schemes described are based on conservation laws, no direct mention seems to be made about the level at which balance is satisfied by the computer calculations.

The basic techniques treated are timely, are closely related to several fluid dynamic applications to nuclear engineering problems, and should certainly be of general interest to many American Nuclear Society members.

Clarence E. Lee is a professor in the Department of Nuclear Engineering at Texas A&M University. He is currently doing research on analytical and numerical methods in diffusion and transport theory, charged particle transport, high temperature gas-cooled reactors (prismatic and pebble bed), fission product migration, and fast reactor accident analysis.

Nuclear Energy (2nd ed.)

Author	Raymond L. Murray
Publisher	Pergamon Press, Inc., Elmsford, New York (1980)
Pages	317
Price	$15.00
Reviewer	Jerome G. Morse

The author has succeeded in bringing together in concise form the broader aspects of nuclear energy as a useful introductory text. It is correctly subtitled "An Introduction to the Concepts, Systems, and Applications of Nuclear Processes." Constructed in three sections, the flow is as follows: Part I treats Basic Concepts; II, Nuclear Systems; and III, Nuclear Energy and Man. Each of the 27 chapters concludes with its own brief summary, followed by a useful selection of challenging problems to enable testing the comprehension of the information presented. Answers are also provided.

The first section carries the reader through the fundamentals of nuclear energy in a well-organized, "no frills" manner. As a review of the subject, the treatment is excellent; for the new student, however, its effectiveness would be enhanced considerably by increasing the number of illustrative examples. Next is the section covering concepts and some application, and it reflects well the author's long experience in nuclear engineering. He shows a good balance between theory and hardware at this intended entry level. The section deals with particle accelerators, isotope separators, radiation detectors, fission, fusion, and breeder systems, and energy conversion methods.

In the last and largest section, Murray addresses the critical issues now facing nuclear energy, from an unemotional technical perspective. Included are the health, safety, and environmental concerns related to reactor operation and waste disposal. He is to be commended for his balanced views on timely subject matter not normally treated in texts of this type.

The book reads well; its coverage is direct and unambiguous, and is amply illustrated and referenced adequately. Its audience may comprise two major groups. As a college text, it should serve very well, and it should be equally effective as a reference/review volume for those engaged in the nuclear field.

Jerome G. Morse is adjunct associate professor of physics at the Colorado School of Mines, where he teaches graduate level courses in nuclear methods in mineral exploration and production, and radiation and its control in uranium mining and milling. Morse is also president of Morse Associates, Inc., a consulting firm addressing radiation-related environmental issues. He is a fellow of the American Nuclear Society, and co-editor in chief of Elsevier's new International Journal of Uranium.

Introduction to Metallurgical Thermodynamics (2nd ed.)

Author	David R. Gaskell
Publisher	Hemisphere Publishing Corporation, New York (1973)
Pages	611
Price	$29.95
Reviewer	Craig Shumaker

Gaskell's second edition of *Introduction to Metallurgical Thermodynamics* is not a real improvement over the first edition. The text's strengths are in the latter chapters where solutions, condensed phase reactions, and graphical representation of thermodynamic data are discussed. The early chapters suffer for a number of problems:

1. The first law material (Chap. 2) deals only with gases. No discussion of the application of the first law to condensed phases is made, such as tensile and compressive loading of metals.

2. Section 2.10 (Numerical Examples) has proven difficult for students to follow.

3. The International Union of Pure and Applied Chemistry has recommended that work be defined as positive when done on a system. Therefore, the first law is

$$\Delta E = q + w \ .$$

Gaskell has not adapted this convention in the second edition.

4. Section 3.5 (An Illustration of Irreversible and Reversible Processes) is extremely hard to follow *and* explain to students. A simpler explanation would be better.

5. The discussion of the carnot cycle in Chap. 3 is confusing because of notation and erroneous signs. Specifically, the text shows that the work obtained w is equal to $q_1 - q_2$ where it should be

$$-w_{\text{net}} = q_2 + q_1 \ .$$

The subscript "net" clarifies the work, the minus sign on w_{net} is from the positive convention for work, and the addition of heats is correct, since the value of q_1 is actually negative.

6. In the numerical examples for Chap. 3, a Maxwell relation from Chap. 5 is used in a derivation.

7. Many equations are left unnumbered throughout the text.

8. Chapter 4 (Statistical Interpretation of Entropy) is weak.

9. Tables of data are not all in one place. Some are in the text; some are in the appendixes.

10. Some homework problems are heat balance problems and no explanation of how to perform a heat balance is discussed specifically in the text.

11. Chapter 8 (Behavior of Gases) contains P-V-T diagrams. This could have been covered earlier, before the first law material.

Although, the first half of the book is poorly organized, it is essentially complete with the exception of the first law as it applies to solids and liquids. As mentioned earlier, the latter chapters (starting with Chap. 9) are quite adequate and thorough. The section on the construction of phase stability diagrams is well done. Included in this section is an example of the uranium-carbon system.

In conclusion, this text offers a good discussion of phase stability and solutions. Another text is needed for a well-organized, straightforward presentation of the first and second laws as it applies to metallurgical systems and condensed phases. The book is written at a level suitable for juniors and seniors in engineering with prior experience in physical chemistry. The book is too advanced for most sophomores.

Craig Shumaker is currently an assistant professor in metallurgical engineering at the Ohio State University. His research interest is in the area of chemical metallurgy. For the past three years, he has taught a sophomore thermodynamics class, for which the required text is the first edition of this book. Therefore, he is very familiar with its first ten chapters. He is also a co-inventor for a silver refining process (patent pending).