

**COAL: ITS COMPOSITION,
ANALYSIS,
UTILIZATION AND
VALUATION; PP. 1-166**

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Coal: Its Composition, Analysis, Utilization and Valuation; pp. 1-166 by E. E. Somermeier

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BY

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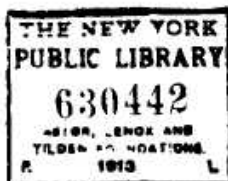
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PREFACE

THE data and descriptive matter given herein, are largely based upon private notes and upon information and material scattered through text-books, technical bulletins, and in original papers in technical and scientific journals. Much of this data is either inaccessible or in such a form as not to be readily applied or interpreted and hence is not likely to be utilized by those who have the most active interest in coal.

In the preparation and arrangement of the material, three distinct classes of readers have been to a certain extent kept in mind:

- (1) The mechanical and power plant engineer;
- (2) The chemical engineer and chemist;
- (3) The non-technically trained business man and operator who has to do with the buying and selling of the coal.

In including data which might be of interest and value to these different groups of readers a portion of the material is necessarily elementary for some and a portion is correspondingly technical for others. Good advice to each reader is to select that which may be of interest and use, and to pass over any discussion or data which may appear too elementary or too technical for his needs.

To the technical man who is familiar with much of the data and many of the formulas given, it may appear that many of the simpler illustrations and details might perhaps just as well have been omitted. However, it is the writer's experience that specific formulas and specific data are not, as a rule, likely to be given too much in detail to suit the occasional user, who may have neither the time nor the inclination to elaborate the formula or to check up the data. He wants each in a form easily understood and readily applicable to his needs.

In the effort to meet this "want" some statements are repeated, perhaps too often, some details enlarged upon a little too much and a few assumptions made which are perhaps not

strictly in accordance with facts. It is hoped, however, that any errors in this direction are of little real consequence and that the collection of material given herein may be a slight contribution toward a more general appreciation of the properties and a better utilization of one of the earth's most valuable assets—coal.

The author desires to express his appreciation to Professor E. A. Hitchcock of the Department of Mechanical Engineering, Ohio State University, and Professor D. J. Demorest of the Department of Metallurgy, for advice and suggestions.

Especial acknowledgment is due to the late Professor N. W. Lord, the able and inspiring teacher, to whom the author is indebted for much of the material given herein.

E. E. SOMERMEIER.

October, 1912.

WYV WEM
CLUB
YRARELL

INTRODUCTION

COAL is generally recognized as being a product of the more or less complete decomposition of vegetable matter under varying conditions of moisture, temperature and pressure. Depending upon the varying conditions and upon the completeness of the decomposition and upon the kind of vegetation from which it is derived, the resultant product as it actually occurs is far from uniform, ranging from the initial stage of woody fibrous peat through lignite (brown coal), bituminous coal high in oxygen, bituminous coal low in oxygen, semi-bituminous coal, anthracite and the final stage—graphite. For similar conditions of moisture, temperature, extent of decomposition and similar vegetable origin, the resultant coal should be uniform in composition and properties. Usually, however, other factors acting during the period of formation modify and change the final product, so that coal from different portions of the same bed or even different portions of the same mine is far from uniform in some important properties, namely, the content of sulphur and ash.

If coal contained only constituents which were present in the original vegetable matter, it would be uniformly low in both sulphur and ash, but during the early stages of its formation underneath the surface of swamps or lakes, streams or rivulets carried silt and sediment over the decomposing bed of vegetation, which sediment settled down and became an integral but varying constituent of the coal. Sulphur in solution in the water, coming in contact with salts of iron and reducing organic compounds resulted in the formation and precipitation of pyrite, while other reactions not clearly understood produced variable quantities of organic compounds of sulphur as a constituent of the coal.

Other factors or agencies may also materially affect the coal in certain portions of the seam or field. Faults and fractures in the coal and surrounding rocks are often accompanied by local variations in the nature of the coal. Weathering of the coal near