

Process design and techno-economic analysis of CO₂ recovery process for CO₂ EOR production

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During CO₂ EOR (Enhanced Oil Recovery) operation, CO₂ recovery process is introduced to recycle CO₂ and produce hydrocarbon products, for example, NGL(natural gas liquids) from the produced gas mixture. As using CO₂ for EOR not only supports CO₂ sequestration, but also increases profit through enhanced oil production, it is important to accommodate CO₂ recovery process for EOR operation in an economic and environmental manner. Hence, this study focuses on process design of CO₂ recovery plant in which hydrocarbon products and CO₂ are cost-effectively separated, together with effective removal of acid gases and water. Because produced oil typically contains CO₂, acid gases, hydrocarbon gases and water, a series of separators, including 3-phase separators, dehydrators, acid gas removal units and CO₂ separation units, should be integrated to separate a multi-component mixture. A case study for designing CO₂ recovery processes is presented, in which a few promising flowsheets having different process configuration are suggested, and their techno-economic impacts as well as engineering feasibility are systematically evaluated. Additionally, LCA (life-cycle analysis) is performed to assess life-time economic and environmental effect of CO₂ EOR with the strategic application of process optimization technique.

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