

1. Record Nr.	UNINA9911007167703321
Autore	Rahimpour Mohammad Reza
Titolo	Advances in Natural Gas : formation, processing, and applications . Volume 5 Natural Gas Impurities and Condensate Removal // edited by Mohammad Reza Rahimpour, Mohammad Amin Makarem, Maryam Meshksar
Pubbl/distr/stampa	San Diego : , : Elsevier, , 2024 ©2024
ISBN	9780443192241 0443192243
Edizione	[1st ed.]
Descrizione fisica	1 online resource (320 pages)
Altri autori (Persone)	MakaremMohammad Amin MeshksarMaryam
Disciplina	665.73
Soggetti	Natural gas Chemical engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Front Cover -- Front Matter -- Natural Gas Impurities and Condensate Removal -- Copyright -- Contents -- Contributors -- About the editors -- Preface -- Reviewer acknowledgments -- I - Particulates and condensates removalfrom natural gas -- 1 - Introduction to nonacidic impurities of natural gas: Particulates, condensates, mercury, nitrogen, helium -- 1. Introduction -- 1.1 Natural gas categories based on chemical composition -- 1.1.1 Hydrocarbon percentage -- 1.1.2 Quantity of sulfur -- 1.2 Natural gas processing -- 2. The constituents of natural gas -- 2.1 Hydrocarbon constituents -- 2.2 Nonhydrocarbon constituents -- 2.2.1 The diluents -- 2.2.2 Pollutants -- 2.2.3 Solid matter -- 3. Mercury cycle -- 3.1 Physical properties of mercury -- 3.2 Chemical substance characteristics -- 4. Helium -- 4.1 Characteristics of helium -- 5. Nitrogen -- 6. Nonacidic component removal from natural gas -- 6.1 Hydrocarbon removal from liquid -- 6.2 Removing mercury -- 6.2.1 Nonregenerative processes -- 6.2.2 Regenerative process -- 6.3 Elimination of miniscule substances -- 7. Conclusion and future outlooks -- Abbreviation and symbols -- References -- 2 -

Arsenic removal from natural gas condensate -- 1. Introduction -- 2. Arsenic removal -- 2.1 Pyrolysis -- 2.2 Adsorption processes -- 2.3 Absorption process -- 3. Case study -- 4. The effects of arsenic exposure on human health -- 4.1 The adverse effects of arsenic exposure on human health -- 4.1.1 Impacts on lungs -- 4.1.2 Impacts on hemoglobin -- 4.1.3 Carcinogenicity -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 3 -

Condensate stabilization process -- 1. Introduction -- 2. Condensate stabilization -- 2.1 Cascade flash separation for condensate stabilization -- 2.2 Stabilization by distillation -- 2.2.1 Condensate production -- 2.3 Cold-feed distillation tower.

3. Design considerations of stabilization column -- 4. Trays and packing -- 4.1 Trays -- 4.2 Packing -- 4.3 Trays or packaging -- 4.3.1 Distillation service -- 4.3.2 Stripping service -- 5. Storage of condensate -- 5.1 Factors to consider in tank design -- 5.2 Management of tank emissions -- 6. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 4 -

Refrigeration process for condensate recovery from natural gas -- 1. Introduction -- 1.1 Refrigeration processes -- 2. Liquefied natural gas and process of liquefaction -- 3. Refrigerant process mixed with propane precooler -- 4. Self-refrigeration -- 5. Dual mixed refrigerant process -- 6. Multistage mixed refrigerant process -- 7. Cryogenic refrigeration -- 8. Classification of existing refrigeration processes in the LNG production industry -- 8.1 Cascade refrigeration -- 8.2 One-step mixed refrigerant process without phase separator -- 8.3 Precooling process without phase separator -- 8.4 The mixed refrigerant process with phase separator -- 8.5 Mixed refrigerant process with precooling and phase separator -- 8.6 Mixed refrigerant process with propane precooling (C3MR) -- 8.7 The mixed refrigerant process with one-stage precooling and phase separator (DMR) -- 8.8 Expansion liquefaction process -- 9. Single nitrogen expansion liquefaction process -- 10. Dual nitrogen expansion liquefaction process -- 11. Solid bed adsorption -- 12. Membrane separation process -- 13. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 5 -

Membrane technologies for condensate recovery from natural gas -- 1. Introduction -- 1.1 Natural gas liquids -- 1.2 Technologies for the removal of natural gas liquids -- 2. Membrane separation mechanisms -- 3. Current applications and cases of membranes for condensate recovery -- 3.1 Polymeric membranes -- 3.2 Inorganic membranes. 3.3 Mixed matrix membranes -- 4. Conclusions and future outlooks -- Abbreviations and symbols -- References -- 6 -

Supersonic technology for condensate removal from natural gas -- 1. Introduction -- 2. Natural gas purification technologies -- 3. Natural gas condensates removal -- 4. Supersonic technology for condensates removal in natural gas -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- Greek symbols -- References -- 7 -

