


The background of the entire page is a soft-focus image of numerous spheres. Some are a vibrant blue, while others are a warm orange or gold. They are scattered across the frame, creating a sense of depth and movement. The lighting is diffused, giving the spheres a gentle glow.

**SEPURAN® Noble**

Membrane technology for  
efficient hydrogen generation



EVONIK, THE CREATIVE INDUSTRIAL GROUP FROM GERMANY, IS ONE OF THE WORLD LEADERS IN SPECIALTY CHEMICALS, OPERATING IN THE NUTRITION & CARE, RESOURCE EFFICIENCY AND PERFORMANCE MATERIALS SEGMENTS.

The Resource Efficiency segment supplies high performance materials such as high performance polymers for environmentally friendly and energy-efficient system solutions; we ensure sustainability – in business and everyday life.

SEPURAN® stands for customized hollow fiber membranes for efficient gas separation. The SEPURAN® Noble membrane has been especially developed for hydrogen recovery and purification enabling highly pure hydrogen to be efficiently produced even when inlet concentrations of hydrogen are very low.

Evonik. Power to create.

**SEPURAN® NOBLE  
VALUE CHAIN**

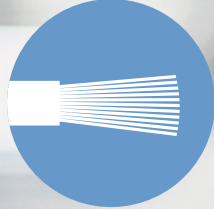


**EVONIK  
BUSINESS**

**Monomer**



**Polymer**



**Membrane**



**Module/  
Cartridge System**



**EVONIK  
TECHNOLOGY  
SUPPORT**

**OEM  
Partner**

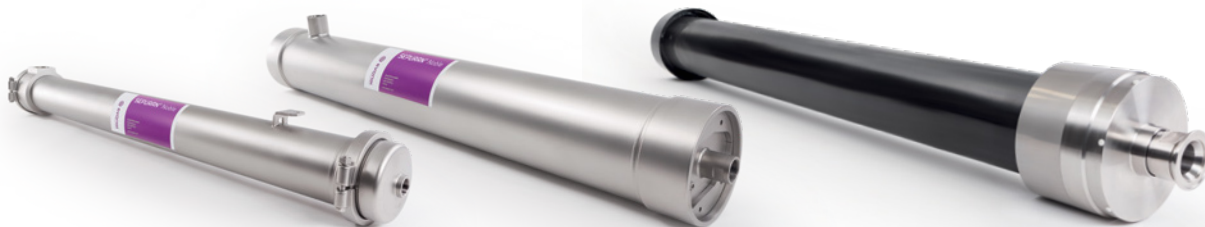


**APPLICATIONS**

**Onshore applications  
with dedicated partners**

# HYDROGEN GENERATION

## Our Products



SEPURAN® Noble	4" Cartridge	6" Cartridge	8" Cartridge
Stainless steel housings	SS316	SS316	SS316
Trans membrane pressure	40 bar / 580 psi	25 bar / 362 psi	80 bar / 1160 psi • 70 bar/1015 psi
Temperature	< 70 °C / 158 °F	< 70 °C / 158 °F	< 50 °C / 122 °F • < 70 °C / 158 °F

### Recovery advantages

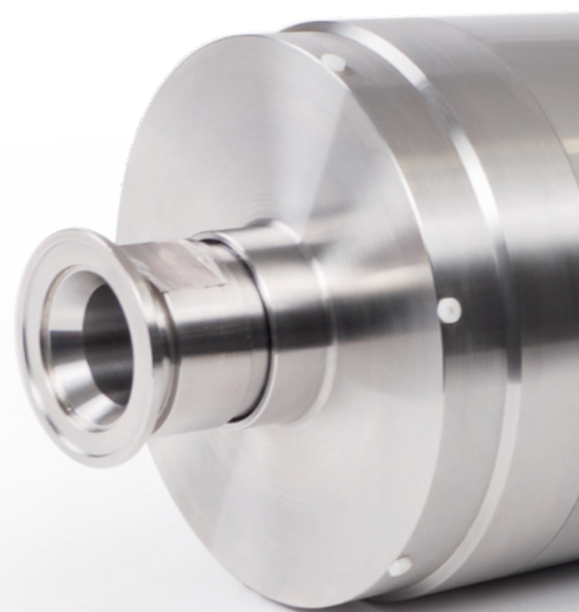
- Hydrogen recovery of more than 90 percent possible

### Upgrading advantages

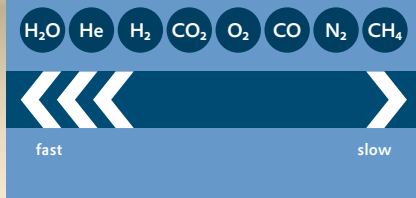
- High selectivity
- Low energy consumption

### Overall features

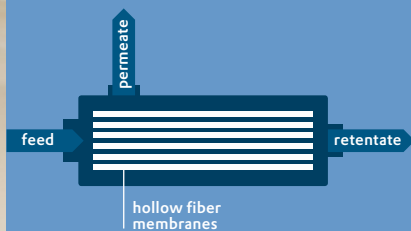
- Low space requirements
- Continuous separation process
- Simple modular setup
- Flexible and easily expanded
- No other auxiliary materials, such as water and sorbents, required
- No emissions into the environment



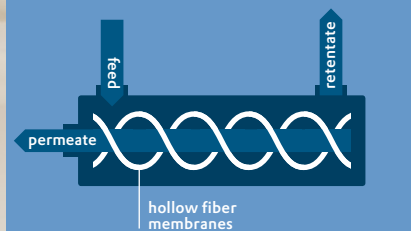
### RELATIVE PERMEATION RATES OF VARIOUS GASES



### MODE OF OPERATION OF A BORE SIDE MEMBRANE FOR GAS SEPARATION



### MODE OF OPERATION OF A SHELL SIDE MEMBRANE FOR GAS SEPARATION



## How do the membranes work?

Gas separation membranes work on the principle of selective permeation through a membrane surface. The driving force for permeation of the gas through the membrane is the difference between the partial pressures of the gas on the retentate side and the permeate side.

The greater this difference, the higher the proportion of the gas that permeates through the membrane. In a separation, such as between hydrogen and nitrogen, permeation of carbon dioxide through the membrane is much faster while nitrogen is retained within. The driving force required for the separation is obtained through a partial pressure gradient.

The permeation rate of each gas depends on its solubility in the membrane material and on the diffusion rate.

Gases that have higher solubility and smaller molecular size permeate the membrane faster than larger, less soluble gases. The ratio of the transport speeds of two gases is called selectivity.

*The higher the selectivity, the higher the energy efficiency of the resulting membrane process.*

Different membrane materials have different separation properties.



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° = registered trademark

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