

PETR ALEKSANDROVICH REBINDER – AN OBITUARY



Soviet science has suffered a great loss. On July 12, 1972 Academician Petr Aleksandrovich Rebinder, Hero of Soviet Labor and Laureate of the USSR State Prize, the prominent scientist died in his 74th year after a long and serious illness.

P. A. Rebinder was one of the originators of modern colloidal chemistry – the physical chemistry of disperse systems and the science of surface phenomena in such systems. His discovery that solid bodies lose some strength after adsorption of surface-active substances from the ambient medium has received universal recognition; this phenomenon is known all over the world as the "Rebinder effect." The extensive and outstanding research work following this discovery has led P. A. Rebinder to introduce a new interdisciplinary science: physico-chemical mechanics, concerned with the role of physico-chemical phenomena in the processes of formation, deformation, and fracture of solids and disperse structures, concerned with new high-strength and long-life materials with a prescribed dispersion structure and produced under optimum process conditions and then subjected to a combination physicochemical, mechanical, and thermal treatment. This new science has already found wide applications in various branches of industry. Active lubricants, which improve the quality of metal and alloy treatment, have made it possible to upgrade surface finishes and tool life in the machine construction industry and in metallurgy. Improvements in the concrete manufacture based on the use of surface-active plasticizers, a new vibration technique in various manufacturing processes – these are just a few and by far not all instances where that new science ties in with industry.

The work done by P. A. Rebinder has contributed to the development of modern rheology.

Modern desiccation technology is based, theoretically, not only on thermophysical principles but also on specialized aspects of physical and colloidal chemistry, on the knowledge which has been gained largely by Petr Aleksandrovich and his students.

The processes by which liquid is removed from capillary-porous bodies do also break down the bond between moisture and material, and this involves an expenditure of a definite amount of energy. Academician P. A. Rebinder has set up a classification Table of all types of bonds between a substance (moisture) and the material, based on a comparison between energy densities of the various bonds. This classification has provided a powerful impetus to a study of sorption and desorption processes in moist

Translated from *Inzhenerno-Fizicheskii Zhurnal*, Vol. 23, No. 5, pp. 936-937, November, 1972.

© 1974 Consultants Bureau, a division of Plenum Publishing Corporation, 227 West 17th Street, New York, N. Y. 10011. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission of the publisher. A copy of this article is available from the publisher for \$15.00.

materials. As a result, several important problems were solved concerning the hydration of materials and the laws were studied which govern the interaction between humid air and colloidal capillary-porous bodies. These studies have again provided the basis for another branch of the science of heat and mass transfer: statics of desiccation processes.

In the theory of desiccation there has been established a direct relation between the rates of heat transfer and of moisture transfer, also with the rate at which a moist material is heated during desiccation. This relation is expressed in terms of a generalized dimensionless variable $c(rdt/du)$, where c denotes the referred specific heat of the moist material, r denotes the specific heat of evaporation of the moisture, and $dt/du = b$ is a quantity characterizing the rise in the mean temperature of a body as a result of a change in its mean moisture content and which is, in effect, the temperature coefficient of desiccation.

The generalized variable bc/r represents the basic characteristic of the process kinetics, numerically equal to the ratio of the quantity of heat consumed on heating a body to the quantity of heat consumed on evaporating the moisture during an infinitesimal time interval. The universal number bc/r has been named the Rebinder number.

With the aid of the Rebinder number, one can establish a direct relation between the mean moisture content and the temperature of materials, which makes it entirely feasible to tie the desiccation theory in with practical engineering design.

P. A. Rebinder was the author of over 500 most valuable scientific works which he has written in the course of 50 active years; he was also an outstanding organizer of scientific activity – the founder of a prominent school which has produced over 30 Doctors of Science and 100 Candidates of Science.

He was a pillar of the Institute of Physical Chemistry at the Academy of Sciences of the USSR, where to the last day he headed the Department of Disperse Systems. A brilliant teacher, for 30 years he directed the Chair of Colloidal Chemistry at the M. V. Lomonosov State University in Moscow. The Soviet scientific community is well aware of Rebinder's contributions both as editor of "Kolloidnyi Zhurnal", serving also on the editorial boards of other journals and encyclopedic publications, and as member of the Science Council to the USSR Academy of Sciences on Physicochemical Mechanics and Colloidal Chemistry.

Petr Aleksandrovich combined his creative scientific and pedagogical work with a great deal of public activity in the D. I. Mendeleev All-Union Chemical Society, in the Moscow House of Scientists, and in the "Knowledge" Society.

For his outstanding scientific, pedagogical, and public activity, P. A. Rebinder was given high awards by the Government: the Order of Lenin, the Red Labor Banners, the Order of the Patriotic War First Class, and many medals.

Petr Aleksandrovich Rebinder combined the talent of a great scientist with a lot of modesty and personal charm, inexhaustible energy and cheerfulness.

The bright memory of Petr Aleksandrovich Rebinder will always remain alive in the hearts of his many friends, colleagues, and students.