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SURFACES OF SOLIDS IN SCIENCE AND INDUSTRY[1]

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I. INTRODUCTION: SOLIDS

EXCEPT for those who live on the ocean the objects observed visually by human beings are mostly solids, yet who has stopped to think that no one has actually seen a solid? All that is observed is the surface of the solid. For example, no one has ever seen anything of a house except the surfaces of its outside and of its inside walls. The surface of a solid may be considered as a two-dimensional system while the solid is itself three-dimensional. Even a single solid is, in general, made up of a very great number of small particles or crystals which are held together by surface forces. The boundary between two such crystals, or two phases, is designated as an interface, although the term surface is often used with a general meaning which includes all types of interfaces.

Surfaces are prominent in that they form the outside boundary of every phase or particle. Thus, if a thermometer is used to test the temperature of a liquid, its bulb must first be put through the surface. In vaporization every molecule must first get into and then jump out from the surface, and the condensation or adsorption of a vapor occurs upon a surface. If two particles unite, a part of their

[1] Julius Stieglitz Memorial Lecture under the auspices of the University of Chicago and the Chicago Section of the American Chemical Society. Presented in much more extensive form to the Conference on Catalysis of the American Association for the Advancement of Science at Gibson Island, Md., June 11, 1945. Much of the work on solids has been published with Dr. George Jura in the *Journal of the American Chemical Society,* while that on liquids is given in Publications 7 and 13 of the A.A.A.S. by the writer.