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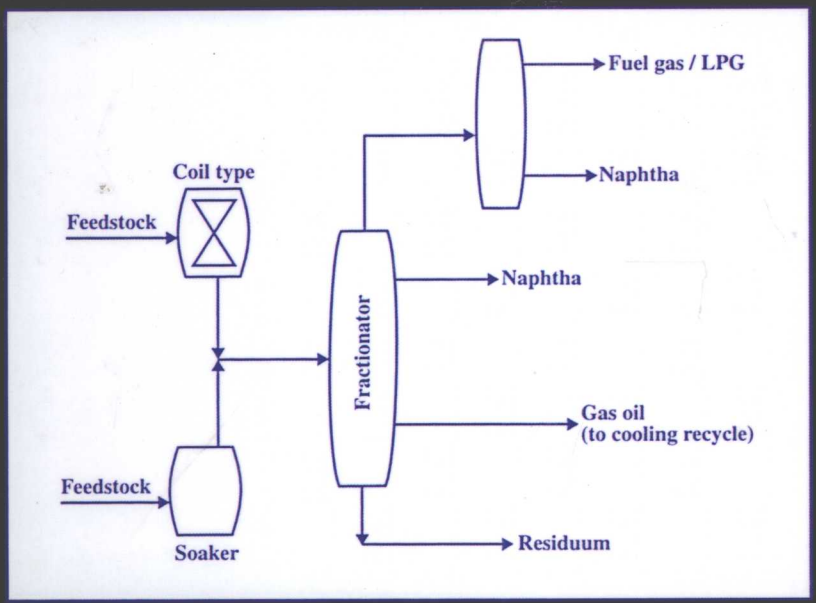

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ADDITIONAL VOLUMES IN PREPARATION

Preface

In recent decades, the energy industry has experienced significant changes in oil market dynamics, resource availability, and technological advancements. However, our dependence on fossil fuels as our primary energy source has remained unchanged. Developments in exploration, production, and refining technologies allow utilization of resources that might have been considered unsuitable in the middle decades of the 20th century.

It has been estimated that global energy consumption will grow about 50% by the end of the first quarter of the 21st century, and about 90% of that energy is projected to be supplied by fossil fuels such as oil, natural gas, and coal. In this supply-and-demand scenario, it is expected that the existing peak in conventional oil production will decline within the next two to three decades and the production of oil from residua, heavy oil, and tar sand bitumen will increase significantly.

As in the 1940s and 1950s, the next two decades will see a surge in upgrading technologies to produce marketable products from residua. The need continues for the development of upgrading processes in order to fulfill market demand as well as to satisfy environmental regulations. In one area in particular—the need for residuum conversion—technology has emerged as a result of the declining residual fuel oil market and the necessity to upgrade crude oil residua beyond the capabilities of the visbreaking, coking, and low-severity hydrodesulfurization processes.

The precursor to this book (*Petroleum Processing Handbook*, J. J. McKetta, Editor, Marcel Dekker, New York, 1992) filled the needs of many readers by covering up-to-date processing operations in an easy-to-read, understandable manner. The current book brings the reader further up to date and adds more data as well as processing options that may be the processes of choice in the future.

In the meantime, the refining industry has entered a significant transition period with the arrival of the 21st century and the continued reassessment by various levels of government—and by various governments—of oil-importing and -exporting policies. Therefore it is not surprising that refinery operations have evolved to include a range of *next-generation processes*, as the demand for transportation fuels and fuel oil has steadily grown. These processes differ from one another in method and product slates and will find employment in refineries according to their respective features. Their primary goal is to

convert heavy feedstocks, such as residua, to lower-boiling products. Thus, these processes are given some consideration in this volume.

The book is divided into three parts: "Feedstock Terminology, Availability, and Evaluation," "Engineering Aspects of Refining," and "Refining." Each part takes the reader through the steps necessary for crude oil evaluation and refining. Part I (Chapters 1–4) deals with the prerefining steps and outlines how to evaluate a feedstock prior to applying refining processes. Part II (Chapters 5–12) will be of particular interest to the engineer who needs to understand the mathematics of chemical reaction, reaction kinetics, transport phenomena, and reactor engineering. Part III (Chapters 13–20) describes in detail, with relevant process data, the various processes that can be applied to a variety of feedstocks. All processes are described with sufficient detail to explain their operation.

By presenting the evolutionary changes that have occurred to date, this book will satisfy the needs of engineers and scientists at all levels from academia to the refinery, helping them to understand the refining processes and prepare for new changes in the industry.

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