

1. Record Nr.	UNINA9911007172903321
Autore	Rahimpour Mohammad Reza
Titolo	Advances in Natural Gas
Pubbl/distr/stampa	San Diego : , : Elsevier, , 2024 ©2024
ISBN	9780443192203 0443192200
Edizione	[1st ed.]
Descrizione fisica	1 online resource (350 pages)
Altri autori (Persone)	MakaremMohammad Amin MeshksarMaryam
Disciplina	665.73
Soggetti	Natural gas Gas engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Front Cover -- ADVANCES INNATURAL GAS:FORMATION,PROCESSING, AND APPLICATIONS -- ADVANCES IN NATURALGAS: FORMATION, PROCESSING, AND APPLICATIONS -- Copyright -- Contents -- Contributors -- About the editors -- Preface -- Reviewer acknowledgments -- I - Fundamental aspects of natural gas hydrates -- 1 - Introduction to natural gas hydrate formation and applications -- 1. Introduction -- 2. Potential application of gas hydrates -- 2.1 Carbon dioxide final disposal -- 2.2 Storage of energy gases -- 2.3 Desalination, ions removal, and treatment of waste water and effluents -- 2.4 Concentration and preservation of food -- 2.5 Cold storage -- 3. Usage of chemical additive to alter the formation and/or dissociation of gas hydrates -- 3.1 Chemical inhibitors -- 3.1.1 Chemical inhibitors having a selective behavior -- 3.1.2 Contemporary application of several inhibitors -- 3.2 Chemical promoters -- 3.2.1 Motivations for using chemical promoters -- 3.2.2 Contemporary application of several promoters -- 3.3 Additives capable to act as inhibitor or promoter, depending on the process conditions -- 3.4 Reasons behind the contemporary usage of promoters and inhibitors -- 4. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 2 - Introduction to natural gas hydrates extraction methods -- 1.

Introduction -- 2. Introducing NGH detection techniques -- 2.1 Seismic survey and analysis -- 2.2 Drilling to get cores -- 2.3 Logging methods -- 2.4 Geochemical exploration -- 3. Techniques to extract natural gas hydrate -- 3.1 Thermal stimulation -- 3.1.1 Thermal properties -- 3.2 Depressurization -- 3.3 Chemical inhibitor injection -- 3.4 Gas displacement method -- 4. Real field tests -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 3 - Thermophysical properties of natural gas hydrates -- 1. Introduction. 2. Phase equilibrium of hydrates -- 2.1 Methods for measuring phase equilibrium -- 2.2 Models of the hydrate phase equilibrium -- 3. Thermal conductivity of hydrates -- 3.1 Measurements of thermal conductivity -- 3.2 Models of thermal conductivity -- 4. Dissociation enthalpy -- 5. Specific heat capacity and thermal diffusivity and of gas hydrates -- 6. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 4 - Thermodynamic properties and phase equilibria characteristics of natural gas hydrates -- 1. Introduction -- 2. Thermodynamic aspects of gas hydrate formation -- 2.1 Thermodynamic requirements for gas hydrate formation -- 2.2 Thermodynamic equilibrium states of simple gas hydrates and their coexisting phases -- 3. Predicting thermodynamic properties and phase behavior -- 3.1 Thermodynamic models for predicting the phase behavior of gas hydrates -- 3.2 Guest molecular properties, salinity, and sediments on hydrate thermodynamics -- 4. Current applications and cases -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 5 - Chemical structure and crystal types of natural gas hydrates -- 1. Introduction -- 1.1 Clathrate hydrates -- 1.2 Semi-clathrate hydrates -- 1.3 Guest-void size ratio -- 2. Properties of the NGHs -- 2.1 Mechanical properties -- 2.2 Thermodynamic properties -- 2.2.1 Thermodynamics -- 2.2.2 Phase equilibria -- 2.3 Thermal properties -- 2.4 Electromagnetic properties -- 2.5 Interfacial properties -- 3. NGH formation and dissociation -- 3.1 Nucleation and crystal growth -- 3.2 Nucleation -- 3.3 Crystal growth -- 3.4 Dissociation -- 4. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 6 - Natural gas hydrate dissociation and dissolution -- 1. Introduction -- 2. Sources of methane origin in NGH -- 2.1 Biogenic methane source -- 2.2 Thermogenic methane source. 3. Gas hydrate stability zone -- 3.1 The requirements for NGH stability -- 4. Gas hydrates in natural porous media -- 5. Hydrate dissociation and production of CH₄ from NGH -- 5.1 Pressure reduction -- 5.2 Thermoelectric stimulation (increment) -- 5.3 Change in chemical potential -- 5.3.1 Inhibitor injection -- 5.3.2 Increased-sized injection of guest gas -- 5.3.3 Reduced-size guest gas injection in NGH reservoirs -- 6. The uncontrolled dissociation of NGH in the climate (environment) -- 7. Conclusion and future outlooks -- Abbreviations and symbols -- Acknowledgment -- References -- 7 - Natural gas hydrates as a carbon neutral energy source: How the intrinsic properties can affect the CO₂/CH₄ exchange pr ... -- 1. Introduction -- 2. CO₂/CH₄ replacement mechanism into hydrates -- 3. Effect of intrinsic properties of hydrates formation on the replacement process -- 3.1 Memory effect -- 3.2 Saturation -- 3.3 Induction time -- 4. Re-definition of the thermodynamic region available for CO₂-CH₄ exchange -- 5. Replacement above and below the freezing point of water -- 6. Conclusion and future outlooks -- References -- 8 - The application of natural gas hydrates as an energy source -- 1. Introduction -- 2. Gas hydrate -- 2.1 Structure -- 2.2 Hydrates in natural environments -- 3. Latest developments in MH energy recovery -- 3.1 MH occurrence and resource evaluation -- 3.2 Programs for drilling, experimental fields, and production technologies -- 4.

