Improved Performance of Gas-Sweetening Processes

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1. Introduction

GASCO/ADGAS gas-processing production volumes have steadily risen with increased product pricing. Many plants that operated at low capacity upon commissioning now operate at full capacity. High production volumes have placed stringent new requirements on gas-processing operations to consistently meet required financial performance.

Amine sweetening and accompanying sulfur plants are key components of natural-gas-processing facilities that frequently limit capacity at high production volumes. GASCO/ADGAS routinely applies process modeling to consistently achieve record gas-plant production volumes required by production commitments and to address plant safety issues.

2. Key Features

HYSYS marketed by Honeywell and AspenTech is currently the workhorse for modeling gas sweetening at GASCO/ADGAS facilities. The amine sweetening modeling capability was added to HYSYS fairly recently, only about five years ago. In GASCO/ADGAS applications, the amine concentration and temperature limitations of this tool constrain engineers trying to model current GASCO/ADGAS processes. Additionally this tool uses only thermodynamic modeling and thus may not accurately describe co-absorption of hydrogen sulfide and carbon dioxide where rate phenomena can play an important role.

Computational tools specifically designed to model amines circuits are marketed by several firms specializing in engineering software. These venders include Bryan Research and Engineering, Sulphurexperts, Optimized Gas Treating, Inc. and WinSim, Inc. The capabilities of these tools in modeling amine-sweetening need to be assessed by GASCO/ADGAS to determine if they provide important new insight that will lead to increased production from existing assets or improved safety margins.

Some of the tools possess new capabilities indicating that implementation of these tools could pay substantial dividends. Many tools have the ability to include the rate phenomena involved in hydrogen sulfide and carbon dioxide absorption. Because of the potential of these tools to extend GASCO/ADGAS's modeling capabilities, it is important that we evaluate these tools.

3. Conclusions

Modeling can provide important information that can increase existing asset capacity and can be used to define safe operating conditions. Importantly, implementation of operational improvements identified in modeling can be particularly advantageous. Such improvements frequently have a low cost and may avoid major shutdowns that significantly reduce plant production volumes.

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Author Biographies

Dr. Bruce Palmer (Principal Investigator) is Professor of Chemical Engineering at The Petroleum Institute. He served as an advisor to the Gas Research Institute in the U.S. for 10 years. His career includes work on sulfur recovery at Texasgulf Sulfur, Inc.

Naif A. Darwish, Associate Professor, is specialized in thermodynamics and has several publications in the fields of thermo-physical property experimentation and computer simulation of natural gas facilities.

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