

HYDROGEN SEPARATIONS IN SYNGAS PROCESSES

- **Efficient and economical hydrogen separation and recovery**
- **Minimal installation cost with skid-mounted construction**
- **Achieves short payback time of 1 year or less**

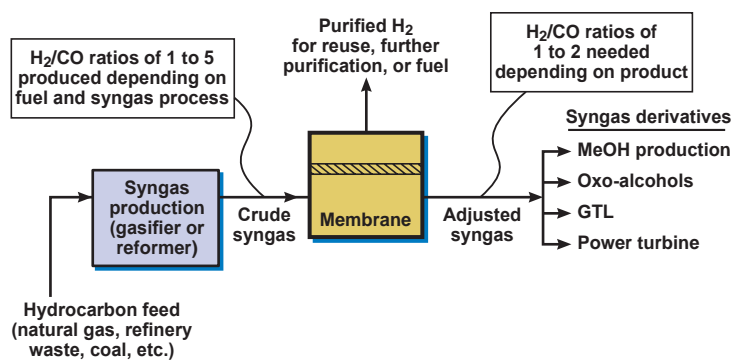
“No moving parts and steady operation make membranes the technology of choice for adjusting syngas.”

Problem

Syngas Ratio Adjustment

Syngas ($H_2 + CO$) is required to make a variety of products. Each of these syngas derivatives has a specific ratio of H_2 to CO in the feed syngas that is optimal for its production. However, the $H_2:CO$ ratio produced is a function of the syngas process and the hydrocarbon feed. This ratio will not necessarily be optimal for downstream products. Therefore, some method for reducing the amount of hydrogen in the syngas is needed.

VaporSep- H_2 ™ Solution



Syngas ratio adjustment using membranes

VaporSep- H_2 ™ offers a simple method for separating H_2 from syngas to adjust the $H_2:CO$ ratio. In a typical system, the feed gas is first cooled to remove condensable hydrocarbons, and then heated before entering the membrane. Hydrogen preferentially permeates through the membrane, producing a purified hydrogen “permeate” stream and a hydrogen-depleted “ratio-adjusted syngas” stream. This ratio adjustment can even produce high-purity CO for processes requiring it as a feed.

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This VaporSep-H₂™ unit adjusts the syngas ratio in a GTL demonstration plant

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MTR Membrane
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Benefits

- Efficient syngas and hydrogen recovery: membrane systems typically recover 90% to 98% of feed CO and produce a hydrogen product at 85 to 95 vol% purity.
- Proven performance: many references for H₂/CO adjustment, including pressures as high as 130 bar and operating lifetimes of more than 10 years.
- Long membrane life
- Simple, reliable, and flexible 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: low pressure steam, instrument air, instrument power, N₂

Application Areas

- H₂ purification
- CO purification
- Syngas ratio adjustment for the following:
 - ✓ Methanol, oxo alcohols
 - ✓ Gas-to-liquids (GTL), power turbine
 - ✓ H₂ recovery from ammonia purge gas