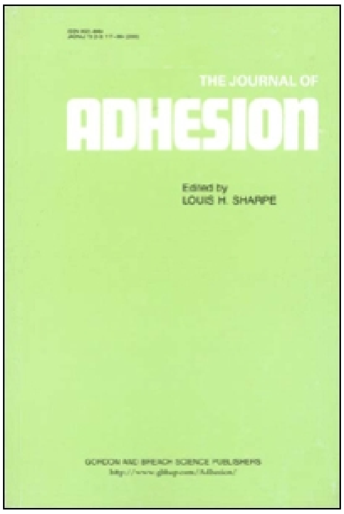

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A Review of: "Treatise on Adhesion and Adhesives, R. L. Patrick, editor. Dekker, New York 1967. Vol. I, 476 pp. $23.75."

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BOOK REVIEWS

"Treatise on Adhesion and Adhesives". R. L. Patrick, editor. Dekker, New York 1967. Vol. I, 476 pp. $23.75.

The volume starts with a brief Introduction which contains an astonishing priority claim and characterizes the following chapters as "an outstanding examination", "superb discussion", "a very lucid report", "a wonderfully lucid discussion", "a wonderful chapter", and so on.

Of the remaining articles, four deal with adhesion itself, namely, with "The Mechanism of Adhesion" (Chapter IV), Rheology of Polymers Used as Adhesives (Chapter VI), Fracture Mechanics Applied to Adhesive Systems (Chapter VII), and Variables and Interpretation of Some Destructive Cohesion and Adhesion Tests (Chapter VIII). The other four are entitled: Intermolecular and Interatomic Forces (II), Adsorption of Polymers (III) Role of Bulk Properties of the Adhesive (V) and Surface Chemistry (IX).

After perusing these chapters, one is left with the impression that the hopes raised by the title are not fulfilled. From a *treatise,* the reader expects a systematic presentation of knowledge without repetitions and contradictions. There is so little system in the volume (compiled by nine scientists), and the author of one contribution pays so little attention to the other papers, that a title like "Opinions on Adhesion and Related Subjects" would have been more appropriate. Several problems which usually are considered in books on adhesion are hardly touched upon but, of course, they may have been reserved for another volume; unfortunately, no table of contents of the future volumes could be found in the first; altogether, three are planned.

Contradictions between different articles are particularly painful when one of the opinions expressed is downright wrong. On pp. 128-129, the equations $\Delta F = \Omega(F_{sl} - F_{sv}) - AF_{lv}$ (1) and $F_{sv} - F_{sl} = F_{lv} \cos \theta$ (2) are given, and the resulting equation $\Delta F = -(F_{lv}/A)\,[1 + (\Omega/A) \cos \theta]$ (3) is said to be a proof that the thermodynamic equilibrium corresponds to a completely wetted state whenever the contact angle is less than 90°. In the above expressions, ΔF is "the change in free energy accompanying the wetting of the substrate", Ω and A "are the actual area of the solid-vapor interface and the area of the liquid-vapor interface" and F_{sl}, F_{sv} and F_{lv} are the free energies of the three interfaces. But equations (1) and (2), if they have any physical justification at all, are compatible only as long as $A/\Omega = -\cos \theta$ (4). If (4) is combined with (3), the result is $\Delta F = 0$. This conclusion is correct, as equation (2) represents an equilibrium condition and—in an isothermal equilibrium—a virtual change in the free energy must be zero. According to Young and Dupré, motion of the 3-phase line occurs only as long as the contact angle has a nonequilibrium value.

On p. 130, a wrong formula for the capillary pressure is given; it would follow from it, that capillary pressure exists also when surface tension is zero. The correct equation is printed on p. 337, but it cannot be found from the Subject Index and can easily be overlooked. Moreover, even if the reader spends so much time on the book as to discover both equations, how can he decide which one to prefer?

On pp. 319-322, the relationship between the "surface energy at failure" and the work of rupture is discussed. A brief—and correct—comment on this relationship is presented on p. 249 in Chapter VII, but obviously it remained unknown to the author of Chapter VIII.

When an adhesive joint is broken by an external force, can the rupture proceed exactly along the interface between an adherend and the adhesive? The answer is "no!" on p. 4, but on p. 191 such a rupture is said to be "conclusively shown" to exist. It is unfortunate that, in the latter instance, only one reference to experiments is given while all the other test results, confirming the above "no!" have been omitted.

This is not the only instance of a very incomplete coverage of experimental data. However, no complaint would be justified at present, as the second volume may still bring the expected review of experimental results. It is hoped that the needs of the readers will be served there with more unselfishness.

The publishers did their part well, although, for a series of disconnected articles, a more detailed Subject Index would be welcome.

J. J. Bikerman