

Comparative evaluation of membrane and amine system for natural gas purification and carbon (IV) oxide utilisation offshore

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Membrane systems are commercially proven and attractive alternative for the purification of natural gas in place of existing amine sweetening and dehydration plants, and also known to be economical alternative for sweetening massive quantities of natural gas for removal of carbon dioxide and other contaminants to achieve 90% recovery for offshore and onshore plants. Evaluation of various membrane types for CO₂ removal from natural gas stream was also done, with ceramic membrane being the preferred choice above the commonly used polymeric membrane material. Membrane system design, process selection criteria and economics and operations were also considered. Production of organic-inorganic hybrid membrane led to increase in membrane selectivity; thereby, reducing methane loss to CO₂, which is termed to be an economic advantage. There was reduction in porosity of ceramic support with gas permeation occurring, based on solution-diffusion mechanism. Membrane seemed to have advantage in terms of low capital and operating cost, compact, size as well as simplicity of operation and maintenance. Achieving higher selectivity at expected level of production and reduction in membrane cost were also recorded, while the operating costs included labour, fuel, chemicals and maintenance charges. Thus, since selectivity and permeability are two very important criteria needed for high membrane performance for removal of CO₂ from natural gas stream, combining the advantage of the inorganic and organic membrane i.e., ceramic and polymeric materials, to generate organic-inorganic based hybrid material are recommended.

Biography:

Bewaji, Aderoju Kehinde, a qualified Chemical Engineer and holds a Bachelor's degree from Ladoke Akintola University of Technology, Osun State, Nigeria and Master's Degree in Oil and Gas Engineering from The Robert Gordon University Aberdeen, United Kingdom.

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