

## Chemistry Of Coal

In this book, specialists from a variety of disciplines address the vast and complex subject of the chemistry of coal. The book comprises two parts: the first consists of seven review articles on coal chemistry, including NMR, tandem mass spectrometry, physics, liquefaction, catalytic reactions, devolatilization and combustion. Of particular interest in this part, is the frequent inclusion in many of the contributions of the authors' own research results, hitherto unpublished elsewhere. Good examples of this are the work on magnetic susceptibility of coal (a new branch of coal physics) and the article on tandem mass spectrometry (a new branch of analytical chemistry of coal). The second part contains twelve original articles covering characterization and chemistry of coal, structure and depolymerization, analytical methods including gas chromatography, mass spectrometry, gas-liquid chromatography, size-exclusion chromatography and analysis of oxygen by fast-neutron activation. Physical chemistry and physical properties of coal are dealt with in articles on coal slurry electrolysis, oxidation, thermal decomposition, absorption and diffusion.

The long-term future for coal looks bleak. The recent UN climate change conference in Paris called for an end to the use of fossil fuels. However, coal

remains one of the world's most important sources of energy, fuelling more than 40% of electricity generation worldwide, with many developing nations relying almost wholly on coal-fuelled electricity. Coal has been the fastest growing energy source in recent years and is essential for many industrial activities, but the coal industry is hugely damaging for the environment. A major driver in climate change and causing around 40% of the world's carbon dioxide emissions, coal fuel comes at a high environmental price. Furthermore, mining and air pollution kill thousands each year. A timely addition to the series, this book critically reviews the role of coal in the 21st century, examining energy needs, usage and health implications. With case studies and an examination of future developments and economics, this text provides an essential update on an environmental topic the world cannot ignore.

When the properties of solid coal are compared with those of other common substances, coal seems in many ways unusual and mysterious. For example, almost any set of measurements of coal properties will exhibit time-dependent variation. This dynamic behaviour, commonly referred to as weathering, is known to affect adversely the physical and chemical properties which make coal valuable or desirable as an energy resource or basic material for the chemical industry. This book deals with the molecular-level origins of commonly observed

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time-dependent variations in the physical properties and chemical constitution of coal which are associated with the weathering process. Primary attention is devoted to the description of what are judged to be among the most important physical phenomena, their conceptual interpretation, and their relationships to various technical aspects of coal utilization, transport, and storage. The text is copiously referenced and indexed so as to make the material as accessible as possible. Chemistry of Coal Weathering is an ideal complement to standard textbooks dealing with coal science and technology, materials science, geochemistry and physical chemistry.

Thoroughly rewritten and updated to reflect the latest advances in technology and highlighting the environmental aspects now being emphasized within the coal industry, this Second Edition of a highly acclaimed reference/text provides a comprehensive overview of coal science—covering topics ranging from the origins of coal to mining and contemporary uses. Maintaining and enhancing the clarity of presentation that made the first edition so popular, The Chemistry and Technology of Coal, Second Edition: Considers the implications of the Clean Air Act Examines the effects of combustion products on the atmosphere Details practical elements of coal evaluation procedures Clarifies misconceptions concerning the organic structure of coal Discusses the physical, thermal,

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electrical, and mechanical properties of coal Analyzes the development and current status of combustion and gasification techniques

Excerpt from Elementary Chemistry for Coal-Mining Students For many years I have delivered both popular and more or less systematic courses of lectures to deputies and other workers in coal mines, students who have little or no knowledge of chemistry but are keenly desirous of learning something of the subject which may be useful to them in their daily occupation. The ordinary text-book of chemistry does not meet their requirements, for it contains much that is unnecessary for them to study, and much that it is desirable for them to know is not to be found in it. The present work has been prepared with the object of meeting the wants of these as well as of other students of coal-mining. It is really a compilation of those parts of chemistry, pure and applied, that are cognate to the coal-mining industry, and does not pretend to be a text-book of chemistry. Its arrangement is based on the plan I have adopted in my lectures, namely, to divide the subject into two parts. The first part includes the description of those elements that enter into the composition of coal, among the compounds of which are found all the gases and most of the principal substances met with in coal mines. In this part a certain amount of necessary chemical theory is introduced. The first nine chapters are devoted to this part and in them special attention has

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been given to such subjects as irrespirable and extinctive atmospheres, the occurrence and detection of poisonous gases and their action on the animal system, the safety lamp and its use in the detection of fire-damp, the hygrometer and its use. The second part is included in the next four chapters and treats of the chemistry of coal and coke, the coking process, by-products and their recovery, explosives, explosions of gases and coal dust. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at [www.forgottenbooks.com](http://www.forgottenbooks.com) This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

Excerpt from Elementary Chemistry for Coal-Mining Students No alteration in the composition of an iron bar takes place when it is encircled by a current of electricity, though a certain change takes place which enables it to attract nails. The bar remains iron whether it is able to attract the nails or not, and Whatever

change has taken place is not a change in composition. It is evident from this examination that bodies can undergo two kinds of change: one which does not involve an alteration in the composition of the body, and another which does. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at [www.forgottenbooks.com](http://www.forgottenbooks.com) This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

