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RESOURCES, TECHNOLOGY, MANAGEMENT

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AN INTRODUCTION TO COAL TECHNOLOGY

N. BERKOWITZ

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For Sheila,
and for Jonathan, Brian, and Cheryl

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PREFACE

Since the late 1960s, and especially since the “oil crisis” of 1973, coal—which had for several decades played a steadily diminishing role in the energy economies of industrialized countries and was, indeed, often viewed as passé—has once more moved onto center stage of the energy scene. Projections of long-term availability and costs of alternative fossil fuels, and better appreciation of technical options for interchanging gas, oil, and coal, have not only led to a consensus that coal will again become an increasingly important component of future energy supplies, but also persuaded many that it will become a *preeminent* primary energy resource before the end of the century.

This book has been written with a view to assisting individuals who, in such circumstances, may wish to gain some technical familiarity with coal. It is not intended for specialists who in the course of their work routinely rely on the vast professional literature that a century of coal research has created. It addresses itself, rather, to scientists and engineers who are presently active in other fields, but who might now want to bring coal within the orbit of their interests, and to advanced students of chemical and mineral engineering who are contemplating careers in coal-related endeavors.

What I have attempted to provide is, in other words, an overview that tells what coal is, how it came into being, what its principal physical and chemical properties are, and how it is handled or processed for particular end uses. For each topic I have tried to provide sufficient information to enable an interested reader, when so inclined, to attack the more specialized literature.

In presenting such diverse material, I have followed a natural sequence by beginning with a brief account of the origin, formation, and distribution of coal (Chapter 1), and then summarizing its composition, classification, and most important properties (Chapters 2–7) before turning to beneficiation and handling (Chapters 8 and 9), combustion (Chapter 10), and various partial or complete conversion technologies (Chapters 11–14), and finally dealing with some aspects of pollution and pollution control (Chapter 15). This format effectively divides the book into two parts—the first (Chapters 1–7) centered on coal science and only the second (Chapters 8–15) concerned with technology *in sensu stricto*. But I hope that incursions into science and the at times fairly detailed discussions of coal chemistry—as, for example, in Section 5.7, which treats the molecular structure of coal—are not misunderstood and deemed to make my choice of title inappropriate. I believe that the scope, challenges, and limitations of coal technology cannot be fully appreciated without an understanding of coal compositions and properties; and since the complexity of coal does not make it easy to gain such understanding, I can only ask my readers' indulgence if I seem on occasion to have gone beyond what they might think sufficient for an overview.

A brief comment on my selection of material and bibliography may also be called for. As much as possible, I have confined myself to topics that bear more or less directly on the *technical* behavior of coal; and with respect to coal technologies I have sought to draw attention to processes that are either already of practical importance or that may reasonably be expected to gain such importance. (I have therefore included a short outline of tar processing, about which much can be learned from the experiences of the 1930s and 1940s, as well as summaries of coal gasification and liquefaction, whose potential still remains to be realized.) To facilitate follow-up reading, I have also, wherever possible, cited the most accessible literature—and, preferably, *English-language* literature. At first glance this certainly distorts the research and development scene, and I would therefore ask readers always to bear in mind that whatever convenience my choices offer them is at the expense of proper recognition of the outstanding contributions made in many other countries and reported in other languages.

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Yet, notwithstanding the help I received, what I present here is ultimately my responsibility, and I alone am to blame for any errors or shortcomings.

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PART I

**ORIGINS, FORMATION, AND
PROPERTIES OF COAL**

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