## THE STRUCTURES OF THE ACETYLMETHYLMANNOSIDES[1]

*Sir:*

Three new crystalline hepta-acetyl-4-glucosido-methyl-mannosides have been prepared by the Koenigs and Knorr reaction: ($\alpha$) m. p. 185°, $[\alpha]_D^{20}$ $+26.7°$ in chloroform; ($\beta$) m. p. 161°, $[\alpha]_D^{20}$ $-22.3°$ in chloroform; ($\gamma$) m. p. 167°, $[\alpha]_D^{20}$ $-12.7°$ in chloroform. These new compounds appear to be analogous to the three previously known acetylmethylmannosides whose structures have been the subject of considerable controversy [Hudson, This Journal, **52,** 1680 (1930)]. Since the new compounds cannot contain a 1,4-ring, that ring structure is eliminated for compounds of the corresponding types. The new derivative designated "$\gamma$" exhibits the reactions characteristic of the acetylmethylglycosides which have recently been assigned an ortho carbonic ester structure by Bott, Haworth and Hirst [*J. Chem. Soc.*, 1395 (1930)] and also independently by K. Freudenberg [*Naturwissenschaften*, **18,** 393 (1930)].

The writer has found that the methoxyl group in one of his new compounds ($\gamma$) may be replaced by a hydroxyl group, giving a hepta-acetyl-4-glucosido-mannose, which does not exhibit mutarotation, $[\alpha]_D^{20}$ $+21.7°$ in chloroform. If the methoxyl group in the parent glycoside were combined directly with the first carbon atom upon removing the methoxyl group, the first carbon would be left free and the new substance would exhibit mutarotation. The absence of mutarotation for the new substance indicates that the methoxyl group in the parent hepta-acetyl-4-glucosido-$\gamma$-methylmannoside was not combined directly with the first or aldehydic carbon. Thus the newly found reactions support the Haworth–Freudenberg ortho carbonic ester structure rather than the 1,3-ring structure for compounds of this type.

Polarimetry Section
Bureau of Standards
Washington, D. C.
H. S. Isbell

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## THE ACTIVATION ENERGY OF ADSORPTION PROCESSES

*Sir:*

A rapid development in experimental researches, during the last decade, on adsorption phenomena at solid surfaces having catalytic activity has served to emphasize the existence of adsorption processes in which a high degree of specificity is manifest. This has centered attention on the function of valence forces in determining adsorption. The experimental work has produced a number of results which, from the standpoint of classical adsorption theory, are abnormal. These include abnormal

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[1] Publication approved by the Director of the Bureau of Standards of the U. S. Department of Commerce.

variations of the extent of adsorption with temperature and pressure, abnormal variations of the heats of adsorption with temperature and pressure, large variations in the velocity of attainment of adsorption equilibrium in different systems and in the velocity of evaporation of adsorbed gases. These several factors also influence the velocity of chemical processes occurring at the surfaces in question.

It has now been found that all of these difficulties can be removed and a unified method of treatment results once it is grasped that adsorption processes, in general, require an activation energy. It can be shown that the activation energies of such adsorption processes may vary from very small values to magnitudes such that the adsorption phenomena may first be obtained at quite high temperatures. Moreover, the magnitude of the activation energy is determined not only by the adsorption process in question but also by the nature of the surface area on which the process occurs. Thus, for example, the adsorption of hydrogen on the most active areas of catalytic metals involves such a small activation energy that the process is rapid at temperatures as low as −100°. With various oxide surfaces the adsorption process only manifests itself at temperatures several hundred degrees above room temperature. Numerous examples of these factors involving a variety of surfaces and the gases hydrogen, oxygen, nitrogen, carbon monoxide and water vapor as adsorbates have been collected. The detailed discussion of the subject will be communicated shortly.

FRICK CHEMICAL LABORATORY
PRINCETON UNIVERSITY, N. J.
HUGH S. TAYLOR

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## NEW BOOKS

**Tables annuelles de constantes et données numériques de chimie, de physique, de biologie et de technologie. (Annual Tables of Constants and Numerical Data Chemical, Physical, Biological and Technological.)** Published under the auspices of the International Research Council and the International Union of Pure and Applied Chemistry by the International Committee appointed by the Seventh Congress of Applied Chemistry (London, June 2, 1909). Vol. VII, Parts 1 and 2, 1925–1926. McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, 1930. Part 1, xxxv + 946 pp. Part 2, xv + 950 pp. 22.5 × 28 cm. Price, $25.00 per set.

All workers in the natural sciences will welcome the appearance of this double volume of the Annual Tables covering the years 1925–1926. Naturally the arrangement and mode of treatment followed in the earlier volumes are retained here. There are, however, certain minor changes and additions. English versions of some portions of the French text which might present some difficulties to the reader have been introduced. Two new chapters on Explosions and on Explosions in Gaseous Mixtures have been added