ideals of systematic mechanization and progress. An enormous debt was owed to the Renaissance engineers by those, for example, who were to find fundamental physical law in the free fall of a stone. Gille demonstrates this forcefully toward the end of this extremely well-wrought volume by bringing the circle of our understanding to a close with the reminder that Galileo was one of them.

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Physical Adsorption

The Solid-Gas Interface. E. ALISON FLOOD, Ed. Dekker, New York, 1967. Vol. 1, xviii + 514 pp., illus. $21.75; vol. 2, xvi + 661 pp., illus. $27.50.

This two-volume treatise brings together knowledge of essentially all aspects of physical adsorption of gases on solids, and at the same time treats the subjects in depth. The work consists of 37 chapters written by various authors, and each volume is concluded with a commentary on its contents. There is some overlap of subject matter among the chapters, but for the most part this duplication is useful in that a different point is emphasized in each chapter. Chemisorption is not comprehensively covered, but it is mentioned in many parts of this work; likewise, liquids are treated in relation to certain topics such as sorption.

After a historical survey of the study of adsorption, volume 1 goes on to cover most of the basic phenomena and the theory of adsorption. Subjects dealt with include thermodynamic analyses of adsorption, treatments which lead to the BET (Brunauer-Emmett-Teller) and other classical isotherms, adsorbent-adsorbate interaction forces, surface energy and structure, adsorbate equations of state, and lattice theories. The papers range from complete derivations and lucid discussions (for example, of Gibbs's isotherm) to more abbreviated developments, but each is complete in itself. Also covered in volume 1 are heats of adsorption and immersion, surface cleanliness, and very-low-pressure adsorption.

Volume 2 covers the various methods and techniques used to study surfaces and adsorbed layers and also covers sorption and transport properties of gases on or through solids. Among the methods discussed are dielectric, magnetic, optical, infrared, nuclear magnetic and electron paramagnetic resonance, Mössbauer, and low-angle x-ray scattering studies. A discussion of semiconductor surfaces complements the electronic studies. Adsorption accompanied by dimensional and other physical and mechanical changes is reported on, as are theories of pore structure. Ways in which pore structure and adsorption influence the interaction of gases and solids are discussed in chapters on chromatography, accommodation coefficients, and adsorption hysteresis. Active carbon, perhaps the most frequently used adsorbent, is given a chapter by itself, but otherwise the work is arranged according to the method or theory employed.

These volumes adequately present the principles of the various methods used to study adsorption in addition to comparing the various applications of these techniques. They also provide generous quantities of experimental results which are used to evaluate and test experimental studies and theoretical descriptions of adsorption, as well as to characterize adsorption phenomena. The treatise admirably fulfills its aim of combining theoretical and experimental results from a wide range of disciplines relevant to adsorption. It is readable and should be immediately useful to all workers in this field. The specialized researcher and the graduate student alike can gain a nearly complete background in physical adsorption from this treatise.

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Technique in Protein Chemistry

Cross Electrophoresis. Its Principle and Applications. SHOJIRO NAKAMURA. Shoin, Tokyo, 1966; Elsevier, New York, 1967. x + 194 pp., illus. $17.

This little book, describing a modification of the usual paper electrophoresis procedure, demonstrates what can be done with imagination combined with a thorough knowledge of the technique. A recent issue of an authoritative journal devoted to biochemical research contained 20 papers (out of a total of 37) which could have been significantly improved by the use of paper or gel electrophoretic methods. More certainty of results, economy of experimenter's time, and reduction of material consumed are all desirable objectives in any experimental technique. This book provides evidence, which can easily be extended, that these objectives can be achieved by use of paper and gel electrophoresis techniques.

Why are these techniques used so ineffectively, if at all? Why, for example, do we continue to see the homogeneity of a protein preparation "demonstrated" by ultracentrifugation —or even by free-solution electrophoresis—when the example of the serum albumin polymers proves the superior resolving power of gel electrophoresis? Why is there not more use made of discontinuous buffer systems, two-dimensional gels, or ion-exchanger gels, all of which can contribute significant information, including some that cannot be obtained from any other experimental procedure?

One reason may be the absence of electrophoresis experiments in the usual undergraduate biochemistry courses. Another may be the tendency of the modern molecular biologist, accustomed to using digital computers and nuclear magnetic resonance, to look with disdain upon electrophoretic procedures: the apparatus is inexpensive (often homemade), the mathematical theory does not go beyond high school algebra, the results are little more than qualitative. Worst of all, good results demand more artistic talent than scientific technique. Whether or not these strictures are valid, the consequence is a serious deficiency of interest in electrophoresis methods, and failure to apply them as useful laboratory procedures.

Perhaps these characteristics of electrophoretic methods are really advantages. I myself prefer paper and gel methods to free-solution electrophoresis just because of them. At any rate, such purported deficiencies do not diminish the usefulness of the technique Nakamura describes in the present work.

I must confess that, on first reading this book, I was appalled by the opportunities I have missed. For years I have tried to eliminate "artifacts" and irregularities from my electrophoresis patterns, the object being to produce paper or gel electrophoresis patterns as much like the standard free-solution electrophoresis pattern as technical control can make them. Nakamura has perceived that deviations from the expected pattern are not after all purely accidental: they are the predictable results