



PERVATECH[®]

Datasheet

SPIRAL-WOUND PDMS MEMBRANES

Spiral-wound PDMS (polydimethyl siloxane) membranes have organophilic (hydrophobic) characteristics, which means that the organic constituent of the feed passes preferentially through the membrane.

MEMBRANE ELEMENT

Geometry	Flat sheet, configured into spiral-wound construction for liquid pervaporation
Dimensions	SR1: 0.5 m ² SR2: 1.0 m ² SR5: 4.0 m ² For gas separation, the membrane surface area per module can be 70 to 100 % higher, because thinner sheets and leaves can be used.
Substrate material	PET
Top layer	PDMS

OPERATIONAL WINDOW

Temperature	Maximum 70 °C (short-term 80 °C)
Pressure	Maximum 5 bar
pH	1-12
Pre-filtration	10 µm cartridge filter

MOUNTING

- Mount the modules vertically
- Ensure that the feed is entering from the bottom part of the module
- Respect the flow indication arrows on the module for the correct mounting orientation

WARNING

- Do NOT pressurize with gas/N₂/air
- Do NOT pressurize permeate (vacuum) side: this will immediately destroy the membrane

CLEANING OF PDMS PERVAPORATION MEMBRANES

Cleaning in aqueous environments requires special care. This is to keep elements (more or less) free from microorganisms. In case you are processing food products, starch or other carbohydrate-containing sources like juices, wine or (soybean) milk, take extreme care to clean your element during and after experiments! Cleaning best can be done by rinsing the membranes with RO water.

In case of complex mixtures this may not be sufficient, and you could apply the following procedures:

- 0.05 wt% sodium hydroxide at 40 °C for 30 minutes, then rinse with RO water
- Ethanol or ethanol solutions (>25 wt%)
- Rinse with hot water (max. 90 °C) to remove e.g. waxes and fats and to kill microorganisms
- Enzymatic solutions: depending on the feed (after that rinse with RO water)
- Mild hydrogen peroxide solutions (0.5 wt%) (after that rinse with RO water)

- Please contact us for support!
- *Avoid detergents since they may affect the surface chemistry of the membrane*

STORAGE

After use, rinse thoroughly with RO water.

Short term storage

After rinsing with clean RO water, rinse with 0.25 wt% sodium metabisulphite ($\text{Na}_2\text{S}_2\text{O}_5$) or with >10 wt% ethanol in water. Rinse for at least 30 min and keep the membranes wetted with this solution for storage. For prolonged storage (>2 weeks) $\text{Na}_2\text{S}_2\text{O}_5$ or ethanol should be repeated.

Long term storage

Soak element in a 0.7 wt% benzalkonium chloride in RO water solution. Glycerin should not be used for storage of these membranes.

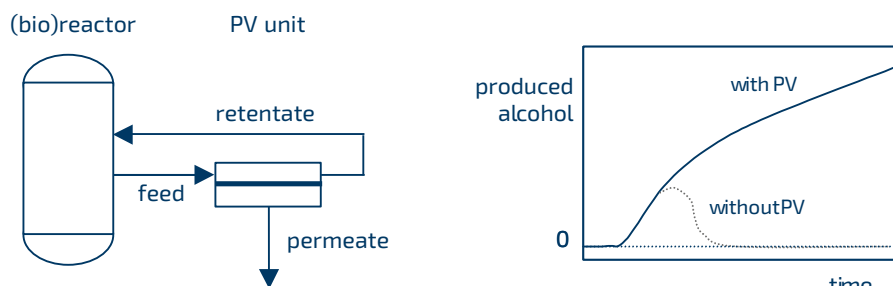
The membrane module should not get dry. It should be stored in the closed pressure vessel (use the supplied stoppers for that) at a temperature below 20 °C. Never keep the membrane in full sunlight.

After storage, and before re-use, carefully rinse with RO water. First permeates may have contamination or non-standard compositions and should not be used for application tests. Typically, stable operation is reached after approx. 2 hours, provided that temperature, vacuum and crossflow are under control.

EXAMPLES OF APPLICATIONS WITH SPIRAL-WOUND ORGANOPHILIC (HYDROPHOBIC) PDMS MEMBRANES

- Recovery or extraction of organics (in biotech or biotech-related food applications) from natural feed streams like fruit juices, wine, beer, coconut oil, essential oils (carvone, limonene) and in combination with fermentation
- Removal of ethyl alcohol (and other alcohols) from wine and beer
- Upgrading of reverse osmosis permeate in juice production
- Combination with bioreactor in production of alcohols (ethanol, IPA, butanol), ABE (acetone, butanol, ethanol), aldehydes, flavor production as well as acid production
- Removal of volatile organic compounds (VOC)
- Enrichment of oxygen. This process is used as quality control in production.
 - For gas separation, different types of leaves and nettings are used compared to liquid pervaporation, since hydraulic resistance plays a much less important role
 - Typical data for quality control on air:
 - Feed flow rate: SR1-2: 5 m³/h
 - Temperature: room temperature
 - Pressure: 5 bar
- Permeate flow: 250-300 liter/m²·h

Typical example of pervaporation (PV) process in combination with bioreactor:



The image shows the principle of a membrane reactor for continuous product recovery (alcohols, aromas). The system with pervaporation continuously produces alcohol while other systems stop when inhibiting amounts of alcohol (or another inhibitor) have been reached. In some cases, a pretreatment is necessary. PDMS membranes are stable and insensitive to fouling.

Heliumstraat 11
7463 PL Rijssen
The Netherlands
T +31 548 530 360
info@pervatech.nl
pervatech.com