Separation Science and Technology ›

Volume 55, 2020 - Issue 7

Natural Gas Processing

Recovery enhancement of liquid hydrocarbons in dew point control unit of natural gas processing plant

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Pages 1407-1414 | Received 14 Aug 2018, Accepted 04 Mar 2019, Published online: 31 Mar 2019

Cite this article https://doi.org/10.1080/01496395.2019.1591450 Check for updates

ABSTRACT

The low temperature absorption method is currently used in a gas-processing unit to control the natural gas dew point. The major problem of this unit is the simultaneous absorption of high amount of methane within heavier hydrocarbons, which leads to low purity of ethane and propane streams. Considering the operational conditions, the mentioned method used in second and third phases, will control the dew point at −23° c at the best condition. This temperature is not proper for dew point and shows very high amount of hydrocarbons in product gas. In this study, a new process has been introduced in order to drop the gas liquid dew point (natural gas liquid) to −85° c by self-refrigeration technology. Due to the advanced nature of absorption process, the problem of methane existence in the product of gas liquids is noticeably overcome. In this process, natural gas enters the turbo expander after passing through a

refrigeration cycle at −37° c and it is then expanded in an isotropic process to 2896 kPa pressure. Expander outlet with reflux and condensate produced from a cold separator are fed to an absorption tower with a reboiler and the separation will occur. The advantage of this method is controlling the concentration of methane in the product streams. Simulation results show that the process can daily produce 22,280 barrels of gas liquids with a concentration of 0.5 mole% of methane. In addition, the recovery efficiencies of propane and butane in the newly proposed method are 97.3% and 99.99%, respectively, which show a remarkable advantage over the current trend.

KEYWORDS:

Self-refrigeration | turbo expander | absorption | gas liquids | dew point