Greek Letters

β = constant
ρ = density
Σ = $\rho_L^i + \rho_U^i$
ζ = defined by Eq. 4

Superscripts

f = final
i = initial

Subscripts

C = cell or concentration
D = diffusivity
L = lower compartment of diaphragm cell
U = upper compartment of diaphragm cell

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BOOKS

Classical Thermodynamics of Nonelectrolyte Solutions, H. C. Van Ness and M. M. Abbott, McGraw-Hill 1982, 482 pp. $39.50.

This book gives a detailed account of the classical approach to the thermodynamics of mixtures, and particularly fluid phase equilibria. It is assumed that the reader has had a course in thermodynamics, but the fundamentals are well reviewed in the early chapters, so that readers whose knowledge is rusty will find the book self-contained. After an initial review chapter, there are two chapters giving the thermodynamic equations and introducing the necessary functions (fugacities, activity coefficients, etc.). This is followed by a chapter on behavior of pure fluids and equations of state for pure and mixed fluids. There are particularly useful accounts of the corresponding states correlations, virial expansion and cubic equations of state, with advice on when to use each. The final two chapters cover property changes on mixing and applications to phase equilibria. This last chapter is the longest in the book (138 pages), and is the most useful to chemical engineers. There are also several useful Appendices covering mathematical techniques, conversion factors, residual function calculations, critical constants, Newton's method, G^E equations, and flash calculations. As in other books by these authors, the text is lucid and easy to read, there are many worked examples, and a very good collection of problems at the end of the book.

Although the authors state clearly at the beginning that they will limit themselves to a purely classical approach, the omission of any molecular interpretation seems to me to restrict the book's appeal as a graduate level text. The inclusion of some statistical thermodynamics gives the reader a feeling for the relation between molecular and macroscopic fluid behavior. Without it the reader cannot appreciate the significance of the virial equation of state or local composition concept, for example, and the all-important mixing and combining rules appear as *ad hoc* constructions. Some of the more complex problems that chemical engineers encounter are included and well treated, for instance, Henry's constants for mixed solvents and ternary phase equilibria. However, as in other texts, a number of the more complex areas are omitted or given scant mention. These include detailed discussions of high pressure phase equilibria (particularly highly nonideal mixtures), calculations for mixture critical points, the nonanalytic behavior of thermodynamic properties near critical points (important in supercritical fluid operations), and the use of group contribution methods.

This book will be useful as a reference and as a text for a second thermodynamics course.

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Industrial Heat Exchangers: A Basic Guide by G. Walker, Hemisphere Publ. Corp. Washington DC, 1982, $41.50, 408 pg.

Recently a number of books started to appear in the, until now, largely neglected area of heat exchanger technology. Practically all such texts are directed to the already experienced reader. The author is correct in stating that this is a "different" book, aimed at the forgotten non-specialist user of heat exchangers as an elementary guide. Within such restrictions it fulfills it's objective very well indeed.

The book starts with a brief summary of heat transfer processes, useful for a novice. The main body of the book contains a concise survey of most industrial heat exchanger types, their principles of operation, areas of application, advantages and limitations and various related comments. Included are standard tubular exchangers, air exchangers, plate and spiral, compact, non-metallic and cryogenic types. Separate sections are devoted to regenerators and boilers, very hard to find elsewhere in such a concise form. Numerous well selected illustrations make the book a good source for self-education or as a supplementary text for heat transfer courses where heat exchangers are usually treated only from academic point of view.

Of special interest even to the more experienced heat exchanger user are the sections on corrosion and erosion, hard to find in general reivew texts. Codes and Standards, exchanger Specification Forms and Buyer's Practices are also covered in a brief survey. The section on Information Sources, both published and confidential can also be useful, but is not exhaustive.

The reader should not expect information on actual design, which the author wisely omitted. The expert will find an occasional oversimplification which, however, should not detract from the main strength of the book which is a very useful down-to-ground general review of heat exchanger applications.

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History of Chemical Engineering, William F. Furter, Editor, Advances in Chemistry, Series 190, American Chemical Society, Washington, D.C. (1980) 435 pages, $39.00.

