

## **The Rectisol Demonstration Unit: Optimisation of the Rectisol Design for Syngas Purification**

E. Masurel\*, A. Chang\*\*, R. Szabo\*\*\*, S. Schmidt\*\*\*, S. Corbet\*\*\*

\*Air Liquide Frankfurt Research and Technology Center, Frankfurt am Main, Germany, \*\*Air Liquide Shanghai Research and Technology Center, Shanghai, China, \*\*\*Air Liquide Global E&C Solutions Germany, Frankfurt am Main, Germany

### **Abstract**

Keywords: Packing, Rectisol, syngas purification

Rectisol process is used for more than 80% of the gasification projects for acid gas removal. The Rectisol process is an efficient way to remove sulfur compounds, CO<sub>2</sub> and other traces from syngas with chilled methanol as solvent. In order to respond to the customer need for continuous CapEx and OpEx improvement, the use of packing to replace trays in absorber and reabsorber column seems promising. Nevertheless, as the Rectisol is a process with a large range of operating conditions (L/G ratio, temperature, pressure, liquid loads...), the correlations from the literature should be out of their domain of validity for some sections.. This uncertainty leads to a less optimized design to ensure the quality of the product gases.

### **1. Methodology**

In order to have a better understanding of the performance of packings for Rectisol application, a demonstration unit has been built and connected to a commercial size Rectisol unit in order to perform tests with packings. Gas and liquid flows circulating in the Rectisol Demonstration Unit (RDU) are directly extracted from and returned to the main plant. The RDU allows to test of packings and is equipped with all the required instruments to study both hydraulics and performances of tested packings (online gas analysis, temperature and pressure sensors, coriolis flow meters...). A method of sampling and analysis of cold, pressurized laden methanol has been developed. Different kinds of packings have been tested which might be beneficial for different column sections.

### **2. Results**

The RDU provides a proof of concept on the use of packing in the Rectisol columns and enables to improve the estimation of the operating limits and the performances. Based on the results of the tests performed on the RDU, optimised design rules of Rectisol process with packing have been defined. This new design allows to significantly reduce the CapEx and OpEx compared to the unoptimized design with packing and compare to trays design.