Process Economics Program

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NGL Recovery by Low Pressure Drop Refrigeration Process

By Richard H. Nielsen
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Abstract

The development of horizontal drilling and fracking (hydraulic fracturing) technology for producing gas from shale reserves is significantly increasing NGL (natural gas liquids) production as well. This process has already significantly increased natural gas production and proven reserves in the United States. Another result of this new production is ethane displacing liquid feedstocks for ethylene steam cracking. Several new steam crackers announced to be built in the United States will be fed by NGL recovered from shale gas. Other countries are interested in shale gas exploration including China, India, Poland, Germany, Spain, the United Kingdom, and Ukraine.

Randall Gas Technologies, a division of Lummus Technology, a CB&I company, has developed the IPOR™ (Iso Pressure Open Refrigeration) process to economically totally recover C3+ LPG from most natural gas feedstocks. The process uses conventional propane refrigeration combined with an open-loop mixed-refrigeration cycle to obtain separation at cryogenic temperatures far colder than in conventional refrigeration processes. This enables recovery efficiencies comparable to advanced turboexpander processes but at lower capital and operating costs. Since the pressure drop of the natural gas stream across the plant is low, recompression of the sales gas is avoided in many applications where the raw gas supply pressure (<600 psig) is high enough to meet the sales gas pressure requirement plus the process pressure loss. The process can be configured in several ways depending upon the feedstock, site conditions, and objectives.

In this Process Economics Program Review, the economics of two applications of the process are presented. The first application is C3+ recovery from a lean gas feedstock. The second application lowers the nitrogen content (IPOR-N2 process) of the natural gas while recovering a mixed C3+ NGL product from a rich feed gas.
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