

Preface

The final three decades of the twentieth century and the first two decades of the twenty-first century have experienced not only perturbations of energy supply systems but also changes in attitudes of governments and voters alike toward environmental issues. Thus, environmental issues will be with us as long as there is manufacturing of e-consumer goods and the use of fossil fuels for energy production. And it is this latter issue that is the subject of this text. The continued use of gas streams as combustible fuel is a reality, and gas processing, although generally understandable using chemical and/or physical principles, still requires an attempt to alleviate some of the confusion that arises from uncertainties in the terminology. However, while gas streams (particularly natural gas) offer options for the production of energy and chemicals, there are issues that need to be addressed before use of any of the various gas areas.

This three-volume collection of books presents to the reader an understanding of the origin of gases, the properties of gases, and the uses of gases.

The primary aim of the first volume was to introduce the reader to the origins of natural gas, and it contains chapters dealing with recovery, properties, and composition, including gas production from hydrocarbon-rich deep shale formations, known as shale gas, which is one of the most quickly expanding trends in onshore domestic gas exploration, and presents the development of deep shale formations, typically located many thousands of feet below the surface of the Earth in tight, low-permeability formations. The basic technology of reservoir engineering is presented using the simplest and most straightforward of mathematical techniques. The book focuses processes and, wherever possible, the advantages, limitations, and ranges of applicability of the processes are discussed so that the selection and integration into the overall gas plant can be fully understood. It is only through having a complete understanding of the technology that the engineer can hope to appreciate and solve complex reservoir engineering problems in a practical manner.

Volume 2 deals with the constituents of gas streams and the properties of the individual constituents. The volume also presented the chemistry and engineering aspects of the methods and principles by which the gas streams might be cleaned from their noxious constituents. The concept of gas condensate is also introduced and discussed as well as the methods which can be applied to the analysis of gas streams and gas condensate.

The second volume also contains references to several other types of gas streams (in addition to the subcategories of natural gas) that need to be presented here and include the following gas streams that are listed alphabetically rather than by any order of importance: (1) refinery gas, (2) biogas, (3) coalbed methane, (4) coal gas, of which there are various types, (5) flue gas, (6) landfill gas, (7) shale gas, and (8) synthesis gas all of which will, more than likely, also require processing for the removal of contaminants. If these gas stream are not already co-processed with natural gas, there

is the expectation that as the future unfolds, such gas stream will evolve and become more common to the gas industry.

Volume 3 introduces the concept of liquefied natural gas and the concept “gas to liquids” and also presents a review of the uses of gas streams and the effects of the various gases on the environment. This volume also describes the properties gas streams, and the way they are related to corrosion effects is also presented. The relationship of the properties of gas streams as they affect corrosion such as carburization and metal dusting as well as corrosion in steel and other materials used in refinery technology is also presented, and the book summarizes key findings into corrosion processes in gas-processing equipment as well as corrosion in offshore structures.

Each book contains references at the end of chapter which include information from the open literature and meeting proceedings to give a picture of where the gas processing technology stands as well as indicate some relatively new technologies that could become important in the future. Also, each book contains a comprehensive glossary.

The books are written in an easy-to-read style and offer a ready-at-hand (one-stop-shopping) guide to the many issues that are related to the engineering aspects of the properties and processing of natural gas as well as the effects of natural gas on various ecosystems as well as to pollutant mitigation and cleanup. The books present an overview with a considerable degree of detail of the various aspects of natural gas technology. Any chemistry presented in the books is used as a means of explanation of a particular point but is maintained at an elementary level.

Dr. James G. Speight,
Laramie, Wyoming, USA
January 2023