich.edu/~cre/asyLearn/itresources.htm](http://www.engin.umich.edu/~cre/asyLearn/itresources.htm).*
2. To provide the student with the option/opportunity for further study or clarification of a particular concept or topic
3. To provide the opportunity to practice critical thinking, creative thinking, and problem-solving skills
4. To provide additional technical material for the practicing engineer
5. To provide other tutorial information such as additional homework problems and instructions on using computational software in chemical engineering

## I.1 CD-ROM Components

There are two types of information on this CD-ROM: information that is organized **by chapter** and information organized **by concept**. Material in the by chapter section on the CD-ROM corresponds to the material found in this book and is further divided into five sections.

- **Objectives.** The objectives page lists what the students will learn from the chapter. When students are finished working on a chapter, they can come back to the objectives to see if you have covered everything in that chapter. Or if students need additional help on a specific topic, they can see if that topic is covered in a chapter from the objectives page.
- **Learning Resources.** These resources give an overview of the material in each chapter and provide extra explanations, examples, and applications to reinforce the basic concepts of chemical reaction engineering. Summary Notes serve as an overview of each chapter and contain a logical flow of derived equations and



additional examples. Web Modules and Interactive Computer Modules (ICM) show how the principles from the text can be applied to nonstandard problems. Solved Problems provide more examples for students to use the knowledge gained from each chapter.

- **Living Example Problems.** These problems are usually examples from the text that require computational software to solve. Students can “play” with the problem and ask “what if . . . ?” questions to practice critical and creative thinking skills. Students can change parameter values, such as the reaction rate constants, to learn to deduce trends or predict the behavior of a given reaction system.
- **Professional Reference Shelf.** The Professional Reference Shelf contains two types of information. First, it includes material that is important to the practicing engineer but that is typically not included in the majority of chemical reaction engineering courses. Second, it includes material that gives a more detailed explanation of derivations that were abbreviated in the text. The intermediate steps to these derivations are shown on the CD-ROM.
- **Additional Homework Problems.** New problems were developed for this edition. They provide a greater opportunity to use today’s computing power to solve realistic problems. Instead of omitting some of the more traditional, yet excellent problems of previous editions, these problems were placed on the CD-ROM and can serve as practice problems along with those unassigned problems in the text.

The materials in Learning Resources are further divided into Summary Notes, Web Modules, Interactive Computer Modules, and Solved Problems. Table I-1 shows which enrichment resources can be found in each chapter.

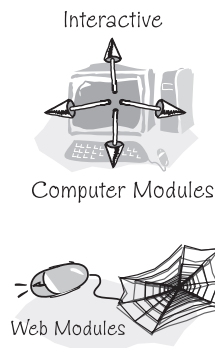
TABLE I-1. CD-ROM ENRICHMENT RESOURCES

Learning Resources:	Chapters														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Summary Notes															
Web Modules															
Interactive Computer Modules															
Solved Problems															
Living Example Problems															
Professional Reference Shelf															
Additional Homework Problems															

**Note:** The ICMs are high-memory-use programs. Because of the memory intensive nature of the ICMs, there have been intermittent problems (10–15% of Windows computers) with the modules. You can usually solve the problem by trying the ICM on a different computer. In the Heatfx 2 ICM, only the first three reactors can be solved, and users cannot continue on to part 2 because of a bug currently in the program.

The information that can be accessed in the by concept sections is not specific to a single chapter. Although the material can be accessed from the by

chapter sections, the by concept section allows you to access certain material quickly without browsing through chapters.



