

How to Use **H** the DVD-ROM



The primary purpose of the DVD-ROM¹ is to serve as an enrichment resource. The benefits of using the DVD-ROM are fivefold:

1. To facilitate different student learning styles:
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

H.1 DVD-ROM Components

There are two types of information on this DVD-ROM: information that is organized **by chapter** and information organized **by concept**. Material in the “by chapter” section on the DVD-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 they 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

¹ In some places in the text, DVD-ROM, and book Web site, the enclosed DVD-ROM is sometimes referred to as “CD” or “CD-ROM.”

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 Games (ICG) 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.

Links to entertaining **YouTube** videos can be found in the *Summary Notes* of Chapters 1, 3, 4, and 5.

Chapter 1: *Fogler Zone (you've got a friend in Fogler)*.

Chapter 3: *The Black Widow* murder mystery and *Baking a Potato by Bob the Builder and Friends*.

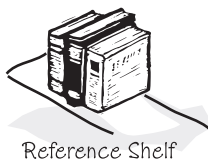
Chapter 4: *CRF Reactor Vid*, a “semi batch” reactor with Diet Coke and Mentos.

Chapter 5: Learn a new dance and song, *CSTR* to the tune of YMCA, and *Chemical Good Time Rhythm* rap song and *Find Your Rhythm*, an *Ice Ice Baby* remix.



- **Living Example Problems.** These problems are usually the second Home Problem in each chapter (e.g., P5-2_B), most of which 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.

- **DVD-ROM Chapter Materials.** The graduate material from the fourth edition of *Elements of Chemical Reaction Engineering*, i.e., Chapters 10, 11, 12, 13, and 14 are included on the DVD-ROM as PDF files. These chapters are primarily used at the graduate level. These chapters are referred to in the text as, for example, “DVD-ROM Chapter 10.”



- **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 DVD-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 DVD-ROM and can serve as practice problems along with those unassigned problems in the text.

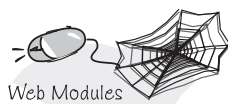
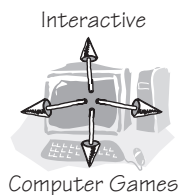
The materials in Learning Resources are further divided into *Summary Notes*, *Web Modules*, *Interactive Computer Games*, and *Solved Problems*. Table H-1 shows which enrichment resources can be found in each chapter.

TABLE H-1 DVD-ROM ENRICHMENT RESOURCES

	Chapters												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Summary Notes	■	■	■	■	■	■	■	■	■	■	■	■	■
Web Modules	■	■	■	■	■	■	■	■	■	■	■	■	■
ICGs	■	■	■	■	■	■	■	■	■	■	■	■	■
Solved Problems	■	■	■	■	■	■	■	■	■	■	■	■	■
Additional Homework Problems	■	■	■	■	■	■	■	■	■	■	■	■	■
LEP	■	■	■	■	■	■	■	■	■	■	■	■	■
PRS	■	■	■	■	■	■	■	■	■	■	■	■	■
YouTube video links	■	■	■	■	■	■	■	■	■	■	■	■	■

Note: The ICGs are high-memory-use programs. Because of the memory intensive nature of the ICGs, there have been intermittent problems (10–15% of Windows computers) with the games. You can usually solve the problem by trying the ICG on a different computer. In the Heatfx 2 ICG, 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” sections allow you to access certain material quickly without browsing through chapters.



- **Interactive Web Modules.** The DVD-ROM includes both Web Games and ICGs. The Web Games 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.
- **Interactive Computer Games.** ICGs are games 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.
- **Syllabi.** Representative syllabi have been included on the DVD-ROM: (1) A 4-credit hour undergraduate course, Chemical Engineering 344 and (2) a 3-credit hour graduate course.
- **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.

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- **Credits.** See who was responsible for putting this DVD-ROM together.

H.2 Navigation

Students can use the DVD-ROM in conjunction with the text in a number of different ways. The DVD-ROM provides *enrichment resources*. It is up to each student to determine how to use these resources to generate the greatest benefit. Table H-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 H-2 HOT BUTTONS IN SUMMARY NOTES






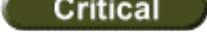









<i>Clickable Button</i>	<i>Where it goes</i>
	Solved example problem
	General material that may not be related to the chapter
	Hints and tips for solving problems
	A test on the material in a section, with solutions
	Derivations of equations when not shown in the notes
	Critical Thinking Question related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

TABLE H-2 HOT BUTTONS IN SUMMARY NOTES (CONTINUED)

Clickable Button	Where it goes
	Plot of an equation or solution
	Extra information on a specific topic
	Audio clip

The creators of the DVD-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 DVD-ROM.

H.3 How the DVD-ROM/Web Can Help Learning Style

H.3.1 Global vs. Sequential Learners

See www.engin.umich.edu/~cre/asyLearn/itresources.htm.



Global

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

Sequential

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

H.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 ICGs

Reflective

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

H.3.3 Sensing vs. Intuitive Learners

Sensing

AU:
Should this read
Living Example
Problems?

- Use *Web Modules* (cobra, hippo, nanoparticles) to see how material is applied to real-world topics
- Relate how *Living Learning 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 ICGs to understand “what if . . .” style questions

H.3.4 Visual vs. Verbal Learners

Visual

- Study the examples and self-tests on the DVD-ROM summary notes that have graphs and figures showing trends
- Do ICGs 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 ICGs