Process Chemistry of Coal Utilization: Reaction Mechanisms for Coal Decomposition and Volatiles Conversion relates major advances in coal science on how to interpret performance data from lab, pilot and commercial scales. The book presents a very broad range of quantitative methods, from statistical regressions, to rudimentary models, CFD and comprehensive reaction mechanisms. Combining the latest research in the field, including an abundance of lab datasets, the book illustrates how a particular operating condition affects a specific coal-based reaction system. Managers who use these tactics will be able to tailor their testing and simulation work to effectively characterize and solve their problems. Compiles fully

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validated reaction mechanisms that accurately depict the coal quality impacts in all major coal utilization technologies Includes an abundance of lab datasets that clearly illustrate how operating conditions affect coal-based reaction systems

An integrated text presenting both the chemistry and geology of coal. Describes the essential aspects of the petrology and petrographic characterization of coal, the processes involved in coal conversion and utilization, and the testing and analysis of coal. Includes the most recent statistics regarding production and utilization, as well as the most recent developments in structure, reactivity and routine analysis. Includes many tables and figures.

This historic book may have numerous typos and missing text. Purchasers can usually download a free scanned copy of the original book (without typos) from the publisher. Not indexed. Not illustrated. 1919 edition. Excerpt: ... the constituents of coal are soluble in strong oxidising agents such as potassium chlorate and hydrochloric acid, nitric acid, etc., there being formed either chlorinated or nitrated products of complex constitution and which are more or less typical of the coal used. The Destructive Distillation Of Coal. The destructive distillation of coal at ordinary pressures is a process of great technical importance, and the products obtained by this means are many and varied. Their nature casts a certain amount of light on the composition of coal, but the process of distillation takes place at a somewhat high temperature, and the decomposition is such that it is probably well within the mark to say that of the several hundred recognised products of distillation not more than a few of the gases evolved and of the simpler hydrocarbons exist as such in the coal before distillation. It has, however, been found possible, by means of carrying out the distillation in a vacuum or under reduced pressure, to isolate several constituents of coal in an unaltered form, and in other

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cases to obtain products much nearer to the original coal constituents than those obtained by distillation at ordinary pressures, and on which it is therefore possible to build up reasonable hypotheses as to the chemical nature of the coal substance or substances. Vacuum Tar.--Several experimenters have followed the procedure of first obtaining a "vacuum-tar" by distilling the coal under reduced pressure, and then endeavouring by various means, such as the action of solvents or fractional distillation, to isolate constituents of this tar. The process presents many difficulties in practice. For instance, Pictet and Bouvier<sup>6</sup> found that on fractionally distilling vacuum...

The study of coal for the production of energy is certainly not a new area of research. Many research works were carried out to improve the efficiency of industrial and domestic facilities. In the sixties, however, because of the availability and low cost of petroleum, coal consumption decreased and the research effort in this area was minimum. Meanwhile, the situation has totally changed. Considering the reserves of oil and the instability of regions where they are located, it is becoming absolutely necessary to develop other sources of energy. The major alternative to oil appears to be coal, at least for the near future. Indeed, the reserves known today represent several centuries of energy consumption. It is therefore becoming urgent to develop efficient and non polluting technologies to produce energy from coal. The main possibilities are : · liquefaction · gasification · directed combustion. Research and development

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efforts on liquefaction have been considerably reduced because of high cost of technologies involved and poor prospects for the next two decades. Research works on gasification are progressing; it is a promising approach. However, direct combustion either in pulverized coal furnaces or in fluidized beds is the more promising way of expanding rapidly the utilization of coal. These techniques are already used in some facilities but many environmental problems remain, slowing down their development.

Excerpt from The Chemistry of Coal The literature dealing with coal and its chemical properties is of such an extent that an exhaustive record of the facts and theories contained therein would occupy volumes. All that is attempted in this monograph is to show the chief methods by which the problems of coal-constitution have been attacked, and to outline some of the more interesting results obtained. It is hoped in this way to indicate to those desirous of carrying out research work on coal and kindred substances lines along which investigation may lead to concrete conclusions. An attempt has been made to mention all the more important papers in the bibliography, as it was felt that to anyone contemplating serious research work on coals this section should be of value. The methods described in the section on analysis are those which I have found in practice to be satisfactory, and I hope that this section will prove of value to those

who have occasion to examine coals from the analysts point of view. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at [www.forgottenbooks.com](http://www.forgottenbooks.com) This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

The impetus for this book is twofold. First, in response to the well documented oil shocks of the 1970s there arose a resurgence of research activity in the synthetic fuels area. This book attempts to capture some of the leading edge advances which have been made over the past decade in the area of the chemistry of coal conversion. The second driving force behind this book is to jog people's memories about the fundamental truths of the energy industry, i. e. , there IS a finite amount of liquid hydrocarbons on and under the earth's surface, most of the easy to find, produce, and use liquid hydrocarbons have been exploited, and the real need continues to be for liquid hydrocarbons for use as trans portation fuels.

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The uncertainty is not if synthetic liquids will be needed, but rather when they will be needed. The inability to answer that question accurately caused many of the financial and research disruptions following the double shocks of the 1970s. Since future projections can only be based upon the historical record, they cannot anticipate major disruptions such as, e. g. , discovery of huge easily producible oils fields, or, on the other side, global or regional economic disruptions such as warfare. With this level of uncertainty, then, the second impetus is to point out how much research remains to be done at a time when fiscal support for fossil fuels research in the United States is rapidly spiraling downward.

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