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Book Reviews

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Book Reviews

ADHESION OF LIQUID AND WETTING (RUSSIAN) by A. D. Zimon. Khimiya, Moscow, 1974. 414 pp. (Rub. 3.04.)

Confusion begins at the first word of the title and the first page of the text; adhesion as understood by the author is “the interaction of liquid and solid phases along their boundary”, cannot be determined by measuring forces but can be at least defined as the work of adhesion. If the misleading term *adhesion* is disregarded, the 11 chapters of the book deal with fundamentals of wetting – measurement methods – drops on solids – bubbles under solids – spreading of liquids over solids – adsorption and heat of wetting – moistening of rough and powdered solids – wetting by melts – wetting in flotation – wetting by petroleum and oils – and applications of wetting. Thus a considerable fraction of the physical chemistry of surfaces is covered in this volume; correspondingly, the number of references is impressive: 888.

Apparently, however, the meal was too rich to be digested. Descriptions, theories, and equations are arranged one after another with little regard to their compatibility or discord. Only two of the many striking examples can be mentioned here. In 1939 the present reviewer, after some preliminary experiments, concluded that the angle of tilt (α) at which a drop (of mass m) runs down an inclined plate was determined by the equation $m \tan \alpha = \text{const}$. In 1950, after a more extensive experimental and theoretical study, it was concluded that $m \sin \alpha = \text{const}$. was the correct correlation. Both equations are reproduced in the book (pp. 97, 228) without any explanation of the difference.

On p. 44 it is deduced from some doubtful hypotheses that the 3 surface tensions are mutually connected by the relation $\gamma_{23} = \gamma_{12} - \gamma_{13}$; 1 refers to vapor, 2 to liquid, and 3 to solid phase. On the other hand, from the Young equation of wetting $\gamma_{23} = \gamma_{13} - \gamma_{12} \cos \theta$, θ being the contact angle. Hence, at $\cos \theta = 1$, $\gamma_{12} = \gamma_{13}$ and $\gamma_{23} = 0$. These results alarmed even the uncritical author, but adsorption got blamed rather than arbitrary hypotheses. Also on many later occasions, adsorption rises like *deus ex machina* to take the blame.

Many phenomena have been misunderstood by the author, but the hysteresis of wetting (p. 86) and the Marangoni effect (p. 158) are perhaps the most annoying examples. All in all: a harmful book.

J. J. BIKERMAN

ASPECTS OF ADHESION—7 edited by D. J. Alner and K. W. Allen. Transcripta Books, London, 1973. 295 pp. (£5.50).

This volume is a collection of the papers presented at the Eighth and Ninth Annual Conferences at the City University, London.

If there were themes or major topics for these conferences they were not restated by the editors nor are they apparent from the contents. There are, however, six papers from the Ninth Conference dealing with liquid interlayers (mainly water) and their influence on adhesive performance.

The quality and value of these papers characteristically range from sophisticated to naive. Some are current; others outdated and "old hat". Considering these were the Eighth and Ninth Conferences, a surprising amount of cursory, largely uncritical review is included. A few of the papers judged by both content and references are rather parochial. One paper employed incorrect quantities, unsatisfactory assumptions, and incredible conclusions. Inadequate description of the work and the paucity of data obviated satisfactory critical appraisal.

The most worthwhile contributions (from this reviewer's standpoint) are the "tidbits" which can be gleaned from the several papers dealing with the physical, chemical, and mechanical characteristics of the interfacial region (including some of the work on liquid interlayers) and the up-to-date continuum mechanical approach to adhesive performance.

Physically this volume leaves something to be desired. Several pages became completely or very nearly detached by what I would consider relatively gentle handling. Also there are an exceptionally large number of typographical errors, omissions of heading in tables, and use of incorrect units.

J. R. HUNTSBERGER