

Prof. Marrack regards the world's food supply as being inadequate, because it is left to an economic system dependent upon a profit motive for its effective working. The breakdown may be in purchasing power, retail price, costs of transport, production, or governmental financial policy. So long, however, as food supply is controlled by factors other than the nutritional needs of the people, so long will that supply be liable to shortages.

Before this War, 90 per cent of the world population was in some respect short of food. The essentials of food planning include increasing the production of food. The biggest obstacles to this in different parts of the world are the small size of farms (33 per cent of farms in Japan are a quarter of an acre in size), debt on the farmer (£40 per head of population in Rumania) and backward state of agriculture (primitive instruments and methods). Planning must include regulation of amounts and type and transport of foodstuffs, and finally increased purchasing power. To attain all this with efficiency, Prof. Marrack proposes an international supreme authority with power to plan on a world scale, using the fullest resources of the globe, and with executive powers to carry its plans to fruition, so that no obstacle shall impede any individual from attaining full nutritive health.

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SURFACE PHYSICS AND CHEMISTRY

The Physics and Chemistry of Surfaces

By Prof. Neil Kensington Adam. Third edition. Pp. xii + 436. (London: Oxford University Press, 1941.) 22s. 6d. net.

MANY branches of science have had their seeds planted some forty years ago and in the intervening period have germinated, grown and flourished to such an extent that massive trees now stand on previously bare earth. The physics and chemistry of surfaces is in this category, and the historian follows this growth first by means of a monograph and then with a text-book in which edition follows edition. Prof. N. K. Adam is universally recognized as one of the historians of this subject, and we welcome his third edition of his well-known text-book.

This volume follows the lines of his second edition, in which a few sections have been rewritten and certain important advances have been inserted in an appendix. It must be admitted that this is not a very satisfactory method of presenting an integrated view of the whole subject. Indeed, the fundamental difficulty presented to the historian goes somewhat deeper, in that subjects soon outgrow the confines of a single text-book. It would indeed be preferable to cut once and for all the Gordian knot and divide the subject into discrete sections, for example, into fluid and solid surfaces respectively. The problems of each would indeed be confined, but with difficulty, into the confines of single separate volumes.

The present edition gives an excellent account of the present state of our knowledge of the liquid surface, in which field Prof. Adam himself is a recognized authority, but many advances have been made in the study of gas films on solid surfaces as well as in understanding the mechanism of the various

heterogeneous catalytic processes, more particularly those involving hydrogen, such as exchange reactions, hydrogenation, double-bond migration and ring closure in hydrocarbons, which might well have been included in an authoritative text-book.

The space which would be available if these topics were transferred to a separate volume could readily be filled by extension of certain portions of the present volume. Thus on p. 35 some thirteen lines only are devoted to the examination of films by reflected light. This method of examination, admittedly a difficult one, is a powerful method of attack, and several interesting properties of films have been revealed which might well have been included.

The general characteristics of surface films of insoluble materials can be portrayed by means of the phase rule, and the thermodynamics of the equilibrium between phases and changes of state have been shown to follow the three-dimensional prototypes. In ordinary phase changes there is a sharp transition in which the properties change discontinuously, including the area and the entropy (resulting from the latent heat). We know in three-dimensional systems that there are cases in which the change in volume and entropy are not discontinuous but merely change very rapidly within a few degrees; this is revealed by a large specific heat in the neighbourhood, but no latent heat. Such changes as are exemplified by molecular rotation in crystals or order-disorder transformation in β brass are phase changes of the second order. Dervichian, in a lengthy series of investigations, recently showed that such changes were also exhibited by monolayers. More than one page in the appendix might have been devoted to this work.

On pp. 38-39 a general description of the method of presenting the results of measurement of the phase boundary potential at liquid/air surfaces is given, and a further development of the concept of phase boundary potentials at liquid/solid and air/solid interfaces is given in Chapter 8 and the appendix thereto. Gatty's analysis of the phase boundary potential at the liquid/air surface provides us with the clearest picture of the origin of surface potential and should find a place in the introductory chapter.

It is clear that our knowledge of the structure of monolayers of macromolecules, especially of the biologically important proteins, is by no means complete. The author adopts the view that protein films are coherent. Several French investigators, on the other hand, have claimed that the vapour state can be obtained and actually measured, providing us with a method of determining the molecular weight. This clearly requires reinvestigation.

Only two and a half pages are devoted to consideration of the chemical reactions in films and the formation of complexes by the process of film penetration. The literature on this subject is now fairly extensive, and in view of the many biological implications it may be regarded as one of the most important aspects of surface chemistry, fully meriting a chapter to itself.

The third edition has been compiled with the author's usual care, and the topics given in the appendix have evidently been carefully selected with the view of presenting important as well as interesting developments in the field of the physical chemistry of surfaces. Scarcely any imprint of war is to be noted in the paper, binding, or printing of this, the third edition.

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