ialization in nonspecific engineering curricula, such as general engineering, engineering science, etc. In essence this resolution stated that if schools wish accreditation only as an engineering curriculum, without specifically implying that its chemical engineering option has been separately accredited, ECPD would accredit on that basis. However, if the school wishes to state in any of its informational literature or transcripts that a chemical engineering option has been accredited, the regular procedures and standards of AIChE would have to be followed. This resolution was forwarded to the ECPD E.E. & A. Committee, who now have it under consideration.

ChE book reviews

Elementary Chemical Reactor Analysis
Rutherford Aris
Prentice-Hall, (1969) xii plus 352 pp.
Englewood Cliffs, N. J.

The book is similar in approach and subject matter to Aris' earlier text "Introduction to the Analysis of Chemical Reactors", Prentice-Hall, 1965. The main differences lie in the addition of several detailed examples analyzing realistic situations of the kinetics or reactor design for actual chemical reactions, and in reducing some of the mathematical complexity. As is to be expected of the author, the book is excellently written and reads well. A brief, but adequate list of the most pertinent references of direct use with the text material is included at the each of each chapter.

The use of the term "analysis" in both book titles is appropriate, for the focus is on the formal mathematical aspects of the subject. Because of this, many instructors may not choose the text for an introductory undergraduate course, as is the stated intent of the author, but rather in a basic graduate course. At the latter level, with some prior knowledge of chemical reactor design and advanced mathematics, the more general and absctract mathematical treatment may be better understood and appreciated. Certainly every graduate student should have some exposure to the sophisticated description of of the kinetics of the general reaction $\Sigma \alpha_{ij} A_i = 0$ as often used in modern chemical reaction engineering analysis. Since the text was not really written for graduate students, however, a certain amount of useful material (e.g., catalyst deactivation) might need to be added by the instructor.

The book begins with an over-view of the subject, including a useful flow chart, and gives many of the important sources of information — journals, books, and reviews. Chapter 2 presents the formal logical aspects of stoichiometry. Included are definitions of extent (the use of ζ moles/volume rather than the classical notation ζ moles can be confusing) and rates of reaction along with independence of complex reaction systems. Thermochemistry is discussed in Chapter 3, again from a formal point of view, but including some information on heats of reaction, etc.

Next "The Progress of the Reaction in Time" for elementary (isothermal, batch reactor) integration of the rate equations for the standard simple kinetic schemes is presented, including a brief treatment of reaction paths for complex systems of first order reactions. The final chapter (6) discussing kinetics is concerned with heterogeneous reactions. Adsorption mechanisms, external, and internal diffusion processes are covered in some detail; the reviewer feels that Aris' treatment here is one of the best available from the viewpoint of kinetics required for reactor design.

Chapter 7 on the perfectly mixed flow reactor begins the study of actual reactor design. It starts with derivation and discussion of rigorous general transient mass and heat balances, and some aspects such as incompatible feed and initial conditions which are unavailable elsewhere. The notion of, physical reasons for, and some mathematical treatment of autothermal stability is covered. An excellent detailed design example is given as well as optimal sequences of stirred tank reactors. The discussion of imperfect mixing, segregation, etc., which was kept brief and simplified, may not be very understandable without further explanation in class.

Various types of adiabatic reactor design problems are treated in Chapter 8, including stirred tank and tubular cases. For the latter, it might have been preferable to put this chapter after the one on tubular reactor design. Most of the text material is devoted to the algebraic aspects of optimization of single and sequences of adiabatic reactors. Chapter 9 is devoted to the tubular (plug flow) reactor and begins with the standard steady state design methods, proceeding to optimal temperature profiles, and co-and counter current cooled reactors, the latter with an excellent example of ammonia synthesis.

Parametric sensitivity and autothermal stability are next treated and the chapter concludes with a discussion of flow profile and axial dispersion effects. The last chapter (10) is primarily concerned with optimal operation and control of batch reactors.

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ChE curriculum

Specialization in FINE PARTICLE TECHNOLOGY

CLYDE ORR, JR.
Georgia Institute of Technology
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American universities do not emphasize subspecialities within a general field as much as do some of our European counterparts, except by way of thesis research. Georgia Tech and Loughborough University of Technology in England are inaugurating an exchange program for first-year master's degree graduate students in chemical engineering that will bring somewhat more specialization into U. S. education and will broaden the program for the English students. The area of specialization of this initial program may be generally termed fine particle technology.

Loughborough University is primarily a technological institution with departments covering a full range of engineering disciplines, applied sciences, management, and the social sciences. It is much like Georgia Tech in orientation, course offering, size, and student background. Within its chemical engineering department are professors having special competence in solid-liquid separation, comminution, emplsification, mixing and blending, and the like, while Georgia Tech competence in the fine particle area tends more toward aerosol technology and air pollution abatement. Exposure of students to both special groups with their different viewpoints along with instruction in the more traditional subjects of thermodynamics, transport phenomena, advanced mathematics, etc., will result, it is beileved, in an augmented educational experience and lead to considerable expertise on the part of the recipients

Approximately the first six months of graduate study will be spent at the foreign institution and the remaining time at the home institution, thus enabling the students to conduct their thesis research at the home institution. The thesis problem must involve some aspect of particle technology. The degree will be awarded by the home institution upon satisfactory completion of the course of study. Each institution enrolls its own students and is responsible for obtaining or advising on financial support for its students.

A typical Master's program for Georgia Tech students at Loughborough would be as follows:

Fall Quarter	Winter Quarter
Mathematics	Mathematics
Fluid Mechanics	Particle Characterization
Heat & Mass Transfer	Particle/Fluid Systems
Thermodynamics	Interfacial Phenomena
Computing	Particle Lab. 15 hrs/wk)
Laboratory (6 hrs/wk)	

Upon returning to Georgia Tech, students will be required (1) to complete satisfactorily two of the three graduate courses: Aerosol Technology, Industrial Emission Control, and Atmospheric Reactions; (2) submit an acceptable thesis; and (3) participate, as long as enrolled, in a seminar course.

WHITE: Polymer Program (Con'd from p. 41.)

R. L. Boles, H. L. Davis and D. C. Bogue, "Entrance Flows of Polymers Materials: Pressure Drop and Flow Patterns," Poly. Eng. Sci., 10, 29 (1970).

5. Bogue, D. C., "An Explicit Constitutive Equasion Based on an Integrated Strain History," Ind. Eng. Chem. Fund., 5, 253 (1966).
6. White, J. L., "Elastomer Rheology and Processing," Rubber Chem. Technol., 42, 257 (1969).
7. Ballenger, T. F., I. J. Chen, J. W. Crowder, G. F. Hagler, D. C. Bogue and J. L. White," Polymer Melt Flow Instabilities in Extrusion: Investigation of the Mechanism and Material and Geometric Variables," Trans. Soc. Rheol. (in press).
8: White, J. L. and M. Yamamoto "Lattice Theory of Melting of a Crystalline Polymer," J. Phys. Soc. Japan, 28, 891 (1970).
"A Theory of Deformation and Strain Induced Crystallization of an Elastomeric Network Polymer," (to be published).
9. White, J. L. and G. Kingry "Theoretical Analysis and Critique of the chromatographic separation of Macromolecules Using Parous Adsorbents" J. Appl. Poly. Sci. (in press)