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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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).

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
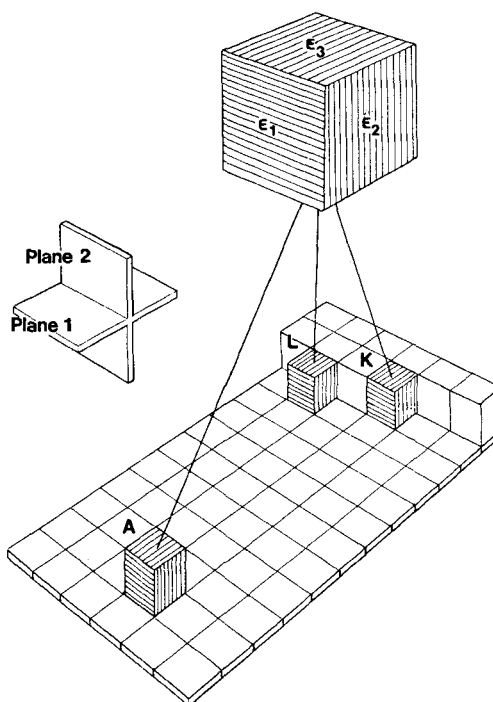

Figure 1. A portion of a stepped surface with adatom (A), ledge (L) and kink (K) adsorption sites.

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 equilib-

rium 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-