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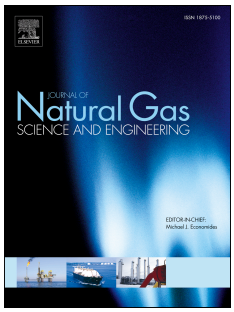

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Enhancing Gas loading and Reducing Energy Consumption in Acid Gas Removal Systems: A simulation Study based on real NGL Plant data

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Abstract

Amine scrubbing with absorption and desorption is the most established technology for Acid Gas Removal (AGR) systems, but suffers from high regeneration energy requirements and, hence offers a good opportunity for more development. A simulation study has been carried out based on a local NGL plant data to evaluate the performance parameters for AGR systems along with energy and utility consumptions for all single alkanolamines (Primary, Secondary and Tertiary) as well as the MDEA/PZ amine blend with different concentrations. The ultimate aim of the study is to address the critical industrial limitations in AGR systems, understand the individual performance for each amine under the same conditions and to investigate the Benchmark amine blend (MDEA+PZ) to optimize the absorption process in terms of enhancing acid gas loading and lowering the regeneration energy consumption. Ten cases have been investigated under the same conditions, where MDEA/PZ with 20/10 wt.% has shown a better performance among single amines and benchmark amine blend 29/1 wt.%; it could save 8% in steam consumption, 45% in cooling water, 62% in Lean Amine Air cooler, 45% in pumping power and 38% in solvent circulation rate, in addition to enhancing acid gas absorption by 67%.

Keywords:

Acid gas; Amines; Gas loading; Energy consumption; Process optimization

1. Introduction

Natural gas plays a crucial role in the world's supply of energy and will continue to do so in the next few decades for industrial and domestic utilization. Despite the rapid