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Nota di contenuto	Industrial Coal Gasification Technologies Covering Baseline and High-Ash Coal; Contents; Preface; 1 Introduction; References; 2 Coal Gasification in a Global Context; 2.1 Applications of Coal Gasification; 2.2 The Three Generations of Coal Gasifiers; 2.2.1 First Generation of Coal Gasifiers; 2.2.2 Second Generation of Coal Gasifiers; 2.2.3 Third Generation of Coal Gasifiers; 2.3 Typical Feedstock and Products; 2.3.1 Feedstock; 2.3.2 Products; 2.3.2.1 Ammonia; 2.3.2.2 Methanol and Derivatives; 2.3.2.3 Electricity (Integrated Gasification Combined Cycle) 2.3.2.4 Substitute Natural Gas (Synthetic Natural Gas) 2.3.2.5 Fischer-Tropsch Liquids; 2.3.2.6 Hydrogen Production; 2.3.2.7 Others; 2.4 Main Markets for Coal Gasification; 2.5 Challenges and Opportunities for Coal Gasification; 2.6 Environmental Aspects; 2.6.1 Air Emissions; 2.6.1.1 Pollutants; 2.6.1.2 Greenhouse Gases; 2.6.2 Water Effluents; 2.6.3 Solid Waste; References; 3 Coal Characterization for Gasification; 3.1 Coal as Gasification Feedstock; 3.2 Petrographic Coal Analysis; 3.2.1 Introduction to Macerals; 3.2.2 Technological Background; 3.2.3 Groups of Macerals 3.2.3.1 Huminite and Vitrinite 3.2.3.2 Liptinite; 3.2.3.3 Inertinite; 3.2.4 Blend Identification; 3.2.4.1 Background; 3.2.4.2 Terms and

Definitions; 3.2.4.3 Interpretation of a Reflectance Analysis; 3.2.5 Temperature Estimation Using Optical Reflectance; 3.2.6 Detection of Other Material; 3.3 Coal Classification; 3.3.1 Introduction; 3.3.2 Reporting of Coal Analyses; 3.3.3 Classification According to the American Society for Testing and Materials Standard; 3.3.4 Classification According to the International Organization for Standardization; 3.3.5 Other Nomenclatures Relevant to Gasification 3.3.5.1 Salty Coals 3.3.5.2 Ballast Coals; 3.3.5.3 Low-Value or Low-grade Gasification Coals; 3.3.5.4 Three-High Coals; 3.4 Coal Sampling; 3.5 Proximate Analysis; 3.5.1 Moisture Content; 3.5.1.1 Technological Background; 3.5.1.2 Analysis of Moisture; 3.5.2 Ash Content; 3.5.3 Volatile Matter Content; 3.5.4 Fixed Carbon; 3.5.5 Alternative Method; 3.6 Fischer Assay; 3.7 Ultimate Analysis; 3.7.1 Technological Background; 3.7.2 Analysis Procedure; 3.7.3 Carbon; 3.7.4 Hydrogen; 3.7.5 Nitrogen; 3.7.6 Sulfur; 3.7.7 Oxygen; 3.7.8 Chlorine; 3.8 Heating Values; 3.8.1 Technological Background 3.8.2 Analysis Procedure 3.8.3 Estimation by Empirical Correlations; 3.8.4 Enthalpy of Formation; 3.9 Caking Properties; 3.9.1 Gray-King Assay; 3.9.2 Free-Swelling Index; 3.9.3 Roga Index; 3.9.4 Dilatation Test; 3.10 Reactivity; 3.10.1 Technological Background; 3.10.2 Determination of Reactivity; 3.10.2.1 General Considerations; 3.10.2.2 Thermogravimetric Analysis; 3.10.2.3 Fixed-Bed Reactors; 3.10.2.4 Entrained Particle Reactors; 3.10.2.5 Wire-Mesh Reactors; 3.10.3 Spontaneous Ignition; 3.11 Mineral Matter and Ash Analysis; 3.11.1 Technological Background; 3.11.2 Minerals in Coal 3.11.2.1 Origin of Coal Mineral Matter

Sommario/riassunto

Coal gasification is the process for production of syngas, a mixture of hydrogen, carbon monoxide and dioxide, from coal and water. It is a classical example for the interaction of basic chemistry, chemical engineering, ecological and economic aspects. This monograph provides the reader with the necessary basic scientific background and displays with industry-proven examples efficiency, but also boundaries of models. Special emphases are a comprehensive overview on latest technology developments, and the introduction of an innovative, new order scheme for evaluation of the gasification process
