COMMUNICATIONS TO THE EDITOR

TWO NEW METHODS FOR THE DIRECT MEASUREMENT OF THE ABSOLUTE AMOUNT OF ADSORPTION IN LIQUID SURFACES

Sir:

Since sorption on moving surfaces has been found in this Laboratory to bear no relation to the Gibbs theorem, or to the requirements for monomolecular films, but to be wholly dependent upon the conditions of the experiment, no adequate determinations have been made of the amount of adsorption of really soluble substances except with the elaborate and extremely exacting microtome method of McBain and Humphreys,[1] [*J. Phys. Chem.*, **36**, 300 (1032)], which has been continually under test during the past five years. We have therefore developed two simple alternative methods which can be very inexpensively constructed, but which depend upon the availability of a Hilger Raleigh Interferometer, preferably with one meter path as used for gases. We have made the cells with ordinary plate glass and paraffin, but metal is preferable for cleaning purposes.

Both methods depend upon the destruction of a known area of previously motionless surface by means of a moving barrier, and the measurement of the concentration of the resulting liquid, which was formerly partly bulk and partly surface, by means of the interferometer. Both methods are applicable to any solutions whatsoever and may be adapted to liquid–liquid interfaces. In the first ("compressed surface"), the liquid is spread out thin (0.5 mm. deep), after repeated cleaning by sweeping in an enclosed cell. It is then pushed together by the movable barrier which is provided with leak proof end connections as in a Pockels–Langmuir–Adam trough. In the second ("submerged surface"), the liquid is pushed into a rectangular well, past baffles which allow the previous contents of the well to flow up behind the barrier. We have combined both methods in one cell, obtaining three sets of interference bands above each other which may be photographed for record or measurement. Use of a cell 40 to 100 cm. in length (10 cm. broad) instead of the usual 1-cm. path of light increases the accuracy of the analysis in direct proportion, making it of the order of 1 part in 10^7 or even 10^8. With a solution containing 1.5 of β-phenylpropionic acid in one liter, the first method gives 5.6×10^{-8} g. per square cm., the second 5.3 as compared with the microtome 5.1×10^{-8}, and Gibbs' calculated value 5.2×10^{-8}. The progress of the adsorption with time is readily followed, and the adsorbed material accumulates in the surface until the surface is many (twelve) hours old. Yet another successful method of less generality, needing no interferometer, will shortly be communicated in detail.

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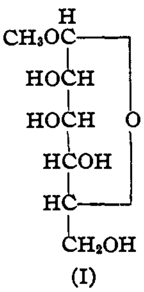
THE OXIDATION OF ALPHA-METHYL *d*-MANNOPYRANOSIDE[1]

Sir:

By the oxidation of alpha-methyl *d*-mannopyranoside in aqueous solution with barium hypobromite a dibasic acid has been produced, the neutral strontium salt of which has been isolated in pure crystalline condition ($[\alpha]^{20}_{D}$ −53.0° in water) in a yield of about 20%. Analyses for strontium, carbon, hydrogen and methoxyl show the empirical formula to be $C_6H_8O_7Sr$. Exact removal of the strontium by sulfuric acid yields an aqueous solution of the organic acid, which does not reduce Fehling's solution. When an aqueous solution of the acid is heated it becomes reducing through hydrolysis. Oxidation of the hydrolyzed acid with bromine water gives good yields of oxalic and *d*-glyceric acids (the latter identified as calcium *d*-glycerate). The structure and configuration of the strontium salt are evi-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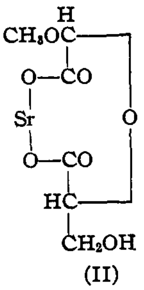
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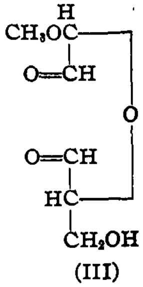
(III)

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[1] Publication authorized by the Surgeon General, U. S. Public Health Service.