

down by a skilled botanist, the collector should have no difficulty in running down a specimen.

But more is given than the botanical and popular name of each species, for the habitat in Great Britain and the distribution of the species abroad is described in many cases, and in dealing with trees the characteristics of the wood and the uses to which it is put are generally given. This is a most desirable feature, and gives the layman a glimpse into the interesting features of the varied distribution of plants over the surface of the earth. In addition to the illustrations attached to each species, twelve pages of photogravures are added of some well-known plants such as the foxglove, cowslip, sweet violet. These are well reproduced; but it is a question whether this space might not have been devoted to the description of twelve more species.

Many features of biological interest are frequently introduced, as in the case of the behaviour of alder seeds after shedding. Such features make the book so much more than a mere list of plants.

This book, so well designed for its purpose, can do a great deal to promote an interest in plant life, and in many instances will lead on to the desire for a more extended knowledge of the green mantle covering the earth, whether it be in the direction of geographical distribution or the grouping of different kinds of vegetation in different parts of the country. For the reader who, after practice with this book, desires to extend his knowledge to other plants of Britain a short list of books is given.

Besides appealing to the layman interested in natural objects it should be of value in the schools. Some knowledge of classification and of plants in their natural habitat is of fundamental importance, and unfortunately it is an aspect of botany which in many British universities is treated in an inadequate fashion.

There is need for similar books on geology constructed on a regional basis, so that a general knowledge of earth structure and its varied plant cover may become a common possession of all educated people.

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## STEAM TABLES AND STEAM POWER

### The 1939 Callendar Steam Tables

Compiled and edited by G. S. Callendar and A. C. Egerton. (Published for the British Electrical and Allied Industries Research Association.) Second edition, with New Appendix on Properties of Compressed Liquid Water. Pp. 70. (London: Edward Arnold and Co., 1944.) 12s. 6d. net.

THE successful design of improved steam power-cycles utilizing high pressures and temperatures depends entirely on an accurate knowledge of the properties of steam. An increase in the efficiency of the steam cycle by 1 per cent represents a large annual saving in the coal cost for a modern power station; but this degree of accuracy in the calculations can only be attained if the tabulated properties of steam at extended pressures and temperatures are reliable. Practical evidence was obtained of the inaccuracy at high pressures of the earlier steam tables when high-pressure boilers were first constructed, for the calculated heat transferred to steam plus the measured losses in the boiler was greater than the heat supplied by the fuel. Since the losses in a

modern boiler are small, and can be measured with a high degree of accuracy, it was clear that the tabulated total heats of steam were greater than the true values.

The work of the late Prof. H. L. Callendar is outstanding in the measurement of the properties of steam, and this research has been continued by Mr. G. S. Callendar and Sir Alfred Egerton, with the support of the British Electrical and Allied Industries Research Association. Research has also been conducted in the United States and on the Continent, with close co-operation between the investigators and the holding of three international conferences.

The following table has been compiled in order to compare the values of the total heat of saturated steam at various pressures as quoted by several investigators.

TOTAL HEAT OF DRY SATURATED STEAM ABOVE WATER AT 32° F. IN B.T.H.U. PER LB.

Investigator and date	Pressure in lb. per sq. in. absolute						
	1	15	200	500	1000	2000	3000
Mollier; 1906	1103.3	1152.1	1205.6				
Marks and Davis; 1909 and 1922	1104.4	1150.7	1198.1	1210.0			
Callendar; 1915* and 1924	1102.4	1151.2	1205.4	1222.2	1230.9	1232.3	
Mollier, translated by Moss; 1927†	1103.2	1151.3	1200.6	1202.0	1179.4	1112.9	1001.2
Callendar and Moss; 1931	1102.4	1151.2	1203.5	1213.2	1204.3	1148.8	1039.3
Knoblauch, Raisch, Hausen and Koch; 1932	1104.9	1151.0	1198.5	1202.7	1190.2	1135.1	1017.0
Keenan and Keyes; 1936	1108.0	1150.8	1198.4	1204.4	1191.8	1135.1	1020.3
Koch; 1937	1105.5	1150.3	1198.9	1205.1	1191.6	1135.1	1019.7
Callendar and Egerton; 1939	1106.0	1151.6	1199.6	1205.5	1192.9	1136.1	1016.4

\* 1915 Tables limited to 500 lb. per sq. in. pressure.

† Based on additional data by Mollier and revised equations.

The general deductions which may be drawn from these above figures are as follows: (a) There is a slight increase in the total heat values for steam at low pressures below atmospheric. (b) Little change has occurred in the total heat values of steam at atmospheric pressure. (c) There is a decrease in the total heat values for high-pressure steam amounting to about 3 per cent at 1,000 lb. per sq. inch and to 8 per cent at 2,000 lb. per sq. inch. (d) Since 1932 the values over the whole range of pressure are sufficiently in agreement for practical design purposes, and within the limits of tolerances set by the Third International Steam Table Conference, 1934.

In connexion with this comparison, it should be noted that the Callendar 1939 values are based on actual measurements of total heat, whereas other tables are based on values deduced from specific heat and volume measurements. The fact that the two systems of determination are now in substantial agreement indicates that the recently published properties of steam cannot err greatly from the true values.

The numerical values in the second edition of the Callendar 1939 Tables are unaltered from those in the first edition of these tables; but a new appendix on the properties of compressed liquid water at high pressures and temperatures has been added. These tables are the result of much careful research and planning, and should meet the requirements for many years of engineers concerned with the design and testing of steam power plant or of heating and ventilating systems.

H. HERWOOD.