diseases other than cancer are not known. The work will be continued along these lines, and attempts will be made to find differences by means other than optical rotation.

Acknowledgments.—The able technical assistance of Miss Elouise Oliver is acknowledged. We appreciate also the coöperation of Drs. C. D. Howe and B. J. Trunnell of the Anderson Hospital in providing the blood samples.

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NOTES

8-Azaguanine Analogs[1,2]

BY CARL TABB BAHNER, DOROTHY ELLIS BILANCIO AND EMMA MARGARET BROWN

RECEIVED SEPTEMBER 21, 1953

The effects of 8-azaguanine[3] as an inhibitor of the growth of microörganisms and certain tumors led to a request that we prepare similar compounds for studies which might throw light on the relation of structure to biological activity. As one of the simplest possible changes we undertook to replace the oxygen atom by a sulfur atom. Klingsberg and Papa[4] have reported the use of a pyridine solution of P_2S_5 for replacing the oxygen atom in 3,5-diiodo-2-pyridone and other compounds which are soluble in pyridine. 8-Azaguanine is practically insoluble in pyridine, but dissolves in a hot solution of P_2S_5 in pyridine. 5-Amino-7-mercapto-1-v-triazolo(d)pyrimidine and 5,7-dimercapto-1-v-triazolo(d)pyrimidine have been prepared from 8-azaguanine by taking advantage of this fact.

5-Amino-7-mercapto-1-v-triazolo(d)pyrimidine.—Thirteen grams of 8-azaguanine was added rapidly to a solution of 27 g. of P_2S_5 in 300 g. of pyridine. As refluxing was continued the clear, brown solution began to deposit crystals. After 6 hours the hot mixture was poured into 640 ml. of boiling water. Upon cooling and filtering 10 g. of buff colored solid was obtained. The crude solid which consisted partly of a phosphorus-containing compound was treated with boiling water. The crystals which deposited on cooling the water were dissolved in hot 0.05 *N* KSH. The precipitate which appeared upon acidification of the KSH solution with acetic acid and cooling was dried with care to avoid atmospheric oxidation and the methanol soluble fraction was recrystallized to give 2 g. of a final product which decomposed at 270°. In paper chromatography using a solvent consisting of 60 ml. of water, 3.6 ml. of acetic acid and 300 ml. of *n*-butanol, the R_f was 0.57; ultraviolet absorption: at *p*H 10 log $E_{224\ m\mu}$ 4.132, log E_{325} 3.950; at *p*H 6.51 log E_{231} 4.097, log E_{341} 3.925. *Anal.* Calcd. for $C_4H_4N_6S$: C, 28.51; H, 2.39; N, 49.97. Found: C, 28.39; H, 2.45; N, 49.81.

5,7-Dimercapto-1-v-triazolo(d)pyrimidine.—The crude solid obtained by a single treatment of 13.0 g. of 8-azaguanine with P_2S_5 in pyridine was dissolved in hot 1:1 hydrochloric acid and thrown out of solution by neutralization with ammonia. Six and seven-tenths grams of the recrystallized material was added to a solution of 11.0 g. of P_2S_5 in pyridine. After refluxing the mixture for 6 hours it was poured into boiling water and the crystals which formed were recrystallized by dissolving in hot 1:1 HCl and neutralizing with ammonia; yield 1 g. The R_f for this compound, using butanol–acetic acid–water solvent, was 0.76; ultraviolet absorption: at *p*H 6.51 log E_{283} 4.153, log E_{343} 4.002; at *p*H 10.0 log E_{283} 4.076, log E_{343} 3.801. *Anal.* Calcd. for $C_4H_3N_5S_2$: C, 25.95; H, 1.63; S, 34.60. Found: C, 26.20; H, 1.88; S, 34.58.

Data on the biological effects of these compounds are to be reported elsewhere.

We are indebted to Dr. R. O. Roblin and Dr. J. M. Ruegsegger of Lederle Laboratories for the 8-azaguanine used in these experiments, to Oldbury Electro-Chemical Company for phosphorus pentasulfide, to Dr. Alfred Gellhorn of Columbia University Institute of Cancer Research for calling our attention to the need for substituted triazolopyrimidines in his study of the mechanism of action of 8-azaguanine, to Dr. Howard Skipper and Dr. Lee Bennett and their associates of Southern Research Institute for determining the ultraviolet absorption spectra of these compounds and screening them against certain tumors, and to Dr. Harry W. Galbraith of Galbraith Analytical Laboratories for the carbon, hydrogen, nitrogen and sulfur analyses.

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(2) Presented in part at the Southeastern Regional Meeting of the American Chemical Society, Auburn, Alabama, October 24, 1952.

(3) R. O. Roblin, Jr., J. O. Lampen, J. P. English, Q. P. Cole and J. R. Vaughn, Jr., THIS JOURNAL, **67**, 290 (1945).

(4) E. Klingsberg and D. Papa, *ibid.*, **73**, 4988 (1951).

A New Synthesis of 1-(2-Pyridyl)-alkanols

BY O. H. BULLITT, JR., AND J. T. MAYNARD

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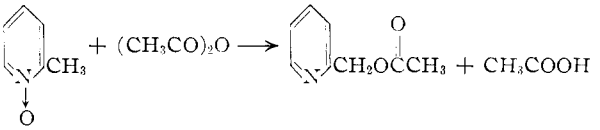
During an investigation of some of the reactions of pyridine N-oxides, a new rearrangement of alkyl-substituted pyridine oxides was encountered. The rearrangement is promoted by carboxylic acid anhydrides and results in the formation of an acylated 1-(2-pyridyl)-alkanol. For example, 2-methylpyridine oxide reacts with acetic anhydride to give 2-pyridylmethyl acetate



Proof of the proposed structure was provided by comparison of ultraviolet (Table I) and infrared spectra with those of known compounds, elementary analysis and preparation of the known picrate of the 2-pyridylmethanol obtained by saponification of the acetate.