Recovery techniques -- 4.1 Thermal simulation -- 4.1.1 Thermal characteristics -- 4.1.2 Computational modeling -- 4.1.3 Experimental research -- 4.2 Depressurization -- 4.2.1 Numerical modeling -- 4.2.2 Experiments conducted in a lab -- 4.3 Injectable chemical inhibitors -- 4.4 The mix of methods -- 5. Conclusion and future outlooks -- Abbreviation and symbols -- References.

9 - Natural gas hydrate-related disasters and case studies -- 1. Introduction -- 1.1 Hydrate structure -- 2. Gas hydrate in pipelines -- 2.1 Disasters case studies -- 2.1.1 Case study 1 -- 2.1.2 Case study 2 -- 2.1.3 Case study 3 -- 2.1.4 Case study 4 -- 2.1.5 Case study 5 -- 2.1.6 Case study 6 -- 2.1.7 Case study 7 -- 3. Gas hydrates in seabed -- 4. Gas hydrate environmental aspects -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- II - Pipeline natural gas hydrates -- 10 . Removal of natural gas hydrate plugs -- 1. Introduction -- 1.1 Gas hydrates -- 1.2 Existence of gas hydrate -- 1.3 Pipelines and gas hydrates -- 1.4 Gulf of Mexico pipeline: A case study -- 1.5 Remediation techniques for gas hydrate -- 2. Chemical inhibitors -- 2.1 Thermodynamic inhibitors -- 2.2 Low-dosage inhibitors -- 2.2.1 Kinetic hydrate inhibitors -- 2.2.2 Antiagglomerates (AA) inhibitors -- 3. Advancement in gas hydrate inhibitors -- 3.1 Contemporary inhibitors for gas hydrate mitigation -- 3.2 Ionic liquids -- 4. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 11 - Natural gas thermodynamic hydrate inhibitors -- 1. Introduction -- 2. Thermodynamic hydrate inhibitors -- 2.1 Conventional THIs -- 2.1.1 Alcohols -- 2.1.2 Diols -- 2.1.3 Salts -- 2.2 Novel THIs -- 2.2.1 Ionic liquids -- 2.2.2 Natural amino acids -- 2.2.3 Sugar-derived compounds -- 2.2.4 Amines and nitrogenates -- 3. Conclusion and future outlooks -- Abbreviations and symbols -- Acknowledgments -- References -- III - Oceanic natural gas hydrates -- 12 - Distribution and discovery of oceanic natural gas hydrates -- 1. Introduction -- 1.1 Geographical distribution of gas hydrates -- 1.2 Global distribution -- 1.3 Production rate of different sources of gas hydrates -- 2. Geochemical signs -- 2.1 Geological indicators -- 3. Diapirism. 3.1 Signs of fluid movement -- 3.2 Submerged holes -- 4. Mud volcano -- 5. Faulting -- 6. Methods for identification and study of gaseous hydrates -- 6.1 Thermodynamic conditions -- 6.2 Ingredients containing hydrates -- 6.3 Reflector for bed simulator -- 7. Zone of stability for gaseous hydrates -- 8. Some projects carried out in the field of gas hydrate exploration -- 9. Conclusion and future outlook -- Abbreviations and symbols -- References -- 13 - Geophysical indicators and methods for producing oceanic gas hydrates -- 1. Introduction -- 2. Principles and procedures for gas hydrate exploration -- 2.1 Hydrates resource estimation -- 2.2 Gas hydrate indicators -- 2.2.1 Seismic indicators -- 2.2.2 Well log data -- 2.3 Pressure coring and analysis -- 3. Gas hydrate processes and characteristics -- 3.1 Hydrates thermodynamic conditions -- 3.2 The gas hydrate system -- 3.3 Hydrate morphology and gas availability -- 3.4 Methods of hydrates production -- 3.4.1 Thermal stimulation -- 3.4.2 Depressurization -- 3.4.3 Inhibitor injection -- 4. Current applications and cases -- 4.1 Case study 1 -- 4.2 Case study 2 -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- Further reading -- Index -- Back Cover.

Sommario/riassunto

This comprehensive volume on natural gas hydrates explores their formation, potential applications, and methods of extraction. Edited by Mohammad Reza Rahimpour, Mohammad Amin Makarem, and Maryam Meshksar, the book gathers insights from various contributors to provide an in-depth understanding of gas hydrates. It covers

fundamental aspects, including the use of chemical additives to influence hydrate formation and dissociation, as well as detection and extraction techniques. The book is aimed at researchers and practitioners in chemical engineering and related fields, offering a detailed examination of the properties, phase equilibrium, and thermal conductivity of natural gas hydrates. It serves as a valuable resource for advancing knowledge and best practices in the domain of natural gas technology.
