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Design, simulation and techno-economic analysis of two processes for the conversion of shale gas to ethylene

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Highlights

- Shale gas has become an important energy source
- In addition to its use for energy, shale gas can be converted into value-added chemicals
- Ethylene is a major building block for valuable petrochemical products
- Two processes for the conversion of shale gas to ethylene are presented
- Techno-economic and environmental implications are discussed

Abstract

Shale gas is being considered as feedstock for the production of major petrochemicals. One such chemical is ethylene. Although the typical production for ethylene is carried out via thermal cracking, alternative processes have been gaining importance recently. Among such alternatives are the Oxidative Coupling of Methane (OCM) and the Methanol to Olefins (MTO) processes. The first one is a direct conversion process while the second one involves several stages. The aim of this work is to carry out an economic, energy and environmental assessment for these two processes. The results show that the MTO process is more profitable under the economic and technical scenario considered here. A sensitivity analysis was conducted to show the shale gas and ethylene prices under which the OCM process would be economically attractive. An analysis on catalyst improvement needed for the OCM process to be profitable is also reported.

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