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THE ENGINEER AND HIS RELATION TO GOVERNMENT¹

By Dr. VANNEVAR BUSH

VICE-PRESIDENT AND DEAN OF THE SCHOOL OF ENGINEERING OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

REAL attention is being given to the professional advancement and the technical interests of the profession. We have an enormously complex system of organization of scientists and engineers in this country, and yet no effective single central organization representing *all* engineers and expressing their viewpoint on public questions. We have an elaborate mechanism for bringing advice to bear on scientific and engineering problems as they arise in government, and this mechanism is not utilized to the full.

What is to be done about it? Certainly no solution lies in forming one more society to join the throng. Integration is indicated; and since societies now exist

for all the express purposes we have considered, a duplication of effort by a newcomer would simply complicate matters. Rather, the existing mechanism should be simplified and strengthened.

Would it be of aid if the great national organizations, such as the American Institute of Electrical Engineers, were to take official and definite positions on public questions involving engineering? I do not think this is their proper function, for reasons I will discuss. This is being done in some such organizations, and the effect so far has not been especially helpful. It is another thing entirely for the American Institute of Electrical Engineers to provide a forum for the frank discussion of important questions by men of all shades of opinion. In this I believe it has a duty to perform. So far it has not been done, and

¹ Concluding part of an address delivered at an evening session of the American Institute of Electrical Engineers, summer convention, Milwaukee, Wis., June 22, 1937.

of the tissue sections was prevented by small platinum hooks anchored to the central absorption chamber. "KOH-papers" were placed in the central absorption chambers of the Warburg vessels as recommended by Dixon and Elliott³ to facilitate absorption of carbon dioxide evolved during respiration. Upon completion of the experiment the tissues were dried to a constant weight at 105° C, and the wet weight calculated by multiplying the dry weight by 5, the factor used by Warburg.²

In four typical experiments the cutting edges of the instrument were separated by a strip of metal 0.3 mm thick. The dry weights of the tissue sections were 7.4, 7.5, 7.4 and 7.2 mgm, corresponding to wet weights of 37.0, 37.6, 37.3 and 36.0 mgm, respectively, when multiplied by the factor of 5. The wet weights obtained by direct weighing were in substantial agreement, being 41.0, 40.5, 40.0 and 40.5 mgm, respectively. The calculated thickness of the tissue sections were within the limit specified by Warburg, being 4.1×10^{-2} , 4.05×10^{-2} , 4.0×10^{-2} and 4.05×10^{-2} cm, respectively. The Q_{O_2} values, based on dry weight, were of the proper magnitude, namely, -10.0, -10.5, -9.7 and -9.9 cu mm. When the cutting edges were separated by approximately 0.6 mm, the thickness of the tissue exceeded the maximum value specified by Warburg, and a Q_{O_2} value of -7.2 cu mm showed that the tissue did not respire in all its parts.

JOHN O. THOMAS
FLOYD DE EDS

AMMONIUM FLUORIDE FUSION: A RAPID MEANS OF DETERMINING POTASSIUM IN SOILS

ORIENTATION data in the study of soil fertility problems require quick and reasonably reliable methods for determination of the major plant food elements in soils. In the case of total potassium a less time-consuming procedure than is now available for accurate estimation of the element would be of distinct advantage in many investigations.

Studies by Shead and Smith¹ showed that it was feasible to decompose refractory silicates with fused ammonium fluoride, with reduction of the time required for fusion to as low as approximately ten minutes. Although their work was limited to the determination of silica in glass sand, their data showed that other constituents were not lost; and since potassium would likewise remain in the non-volatile residue, the procedure offered promise for the determination of potassium.

In preliminary experiments with application of an adaptation of Shead and Smith's procedure to a num-

³ M. Dixon and K. A. C. Elliott, *Biochem. Jour.*, 24: 820, 1930.

¹ A. C. Shead and G. F. Smith, *Jour. Am. Chem. Soc.*, 53: 483-486, 1931.

ber of tropical soils, the time required for determination of potassium has been reduced as much as one half; and approximately 80 to 92 per cent. of the value for K, as determined by a modification of the classical J. Lawrence Smith method,² has been obtained.

The technical grade of ammonium bifluoride suggested by Shead and Smith has proved somewhat more satisfactory than the fluoride, and it is believed, therefore, that the technique required to make this method of decomposition applicable to all kinds of soils can be developed to such a point that the time required for the determination can be materially reduced, and the accuracy of the determination of potassium improved. Details of the procedure as developed will be published at a later date.

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AGRICULTURE

² C. G. Hopkins, "Soil Fertility and Permanent Agriculture," pp. 631-632, 1910; and S. R. Scholes and V. E. Wessels, *Chem. Analyst*, 25: 38-39, 1936.

BOOKS RECEIVED

- BROOKES, HENRY S., JR. *Textbook of Surgical Nursing*. Pp. 636. 233 figures. Mosby. \$3.50.
DYSON, SIR FRANK and R. V.D. R. WOOLLEY. *Eclipses of the Sun and Moon*. Pp. viii+160. 32 figures. 11 plates. Oxford University Press. \$5.00.
EAGLE, HARRY. *The Laboratory Diagnosis of Syphilis*. Pp. 440. 27 figures. Mosby. \$5.00.
EPSTEIN, PAUL S. *Textbook of Thermodynamics*. Pp. xii+406. 64 figures. Wiley. \$5.00.
HOPKINS, B. SMITH. *General Chemistry for Colleges*. Revised edition. Pp. vi+758. 262 figures. \$3.72.
Laboratory Exercises and Problems in General Chemistry. B. SMITH HOPKINS and M. J. COPLEY. Third edition. Pp. xii+234. 29 figures. \$1.76. Heath.
KANTOR, JOHN L. *Synopsis of Digestive Diseases*. Pp. 302. 40 figures. Mosby. \$3.50.
MACKINNEY, LOREN C. *Early Medieval Medicine*. Hideyo Noguchi Lectures. Pp. 247. Johns Hopkins Press. \$2.75.
National Resources Committee Report. *Technological Trends and National Policy, Including the Social Implications of New Inventions*. June, 1937. Pp. viii+388. 73 figures. U. S. Government Printing Office. \$1.00.
Nauka Polska. Vol. XXII, Pp. ix+433. Wydawnictwo Kasy Imienia Mianowskiego; Instytutu Popierania Nauki-Warszawa-Palac Staszica-1937. Warszawa.
PARRAN, THOMAS. *Shadow on the Land: Syphilis*. Pp. ix+309. Illustrated. Reynal and Hitchcock. \$2.50.
PEARSON, HENRY G. *Richard Cockburn Maclaurin, President of the Massachusetts Institute of Technology, 1909-1920*. Pp. 302. Illustrated. Macmillan. \$3.00.
Studies of the Institutum Divi Thomae. Vol. I, No. 1, June, 1937. Pp. 135. 13 figures. 4 plates. Institutum Divi Thomae of the Athenaeum of Ohio, Cincinnati.
WENT, F. W. and KENNETH V. THIMANN. *Phytohormones*. Pp. xi+294. 62 figures. Macmillan. \$4.00.

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