glycoprotein like that isolated from the plasma of tumor bearing mice is completely absent in the plasma of normal mice, and it seems probable that it is one of the constituents of α-globulin which increases in concentration during the tumor growth.

The observation that the addition of sulfate ester containing polysaccharides to normal human plasma gives the illusion of an increased α-globulin[26] made it necessary to analyze our α-globulins for sulfate esters. Both globulins were found to contain only very small amounts of sulfate sulfur, and the phenomenon of the increase of α-globulin during tumor growth appears to be unrelated to the interaction of polysulfates with normal plasma proteins.

Biological Properties.—The growth of transplanted Sarcoma 180 in mice of the strain C57BL/6 was affected neither by injection of the host with α-globulin from tumor bearing mice (simultaneously or prior to the transplantation), nor by addition of this α-globulin to the tumor cell suspension before implantation.

On the other hand, the α-globulin, isolated from tumor bearing mice, did not induce progressive growth of a transplantable tumor (Sarcoma I) in a host otherwise resistant to this tumor (mice of the C57BL/6 strain), *i.e.*, the α-globulin obtained from Sarcoma 180 bearing mice was not identical with or did not contain the "enhancing" or "XYZ" factor.[27,28]

Acknowledgment.—We wish to thank Professor Blix for his generous gift of crystalline sialic acid.

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BOSTON, MASSACHUSETTS

COMMUNICATIONS TO THE EDITOR

THE SODIUM-DIBORANE REACTION

Sir:

Stock[1] by direct reaction between sodium and diborane obtained $Na_2B_2H_6$. More recent investigators[2] obtained NaB_2H_6 and showed by X-ray analysis that it contained sodium borohydride. Studies in this laboratory have clarified the nature of the sodium–diborane reaction and have established the identity of another product, the new compound NaB_3H_8.

Early in the present investigation it was discovered that ethers promote the reaction of sodium and diborane. In ethyl ether sodium, as amalgam, and diborane reacted completely in two days at room temperature, forming a product of composition NaB_2H_6. Rate studies indicated that the reaction in the initial stages involved two gram atoms of sodium per mole of diborane and that $Na_2B_2H_6$ was an intermediate. X-Ray and infrared analysis of NaB_2H_6 confirmed the presence of sodium borohydride and revealed an unidentified constituent, soluble in ethyl ether. Upon evaporation of ether solutions, white solids of composition NaB_3H_8 remained. Calcd. for NaB_3H_8: Na, 36.1; B, 51.1; hydrolyzable hydrogen, 141 mmole/g. Found: Na, 34.5 and 35.6; B, 52.6 and 51.5; hydrolyzable hydrogen, 137 and 142 mmole/g. The X-ray pattern of NaB_3H_8 was unique and well-defined. Further instrumental and chemical analyses of NaB_2H_6 gave no evidence of constituents other than sodium borohydride and NaB_3H_8. The experimental facts quite satisfactorily support the relationship

$$2Na + 2B_2H_6 \longrightarrow NaBH_4 + NaB_3H_8$$

On this basis, an 80% yield of NaB_3H_8 was obtained in one experiment. The relatively small quantity of product compared to reactor volume and quantity of amalgam made quantitative isolation difficult.

The compound NaB_3H_8 is quite soluble in water and in ammonia and is more resistant toward hydrolysis than is sodium borohydride. The solid is thermally stable at least to 200°. Solution of NaB_3H_8 in ethyl ether is accompanied by solvation; at 0° a hemi- and a mono-etherate were identified.

The sodium–diborane reaction is undoubtedly of greater complexity than that indicated by the equation, which does not specify probable reaction intermediates. However, the new compound, NaB_3H_8, may be expected as a product of reactions employing a variety of conditions. It is suggested that NaB_3H_8 be designated as sodium triborohydride. A detailed description of this and related investigations of the reaction of sodium with diborane will be submitted at a later date.

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[1] A. Stock, "Hydrides of Boron and Silicon," Cornell University Press, Ithaca, N. Y., 1933.

[2] J. S. Kasper, L. V. McCarty and A. E. Newkirk, THIS JOURNAL, **71**, 2583 (1949).

LIGHT CATALYZED ORGANIC REACTIONS. IV.[1] THE OXIDATION OF OLEFINS WITH NITROBENZENE

Sir:

As a consequence of the previously reported synthesis of oxetanes by light induced addition of carbonyl compounds to substituted olefins,[2] we have investigated the reaction of nitrobenzene with

[1] Part of a program of research supported by a grant from the Godfrey L. Cabot Fund, Publication No. 61, M.I.T. Solar Energy Conversion Project.

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