Mercury removal from natural gas by absorption and adsorption processes -- 1. Introduction -- 2. Systems for the removal of mercury -- 2.1 Mercury adsorption on activated carbon -- 2.2 Mercury adsorption on activated carbon with sulfur -- 2.3 Mercury adsorption on metal sulfide-containing alumina -- 2.4 Mercury adsorption on molecular sieves -- 2.5 Mercury absorption using ionic liquids -- 3. Resistance of H₂S and H₂O -- 4. Functional groups and active sites -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 8 -

Membrane technologies for mercury removal from natural gas -- 1. Introduction -- 2. Mercury in natural gas -- 2.1 Mercury species classification -- 3. Mercury removal methods -- 3.1 Mercury removal using activated carbon -- 3.1.1 Carbon activated with sulfur -- 3.2 Mercury removal

using membrane -- 3.2.1 Mercury removal using metal-organic framework membranes -- 3.2.2 MOF nanofiber membrane -- 3.2.3 Mercury removal using polymer-supported MOF membranes -- 4. MOF material stability -- 4.1 Altered ligands -- 4.2 Metal protection -- 4.3 Refinement after synthesis -- 4.4 Other materials -- 5. Conclusion and future outlooks -- Abbreviation and symbols -- References -- 9 - Nitrogen separation from natural gas using absorption and cryogenic processes -- 1. Introduction -- 2. Methods for nitrogen separation from natural gas -- 2.1 Membranes -- 2.2 Adsorption. 2.3 Cryogenic distillation -- 2.4 Absorption processes for nitrogen separation -- 2.4.1 Lean oil absorption -- 2.4.2 Liquid ammonia N₂-selective absorption process -- 3. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 10 - Nitrogen rejection from natural gas by adsorption processes and swing technologies -- 1. Introduction -- 1.1 N₂ in natural gas -- 2. Convectional technologies for N₂ rejection from natural gas -- 3. Adsorption, merits, and shortcomings -- 3.1 Adsorbent, types, and features -- 4. N₂ rejection from natural gas by adsorption processes -- 4.1 Pure and binary adsorption of CH₄ and N₂ -- 4.2 Kinetics of adsorption -- 4.3 Adsorption selectivity of CH₄/N₂ mixture -- 5. N₂ rejection from natural gas by swing adsorption -- 6. Conclusion and future outlooks -- Abbreviations and symbols -- Acknowledgments -- References -- 11 - Membrane technology for nitrogen separation from natural gas -- 1. Introduction -- 2. Nitrogen separation from methane technologies -- 2.1 Cryogenic distillation -- 2.2 Pressure swing absorption -- 2.3 Membrane technology -- 3. Membrane module configuration -- 3.1 Hollow fibers -- 3.2 Spiral-wound modules -- 3.3 Plate-and-frame modules -- 4. Flow pattern -- 5. Process design -- 6. Application and cases -- 6.1 One-stage membrane design -- 6.2 Two-stage membrane design -- 7. Polymers -- 7.1 Polysulfones -- 7.2 Cellulose acetates -- 7.3 Polyimides -- 8. Effect of different parameters on membrane performance -- 8.1 Effect of temperature -- 8.2 Effect of polymer structure -- 8.3 Effect of pressure -- 9. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 12 - Adsorption processes and swing technologies for helium removal from natural gas -- 1. Introduction -- 2. Principles of helium removal using swing technologies -- 3. Helium recovery from natural gas. 4. Current application and cases -- 5. Conclusion and future outlooks -- Abbreviations and symbols -- References -- 13 - Helium removal from natural gas by membrane technologies -- 1. Introduction -- 2. Helium separation by membrane technology -- 2.1 Principles -- 2.2 Mechanisms of gas transport -- 2.2.1 Solution-diffusion model -- 2.2.2 Pore-flow model -- 3. Membranes used for helium separation -- 3.1 Polymeric membranes -- 3.2 Inorganic membranes -- 3.3 Mixed-matrix membranes -- 4. Conclusion and future outlooks -- Abbreviations and symbols -- References -- Index -- Back Cover.

Sommario/riassunto

This book, 'Advances in Natural Gas: Natural Gas Impurities and Condensate Removal,' provides a comprehensive exploration of the methods and technologies involved in the removal of impurities from natural gas. Edited by Mohammad Reza Rahimpour, Mohammad Amin Makarem, and Maryam Meshksar, it delves into the chemical engineering aspects of natural gas purification. Key topics include the removal of nonacidic impurities such as particulates, mercury, nitrogen, helium, and arsenic, highlighting both the challenges and advancements in the field. The book is intended for professionals and researchers in chemical engineering, focusing on practical applications and future outlooks in natural gas processing. It serves as a valuable resource for understanding the complexities involved in ensuring the

purity and efficiency of natural gas as an energy source.
