

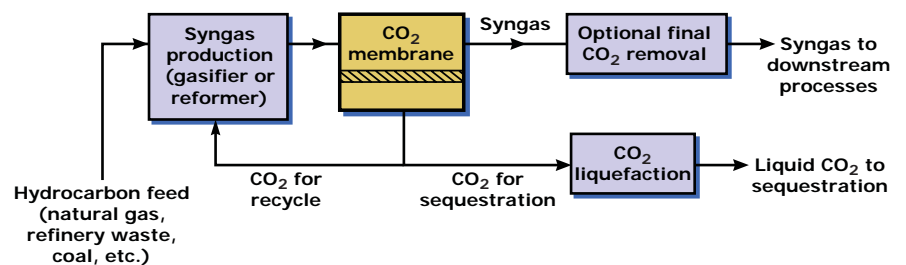
CO₂ REMOVAL FROM SYNGAS

- **Polaris provides a simple technology for CO₂ removal from H₂-containing streams**
- **Minimal installation cost with skid-mounted construction**
- **Achieves short payback time of 1 year or less**

Problem

In syngas production, CO₂ is a desirable feed to the reformer (or gasifier) because it reduces methane consumption and produces a syngas with a more optimal H₂:CO ratio. Often the added CO₂ is imported from a nearby process. However, another attractive CO₂ source is to recover and recycle CO₂ from the reformer/gasifier discharge stream; a simple technology to recover this CO₂ and recycle it to the reformer would be very attractive. Additionally, reformers and gasifiers used to produce hydrogen are significant producers of CO₂, and recovery of this CO₂ for sequestration will play an important role in reducing greenhouse gas emissions. Until recently, membranes could not be used in these applications because conventional CO₂ removal membranes do not separate CO₂ from hydrogen.

VaporSep® Solution



CO₂ recovery and recycle using membranes

“Polaris is an important new innovation: for the first time, membranes can achieve practical separation of carbon dioxide from hydrogen.”

CO₂ REMOVAL FROM SYNGAS

MTR's unique Polaris™ membrane is a new development that allows membranes to separate CO₂ from streams containing hydrogen. The Polaris membrane is much more permeable to CO₂ than to H₂, and can be used to recover a significant amount of the CO₂ contained in the reformer/gasifier discharge for recycle to the reformer. When downstream processes require a higher degree of CO₂ removal, a small conventional CO₂ removal unit may be added. If CO₂ sequestration rather than CO₂ recycling is the goal, the concentrated CO₂ discharged from the membrane can be liquefied and pumped to the sequestration site.

Benefits

- **Efficient CO₂ recycle or removal:** membrane systems can typically separate 80% of feed CO₂.
- **Simple reliable unit; easy to install and operate:** integrates into existing operations with minimal modification; simple installation and operation with compact skid-mounted construction; requires no chemicals, contains no moving parts
- **Minimal utility usage:** cooling water, instrument air, instrument power, N₂ (for purging)
- **Proven performance:** Polaris membranes have been widely tested in the lab and field. First commercial installation has been operating trouble free for more than 2 years.
- **Long membrane life:** the CO₂ membrane is made from very robust materials, and is expected to have a lifetime of 4 to 5 years or more.

System Description

- **Feed pressure: up to 800 psi**
- **Feed: 1 to 200 MMscfd; 10 to 60 vol% CO₂**
- **CO₂ recovery: greater than 50 to 80+%**
- **Modular construction: 1 or 2 skids, each 30 ft (L) x 10 ft (W) x 12 ft (H)**

Application Areas

- **H₂ plants**
- **Syngas production**
- **Methanol production**
- **Gasifiers feeding integrated gasification combined cycle (IGCC) gasifiers and other power plants**
- **Pressure swing adsorption (PSA) feed/tail gas**

CORPORATE HEADQUARTERS

Membrane Technology and Research, Inc.

1360 Willow Road, Suite 103

Menlo Park, CA 94025 USA

Tel: (650) 328-3228

Fax: (650) 328-6580

Email: Refinery@mtrinc.com

Web: www.mtrinc.com

U.S. GULF COAST/MEXICO/ S. AMERICA OFFICE

Houston, USA

Tel: (713) 271-3792

Fax: (713) 271-3791

EUROPE/MIDDLE EAST/ AFRICA OFFICE

Brussels, Belgium

Tel: 32.2.633.6751

Fax: 32.2.633.6751

MTR Membrane
Technology
& Research