healthy attitude about leading a balanced life." He is a friend and confidant to many, and is a dedicated family man. George and Eleni visit their families in Greece annually, and are the parents of two small children, Nikos and Elvie. George enjoys working with his family members in the department, although his suite-mates indicate that he shows a kindred spirit with all of them.

Chess occupies George's technically creative time. A computer program which might teach novices opening moves, standard defenses, and some basic strategies is one ongoing project.

Many colleagues mention his deep and profound interests in literature and philosophy. George explains that his Greek poetry and short stories are a very private creative outlet for him. He always gave public talks and poetry readings of other authors at Minnesota's annual AIChE spring banquet, much to the delight of the audiences. Stephanopoulos has read extensively from 20th Century American writers, the Russian literature, and German philosophy. He follows Greek poetry, notably Nobel laureates George Seferis and Odysseus Elytis. Lately, the South American writers, notably Garcia-Marquez (a strong influence, he says), Ernest Sabato, Jorge Luis Borges, and Vargas Llossa are his favorites.

Commenting on his recent winning of the Curtis McGraw Award for Research from ASEE, George notes, jokingly, that engineering is rarely a route to the Nobel Prize, and that he personally would try to win it only for literature or peace. Considering that he ably handles his commitments to MIT, his editorship on two journals, and his membership in eleven technical and professional societies, while still maintaining strong ties to family, friends and students, the Nobel seems an appropriate long-term goal for this man of vision, technical excellence, and commitment to learning. □

ChE book reviews

PRINCIPLES OF UNIT OPERATIONS, 2nd Edition

by Foust, Wenzel, Clump, Maus, and Anderson
John Wiley & Sons, 1980, 768 pages

Reviewed by
Davis W. Hubbard
Michigan Technological University

This is a revision of the first edition published in 1960 and retains the same large-page format, arrangement of subject matter, and emphasis on engineering practice and design. The type size has been increased and two chapters have been added, increasing the number of pages from 578 to 768. The new edition bears a 1980 copyright and quite a number of references have been added to most chapters since the first edition. The book is intended to be an undergraduate textbook. It is quite easy to read, yet the material is covered in such a way that the reader has the feeling of progressing beyond the simplest basic material. There are extensive equipment diagrams and an excellent emphasis on practical design. One of the attributes of the book is the treatment of the common features of the various topics in a unified way. This is applied both to separations processes and to transport phenomena topics. British engineering system units are used mostly, but there are scattered examples in which SI units are used. There is a good selection of design data, eliminating the need for searching for data in other sources and making the book easy to use for beginning students.

The first section of the book deals with continuous stagewise processes. The emphasis is on the similarities among the different processes discussed. This works well for distillation and absorption, but it is a little strained for leaching and adsorption. The Ponchon-Savarit graphical method of analyzing distillation processes and other related graphical methods are the focal point of this section. The material is written in a straightforward manner and is easy to understand and apply. The ideas of minimum solvent flow rate and minimum reflux ratio are handled well. People who believe that using the Ponchon-Savarit method or graphical methods in general is outmoded and should be discontinued in favor of using numerical methods will not like this section. People who believe that the Ponchon-Savarit method helps provide insight related to energy balances and changes in molar flow rates between stages will be pleased with this section.

At the end of the section about stagewise processing there is a new chapter on multicomponent calculation methods. This chapter replaces one about unsteady distillation processes in the first edition. The discussion focuses on distillation processes and emphasizes fundamentals. Computer codes are not emphasized though computer methods are apparently used in solving the example problems. A very clear example dealing with a five-component mixture is solved using the Fenske-Underwood-Gilliland shortcut method.

The second section of the book treats transport phenomena. There are chapters about transport coefficients, molecular transport, and turbulent transport. The discussion of the various concepts seems quite straightforward and easy to understand. The treatment of unsteady conduction has been changed quite a bit from the first edition. The discussion is somewhat confusing, but empirical equations which could be used for computer calculations are supplied. There is a good discussion about the limitations of semi-empirical turbulence models.

A chapter on heat transfer comes next. This chapter uses British engineering units. The detailed example calculations emphasizing assumptions are good, and there is good coverage of practical aspects of shell-tube heat exchanger design. Condenser design methods are restricted to pure vapors. Mixed vapor condensation is not discussed. The references cited are quite old.

The next chapter treats mass transfer with emphasis on continuous contactors. The differences between gas-liquid and liquid-liquid operations is blurred sufficiently so that the similarities can be seen. The mass transfer coefficient correlations presented are easy to use. There is a clear development of design equations with good explanations of the assumptions involved and the methods of integrating the equations. Some good numerical examples are given. Stage efficiency is mentioned in this chapter, but the treatment is not extensive.

The next section is devoted to simultaneous energy and mass transfer with chapters on humidification and water cooling, drying, and evaporation and crystallization. There is good coverage of water cooling—a topic sometimes treated in a superficial way in textbooks. The discussion includes methods for determining the gas phase temperature and evaluating heat and mass transfer coefficient data from experimental data. The discussion of drying is quite standard. There is an extensive discussion of spray drying, but other types of continuous drying are not mentioned. The chapter on evaporation is written using SI units, and evaporator calculations are described clearly. There is a good review of mass and energy balances and an introductory discussion of mass transfer considerations in crystallization.

The final chapters are devoted to fluid mechanics and fluid mechanical separations processes. The discussion of the Bernoulli equation seems somewhat ponderous, and the notation for friction loss is not the same as used by other writers. The discussion of friction factors for straight pipe is good, but fitting losses are discussed exclusively in terms of equivalent length. This is a time-honored method, but for smooth-walled pipe it introduces a small Reynolds number dependence which is not supported by data. The discussion of flow meters is good. It includes examples of meters suitable for remote reading as well as the traditional types.

The chapter about pumps contains excellent pictures of pump assemblies and excellent discussions of NPSH and specific speed. There is not much discussion of pump efficiency, though the examples of pump characteristic curves which are given include efficiency.

The chapter about fluid-solid separation begins with a discussion of drag coefficients which includes the effect of particle shape. Many topics are covered in this chapter, and there is a certain lack of continuity. It might have been better to make separate chapters focusing on moving solids and fixed solids. The example of thickener design calculations is complete, detailed, and easy to follow. The filtration calculations based upon using an equivalent volume of filtrate to represent the filter medium resistance are fairly easy to understand, but the method has always seemed artificial. The filter analysis calculations are presented in terms of the filtration rate even though this requires graphical or numerical differentiation. The integrated equations are presented but are not used in the analysis. Applications to continuous filtration are ignored.

The appendices are well written and useful. There is a lucid discussion of g_c and J putting these factors into their proper perspective as unit conversion proportionality constants. The dimensional analysis discussion focuses on the Buckingham Pi method, hitting the high points without excessive mathematical development. The unit system which includes force as a fundamental dimension is used exclusively. The appendix in which screen analysis and the characteristics of particles are discussed is well written and easy to understand. There is also an appendix containing most data needed for solving the problems. The sources are sometimes not cited fully.

This book is a gold mine for problems designed to be challenging but easy enough so that students beginning their study of unit operations can be expected to complete them. Between ten and sixty problems are included with each chapter, and only a few chapters have fewer than twenty-five. This is a major strong point of the book. □