tails they can ask you for them in the question period.)

- **If you show data plots be sure the axes are clearly labeled.**
- **Rehearse your talk several times with a friend or in front of your mirror, and make sure the time it takes is within one minute of the time allotted for the talk. Running long can be a disaster in a formal presentation and running short may not win you any friends if you're at a meeting where consecutive talks are scheduled at set times.**

Presentation

- **Never read directly from prepared text—there is nothing more deadly to an audience.**
- **Make frequent eye contact with your audience throughout the talk. Do not stare at your notes or at the screen.**
- **Sound enthusiastic about your subject, or at least interested in it. Do not speak in a monotone. Gesture occasionally. If you seem bored by your material you can be guaranteed your audience will follow your lead.**
- **Make sure your watch is visible and check it occasionally to see how the time is runnning. If you see you are running short or long, try to adjust the speed of your presentation to compensate.**

DISCUSSION

The improvements in the student presentations as the semester progresses are clear and frequently dramatic. Almost invariably poor speakers become adequate, adequate speakers become good, and good speakers become better. During the past six years a student from our department has won the regional AIChE student chapter paper award competition three times. We can't prove it, but we are convinced that the seminar course has a lot to do with this record.

The oral critiques are a valuable and interesting part of the course. The natural student tendency is to be excessively polite, to avoid criticizing harshly lest they themselves come in for the same treatment when it's their turn to speak. As a result, in the first few sessions the principal burden of criticism falls on the instructor. However, as the semester progresses the student criticisms become more and more germane and incisive, although courtesy is always appropriately retained. (We are Southern here, after all.) By the end of the semester the instructor is almost redundant: the points he is prepared to make in his critique are usually made first by the students.

Requiring each student to give a fifteen- or twenty-minute talk and subsequently a ten-minute talk seems to work very well. It is usually difficult (even for seasoned professionals) to present a significant body of technical material in twenty minutes; having to do so provides the students with excellent practice in preparing technical seminars such as those at national AIChE meetings. Cutting the material down to ten minutes presents a whole different set of problems, as the students quickly discover. The latter exercise is good preparation for, say, company staff meetings at which many people must summarize their work in a relatively short time.

Finally, it is critically important for the course instructor to remember that the students taking the course are particularly vulnerable: they are nervous about public speaking in general and they are especially not used to being publicly critiqued. If the criticism is destructive or unduly harsh, or seemingly arbitrary and unfair, the course has the potential of doing much more harm than good. However, as long as the instructor establishes firm ground rules about criticism and takes the lead himself in creating a supportive environment, the course can be among the most positive and rewarding educational experiences the students experience in their academic careers. □

ChE book reviews

CATALYST DESIGN: PROGRESS AND PERSPECTIVES

by L.L. Hegedus, A.T. Bell, N.Y. Chen, W.O. Haag, J. Wei, R. Aris, M. Boudart, B.C. Gates, and G.B. Somorjai

John Wiley & Sons, Somerset, NJ 08873; 288 pages, $47.50 (1987)

Reviewed by
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While there are a number of books on catalysis, it is very difficult to find a book which gives a balanced presentation of the many topics in this field. The problem is that everyone working in catalysis has a different view of what the subject is and what is important. People working in surface physics view catalysts as adsorption on single crystals in ultra-high vacuum, mathematical modellers view it as concentration and temperature gradients across a catalyst pellet, and traditional workers in catalysis view it as the turnover number or selectivity for a reaction carried out over a fixed bed. While not written specifically as a textbook, *Catalyst Design: Progress and Perspectives* has tried to give an overview of work carried out by

all types of catalyst researchers by bringing together leaders from several of the important areas in the field and having each write a brief review of the important aspects of their particular area.

The book itself is a series of short review articles, each written by a different author. The first chapter, written by L.L. Hegedus, very briefly discusses the continued importance of heterogeneous catalysis to industrial practice and lists the applications which utilize the largest quantities of catalysts.

A microscopic viewpoint of catalysis on single-crystal, metal surfaces is presented by G.A. Somorjai in Chapter 2. The work cited is mainly from Professor Somorjai's own research and discusses the results of reaction and adsorption studies on single crystals, including topics such as the importance of crystallographic structure for reactions on metals and the influence of surface modifiers on several example reactions. It should be noted, however, that some of the conclusions reached in this chapter are still controversial within the surface science community.

The third chapter provides a discussion of supported, organometallic clusters by B.C. Gates. The chapter begins with a review of catalysis by transition metal clusters and continues with a discussion of work carried out to anchor these compounds to a support. This second part reviews the synthesis of supported complexes and concentrates on the spectroscopic techniques which have been utilized in characterizing these catalysts. Following the section on synthesis and characterization is a discussion of the catalytic properties for several example catalytic systems.

Chapter 4, by A.T. Bell, is a review of supported metal catalysis, with an emphasis on the effect that the support can have on the metal. The chapter reviews a wide range of topics, including support acidity, preparation procedures for introducing metals onto a support, and the influence that a support can have on a metal's adsorption and reaction properties. Most of this last section involves a discussion of the unusual properties which can be observed with titania supported metals. It should be noted that Professor Bell presents certain conclusions concerning the role of titania which are still being debated in the literature.

A discussion of reaction kinetics and the design of catalytic cycles is given in Chapter 5 by M. Boudart. Since most reactions involve several elementary steps, Professor Boudart suggests ways for logically designing catalysts assuming that the intermediate steps can be selectively altered by judicious choice of catalyst or operating conditions.

W.O. Haag and N.Y. Chen have written a review of acid catalysis by zeolites in Chapter 6. Their chapter starts by describing what zeolites are, followed by a discussion of zeolite properties including sorption behavior, diffusional phenomena, and catalytic activity. The chapter includes a concise introduction to preparation methods for zeolites, to techniques for characterization of the acid sites, and to methods for changing zeolite acidity. Following this introduction, the role of zeolites in several commercial processes is described, with a particular emphasis on the importance of molecular shape selectivity in those processes. The chapter ends with an overview of the design principles which were incorporated into the development of the first zeolite hydrocarbon cracking catalysts.

The section on mathematical modelling of transport properties in catalysis, Chapter 7, was written by R. Aris. The chapter begins with the history behind calculations of catalyst effectiveness and follows with a tutorial on how to determine the influence of catalyst geometry, reaction kinetics, and other factors on the observed reaction rates. The chapter includes a short section on methods for controlling the distribution of catalytic activity within a catalyst pellet and concludes with a discussion of rate multiplicities and stabilities.

The final chapter, written by J. Wei, presents the design considerations used for hydrodemetallation catalysts. The chapter begins by introducing the reader to the complex structure of metal-containing molecules which are present in petroleum. The rest of the chapter reviews the problems associated with dehydrodemetallation in the presence of hydrodesulfurization and discusses the principles used to design catalysts which have a high activity for long periods of time.

Over all, this book provides a good review of a wide range of topics in heterogeneous catalysis. While the book could be used as a text for a course in catalysis, it would be necessary to provide supplementary materials to provide background on the different techniques which are discussed. As with any book on topics for which research is ongoing, one should not consider any of the chapters as being the final word. However, each section does provide a good beginning for the interested reader. There is clearly a need for a book of this type. □