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Nota di contenuto

Front cover; Title page; Copyright page; Dedication; Table of contents; Preface; Acknowledgments; About the Author; Chapter 1: Introduction; Historical Background; Biomass and Its Products; Biomass Conversion; Motivation for Biomass Conversion; Commercial Attraction of Gasification; Brief Description of Gasification and Related Processes; Chapter 2: Biomass Characteristics; Introduction; What Is Biomass?; Structure of Biomass; General Classification of Fuels; Properties of Biomass; Other Gasification-Related Properties of Biomass; Chapter 3: Pyrolysis and Torrefaction; Introduction; Pyrolysis Pyrolysis Product Yield Pyrolysis Kinetics; Heat Transfer in a Pyrolyzer; Pyrolyzer Types; Pyrolyzer Design Considerations; Torrefaction; Chapter 4: Tar Production and Destruction; Introduction; Basics of Tar; Tar Reduction; Chapter 5: Gasification Theory and Modeling of Gasifiers; Introduction; Gasification Reactions and Steps; The Gasification Process; Kinetics of Gasification; Gasification Models; Kinetic Model Applications; Chapter 6: Design of Biomass Gasifiers; Introduction; Fixed-Bed/Moving-Bed Gasifiers; Fluidized-Bed Gasifiers; Entrained-Flow Gasifiers; Plasma Gasification Process Design Product Gas Prediction; Gasifier Sizing; Entrained-Flow Gasifier Design; Design Optimization; Performance and Operating Issues; Chapter 7: Hydrothermal Gasification of Biomass; Introduction; Supercritical Water; Biomass Conversion in SCW; Effect of Operating Parameters on SCW Gasification; Application of Biomass Conversion in SCWG; Reaction Kinetics; Reactor Design; Corrosion; Energy Conversion Efficiency; Major Challenges; Chapter 8: Biomass Handling; Introduction; Design of a Biomass Energy System; Biomass-Handling System; Biomass Feeders Chapter 9: Production of Synthetic Fuels and Chemicals from Biomass Introduction; Syngas; Bio-Oil; Conversion of Syngas into Chemicals; Transport Fuels from Biomass; Appendix A: Definition of Biomass; Appendix B: Physical Constants; Appendix C: Selected Design Data Tables; Glossary; References; Index

Sommario/riassunto

This book offers comprehensive coverage of the design, analysis, and operational aspects of biomass gasification, the key technology enabling the production of biofuels from all viable sources--some examples being sugar cane and switchgrass. This versatile resource not only explains the basic principles of energy conversion systems, but also provides valuable insight into the design of biomass gasifiers. The author provides many worked out design problems, step-by-step design procedures and real data on commercially operating systems. After fossil fuels, biomass is the most widely used fuel