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BOOK REVIEW

Aqueous Two-Phase Partitioning - Physical Chemistry and Bioanalytical Applications

by Boris Y. Zaslavsky

696 Pages, hard cover

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A recurring debate in bioanalytical separations and protein engineering centers around the structure of water. Zaslavsky's book provides an interesting and intelligent survey of current theories about solute effects on water (or *vice versa*). The author attacks the theoretical controversies head-on. In an even-handed manner, he surveys much of the relevant literature on the physical properties of common aqueous solvent mixtures, particularly those containing dextran and polyethylene glycol (PEG). Inclusion of some of the author's own unpublished work on biopolymers, in conjunction with summaries of Ph.D theses, makes this book particularly valuable. He highlights key issues, such as the absence of [a] "self-consistent physical model of solute partitioning in aqueous two-phase systems."(p. 280). In summary, the author knowledgeably discusses current experimental information about partitioning, with a heavy emphasis on biomolecules such as peptides, proteins, nucleotides and DNA. He raises many compelling theoretical questions for further development.

The book is divided into three parts. The first, a brief overview of solution thermodynamics is easy to follow and quite readable. Only an ill-designed table split over several pages interrupts the otherwise clear presentation of relevant data. In part 2, the author lays the theoretical and model-based groundwork for part 3.

In part 3, the author begins with the troublesome topic of hydrophobicity measurements; and compares several partition-based strategies for coping with the current demand for such physical measurements of biomolecules. He discusses the delicate balance between the need for useful screening of biologics and the difficulty of preserving meaningful biological (conformational and structural) information. His points are well-supported by inclusion of relevant data, so the reader may adequately evaluate his arguments. The expansion of these analytical methods into separation techniques forms the next topic of part 3. A coherent discussion of extraction, countercurrent distribution, and various types of chromatography gives rise to certain guidelines for developing a separation. Zaslavsky provides an important contribution to the discussion of methods development because he demands that the discussion originate from sound physical chemical principles (rather than haphazard guesses). He attempts to bring these principles to bear upon commonly misunderstood phenomena; yet he freely admits to several experimental observations that reflect complicated and poorly defined effects.

Part 3 ends with a compilation of aqueous polymer phase diagrams published in the literature since 1986. These data will certainly be helpful to those scientists developing separation methods using such polymer mixtures. Availability of such a compendium may also help to standardize analyst's descriptions of the partition behavior observed in actual separations.

In summary, Zaslavsky's book is a well-written contribution to the fruitful area of a rigorous physical chemical analysis applied to biologically important molecules. It is a good introduction to a wide landscape of pharmaceutically important questions. It will also be valuable as a reference on partitioning and aqueous phases. I recommend it wholeheartedly to novices and practitioners alike.

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