

correctly. The important thing is that if n can be calculated in this way it is not necessary to know E and L separately.

| Reaction. | K/p bars. Exp. | K/p bars. Calc. |
|--|---------------------|----------------------|
| HI decomposition on platinum. ⁶ $A = 13800$ $T = 836^\circ$ | 6×10^{12} | 22×10^{12} |
| N_2O decomposition on gold. ⁷ $A = 29000$ $T = 1211^\circ$ | 4×10^{11} | 4×10^{11} |

The agreement in all these cases is probably good enough to be significant. The zero order HI decomposition on gold⁸ provides a clear-cut exception, the rate being 5×10^4 times greater than the calculated rate of activation. The difficulty of accounting for a greater rate suggests that the reversibility of this reaction, in the adsorbed layer before the iodine diffuses away, is the reason—this could have the effect of increasing the apparent value of E .

It should be interesting to repeat this calculation on other suitable catalytic reactions when the material becomes available.

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¹ Hinshelwood and Burk, *J.C.S.*, **127**, 1105.

² Kunsman, Lamar and Deming, *Phil. Mag.*, **10**, 1015.

³ Burk, *Proc. Nat. Acad. Sci.*, **13**, 67.

⁴ Langmuir, *Trans. Farad. Soc.*, **17**, 841.

⁵ Hinshelwood and Topley, *J.C.S.*, **123**, 1014.

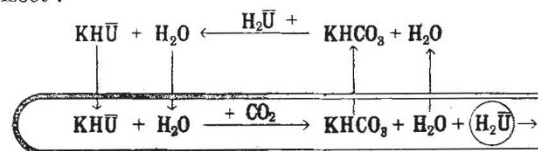
⁶ Hinshelwood and Burk, *J.C.S.*, **127**, 2896.

⁷ Hinshelwood and Prichard, *Proc. Roy. Soc., A*, **108**, 211.

⁸ Hinshelwood and Prichard, *J.C.S.*, **127**, 1552.

Excretion of Uric Acid.

A STUDY of the excretory system of the blood-sucking bug, *Rhodnius prolixus*, has led to the formulation of the following theory of uric acid excretion in that insect:



It is supposed that the upper parts of the four Malpighian tubes secrete a solution of acid urates from the blood into the lumen, and that in the lower parts water and base are re-absorbed, leading to a precipitation of the insoluble uric acid. Thus there is a continuous circulation both of water and of base.

The evidence on which this theory is founded is, briefly, as follows: (1) There are striking histological differences between the upper two-thirds and the lower third of the tube, and uratic granules are confined to the lower third. (2) Neutral red and other vital dyes are taken up from the blood by the cells of the upper segment, and from the lumen of the tube by the cells of the lower segment. (3) Ligation of the tubes at various levels shows that uric acid (or urate) is secreted by the upper segment, and that there is no secretion into the lumen in the lower segment. (4) From 80 to 90 per cent of the uric acid in the urine is not combined with base. (5) Free uric acid is so insoluble that, if it were being excreted in saturated solution in the upper segment, and water re-absorbed in the lower segment, the four Malpighian tubes of this insect (which is 2 cm. long) would have to deal with 20 c.c. of fluid per diem in order to eliminate the daily

output. By the mechanism indicated above, they would have to deal with only 0.4 c.c. per diem. (6) The contents of the tubes are faintly alkaline (pH 7.2) in the upper segment, definitely acid (pH 6.6) in the lower segment. A saturated solution of uric acid is about pH 6.5.

A full account of this work will be published shortly; but the object of this letter is to direct attention to the possibility of the same mechanism being employed in the elimination of uric acid by reptiles and birds. The probability of a circulation of water through the excretory system of these animals has long been recognised, and the possibility of a circulation of base is suggested by the following data. Uric acid is present in the blood in the form of urates. In the urine of the snake, Kohler¹ found that 83 per cent of the uric acid was free; and in the urine of hens 90 per cent is free.² Therefore, if all the uric acid is derived from a glomerular filtrate, base must have been re-absorbed. On the other hand, if the uric acid is secreted in solution by the tubules, since acid urates of sodium and potassium are from thirty to sixty times as soluble as free uric acid (at least in pure water), the suggested mechanism would afford a substantial economy of work.

It would be interesting to know if there is other evidence for this mechanism.

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¹ Kohler, *Hoppe-Seylers Zeitschr.*, vol. 70; 1910.

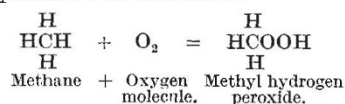
² Szalagyi and Kriwuscha, *Biochem. Zeitschr.*, vol. 66; 1914.

The Peroxidation of Hydrocarbons during Combustion in Air.

PROF. BONE has quoted in his letters with regard to the mechanism of combustion several interesting experimental results which he considers confirm the hydroxylation theory. He has recently directed attention to the finding by Dr. D. M. Newitt and Mr. A. E. Haffner of methyl alcohol in the oxidation products of methane and states that this has "shown conclusively that the slow oxidation of methane proceeds throughout in accordance with the hydroxylation theory".¹

The presence of methyl alcohol in the oxidation products of methane can, however, be explained with equal success by the Engler-Bach peroxidation theory of combustion (1897) recently developed by Callendar and Mardles, Moureu and co-workers, and others (1926). According to the peroxide theory of combustion, the primary reaction is the formation of a moloxide or activated peroxide which catalyses the gaseous reaction and is responsible for autocatalysis and autoxidation.

Callendar and Mardles pointed out² that with paraffin hydrocarbons alkyl hydrogen peroxides might be formed by the simple inclusion of the oxygen molecule in a CH grouping, as, for example, in the following equation with methane:



It will be observed that in the formation of methyl hydrogen peroxide there is no atomic separation in the oxygen molecule as is required by the hydroxylation hypothesis