- **Interactive Modules.** The CD-ROM includes both **Web Modules** and **ICMs**. The Web Modules use a web browser for an interface and give examples of how chemical reaction engineering principles can be applied to a wide range of situations such as modeling cobra bites and cooking a potato. ICMs are modules that use a Windows or DOS-based program for an interface. They test knowledge on different aspects of chemical reaction engineering through a variety of games such as basketball and jeopardy.
- **Problem Solving.** Here students can learn different strategies for problem solving in both closed- and open-ended problems. See the ten different types of home problems and suggestions for approaching them. Extensive information on critical and creative thinking can also be found in this section.
- **Frequently Asked Questions (FAQs).** Over the years that I have taught this course, I have collected a number of questions that the students have asked over and over for years and years. The questions usually ask for clarification or for a different way of explaining the material or for another example of the principle being discussed. The FAQs and answers are arranged by chapter.
- **Syllabi.** Three representative syllabi have been included on the CD-ROM. See a 3-credit course schedule from the University of Illinois, or a couple of 4-credit course schedules from the University of Michigan. You can also practice for mid-terms, finals, or Doctoral Qualifying Exams with the actual exams given at the University of Michigan in previous years.
- **Credits.** See who was responsible for putting this CD-ROM together.

## I.2 Navigation

Students can use the CD-ROM in conjunction with the text in a number of different ways. The CD-ROM provides *enrichment resources*. It is up to each student to determine how to use these resources to generate the greatest benefit. Table I-2 shows some of the clickable buttons found in the Summary Notes within the Learning Resources and a brief description of what the students will see when they click on the buttons.

TABLE I-2. HOT BUTTONS IN SUMMARY NOTES















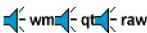
<i>Clickable Button</i>	<i>Where it goes</i>
	Solved example problem
	General material that may not be related to the chapter
	Hints and tips for solving problems
	A test on the material in a section with solutions
	Derivations of equations when not shown in the notes

TABLE I-2. HOT BUTTONS IN SUMMARY NOTES

	Critical Thinking Question related to the chapter
	Web Module related to the chapter
	Chapter objectives
	Polymath solution of a problem from the Summary Notes
	Biography of the person who developed an equation or principle
	Chapter insert with more information on a topic
	Detailed solution of a problem
	Plot of an equation or solution
	Extra information on a specific topic
	Audio clip

The creators of the CD-ROM tried to make navigating through the resources as easy and logical as possible. A more comprehensive guide to usage and navigation can be found on the CD-ROM. Figure I-1 shows how to access the installation files for Polymath and the ICMs on the CD-ROM. The upper left window (CRE04) in the figure is what appears when the disc is inserted and “Explore the CD” is chosen from the auto-run pop-up window.

### I.3 How the CD-ROM/Web Can Help Learning Style

#### I.3.1 Global vs. Sequential Learners

See [www.engin.umich.edu/~cre/asyLearn/itresources.htm](http://www.engin.umich.edu/~cre/asyLearn/itresources.htm).



#### Global

- Use the summary lecture notes to get an overview of each chapter on the CD-ROM and see the big picture
- Review real-world examples and pictures on the CD-ROM
- Look at concepts outlined in the ICMs

#### Sequential

- Use the Derive hot buttons to go through derivations in lecture notes on the web
- Follow all derivations in the ICMs step by step
- Do all self-tests, audios, and examples in the CD-ROM lecture notes step by step

### I.3.2 Active vs. Reflective Learners

#### Active

- Use all the hot buttons to interact with the material to keep active
- Use self-tests as a good source of practice problems
- Use Living Example Problems to change settings/parameters and see the result
- Review for exams using the ICMs

#### Reflective

- Self-tests allow you to consider the answer before seeing it
- Use Living Learning Problems to think about topics independently

### I.3.3 Sensing vs. Intuitive Learners

#### Sensing

- Use Web Modules (cobra, hippo, nanoparticles) to see how material is applied to real-world topics
- Relate how Living Example Problems are linked to real-world topics

#### Intuitive

- Vary parameters in supplied Polymath problems and understand their influence on a problem
- Use the trial-and-error portions of some ICMs to understand “what if . . .” style questions

### I.3.4 Visual vs. Verbal Learners

#### Visual

- Study the examples and self-tests on the CD-ROM summary notes that have graphs and figures showing trends
- Do ICMs to see how each step of a derivation/problem leads to the next
- Use the graphical output from Living Example Problems/Polymath code to obtain a visual understanding of how various parameters affect a system
- Use the Professional Reference Shelf to view pictures of real reactors

#### Verbal

- Listen to audios on the web to hear information in another way
- Work with a partner to answer questions on the ICMs

