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Title:

Bench scale Testing of Next Generation Hollow Fiber Membrane Modules at subambient conditions at the National Carbon Capture Center

Authors & affiliations:

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

Introduction

Air Liquide is developing a hybrid CO_2 capture process based on sub-ambient temperature hollow-fiber membrane operation in combination with cryogenic distillation (Ref 1, 2, 3). Prior work has shown extremely attractive membrane performance. The current work seeks to demonstrate the performance of the novel membrane fiber, in commercial form, with flue gas from a coal fired power plant.

Methods

Bench scale testing at 1,000 NM^3/hr scale has started at the National Carbon Capture Center (NCCC, Wilsonville AL) in a field-test unit incorporating pre-treatment, drying, two commercial membrane bundles, and a slip stream test for novel materials. The membranes can be tested at pressures up to 16 bar with temperatures as low as -52° C.

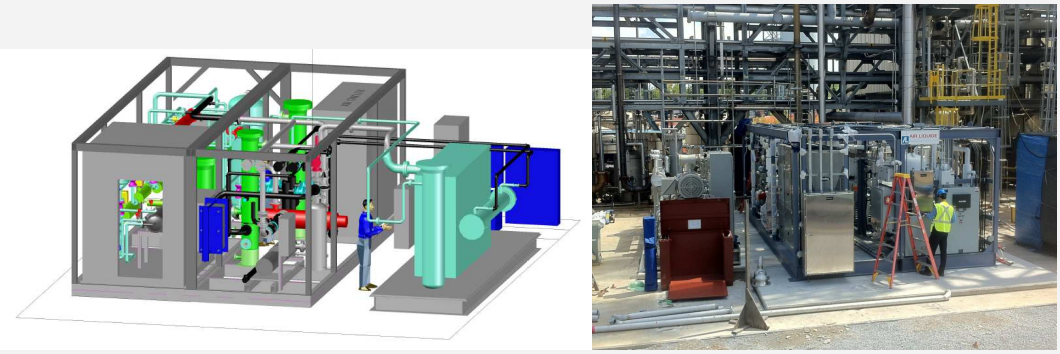


Figure 1 (a) 3D mockup of field test unit (b) installed at NCCC

Results

The novel membrane, designated PI-2, showed significant performance improvements: up to 10-times the CO_2 permeance and similar CO_2/N_2 selectivity (corresponding to approximately 4-times potential productivity per bundle) as compared to baseline PI-1 commercial fiber. Testing with flue gas started in December 2017 at the NCCC. Preliminary results from testing of a 6" PI-2 bundle corresponding to existing commercial modules are shown in Figure 2. Long term test data will be taken in early 2018.

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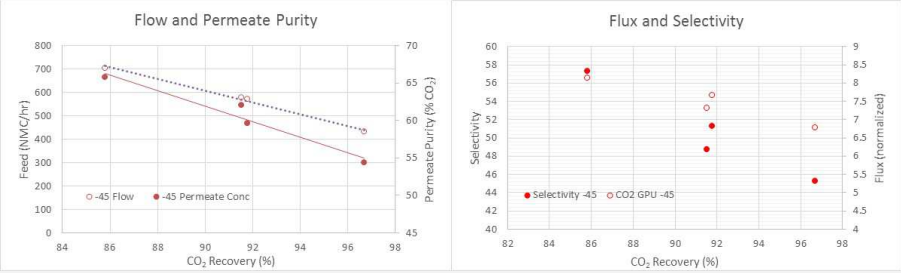


Figure 2 Preliminary Field Results of PI-2 erformance of Bundles and Fiber. Testing with 18% CO2 flue gas at 200 psig feed pressure, temperature -45 °C. Permeance normalized to the PI-1 fiber.

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