The Symposium sponsored by ACS Division of The History of Chemistry and of Industrial and Engineering Chemistry contained twenty-two papers, (*9*) United States; (*5*) Canada; (*4*) United Kingdom; (*1*) Italy; (*1*) Japan; (*1*) Germany; and (*1*) India. Educators traced the development of their schools during the past 100 years, engineers in industry set forth the part of chemical engineering in developing modern process plants.

The diffuse nature of chemical engineering and the lack of clarity when craftsmen and technologist become chemical engineers make it difficult to sort out a definition from the historical treatment, this brings the question "Who is a Chemical Engineer?" The bringing together of the sciences to identify, analyse, and predict the parameters which control the several steps in processing material so as to permit improved designs did not seem to stand out to a reader. The advent of the unit operations era in the late 1920's pointed out by educators along with the design construction, and operation of plants including the separation of uranium, isotopes and fluidized cracking of petroleum described industrial personnel included this representation of chemical engineering.

Historical material generally shows evidence of transition to new areas. Scant reference is made to the combined use of mathematics and computers, to data analysis, solution to complex problems, utility in design, and simulation for optimization. Likewise, one would not surmise the large involvement of universities and industry in biomedical engineering endeavors taking place.

The articles represent a broad view of chemical technology and education during the past century and make interesting reading. The many claims of "firsts", no doubt, would be contradicted by others but established a general sequence of events for the reader. Many authors documented their statements, some 600 references in all. The editor deserves credit for covering the western world and completing this fine historical book.

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LETTERS TO THE EDITOR

To the editor:

In a recent paper, Wey and Jagannathan (1982) evaluated the effect of errors in solubility on the apparent kinetic order of crystal growth from solution. They determined that a 0.21% error in the solubility could cause a variation in the kinetic order from one to two *thus making any conclusions about the crystal growth mechanism questionable.* They conclude the variations in solubility of this order can occur due to the "differential solubility" of individual crystal faces and reference the work of Ritzel (1911) as proof of this concept. We feel that this conclusion is incorrect and that the authors have misinterpreted the results reported by Ritzel and will, therefore, attempt to clarify several points addressed in the paper.

Solubility is the solute concentration established after a crystal-solvent system has reached thermodynamic equilibrium. The crystal form is then unique for a given substance solvent, temperature and pressure is approximately described by the Wulff theorem. It is, therefore, incorrect to discuss solubility of cubic and octahedral NaCl crystals since only the cubic crystals are equilibrium forms. The octahedral crystals have a transient character in aqueous solution (Kern 1969).

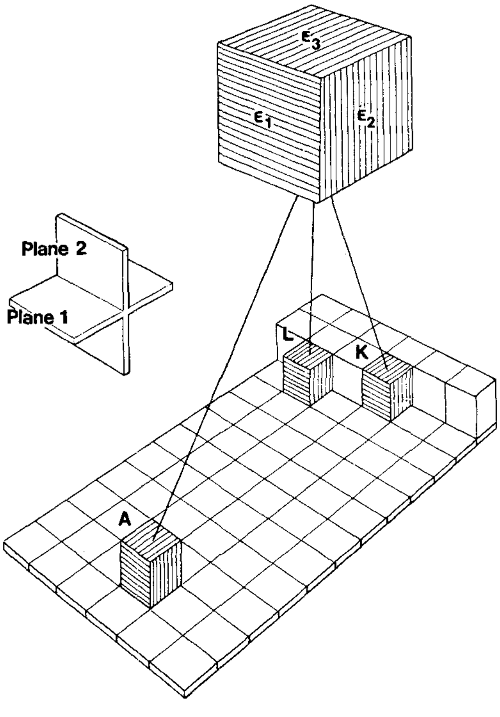

Figure 1. A portion of a stepped surface with adatom (*A*), ledge (*L*) and kink (*K*) adsorption sites.

Ritzel (1911) did not measure and establish differences in solubility of cubic and octahedral NaCl crystals as stated by Wey and Jagannathan. Ritzel measured the rate at which cubic and octahedral faces of NaCl crystals dissolved. From this data, Ritzel calculated the solubility of *infinite* cubic and octahedral NaCl faces undisturbed by the presence of edges. Ritzel correctly realized that for a real crystal, the solute concentration adjacent to the faces of a crystal in equilibrium with its solution must be equal. Ritzel's observations can be explained in terms of the different rates of approach towards thermodynamic equilibrium of the cubic and octahedral faces of NaCl during their disso-