

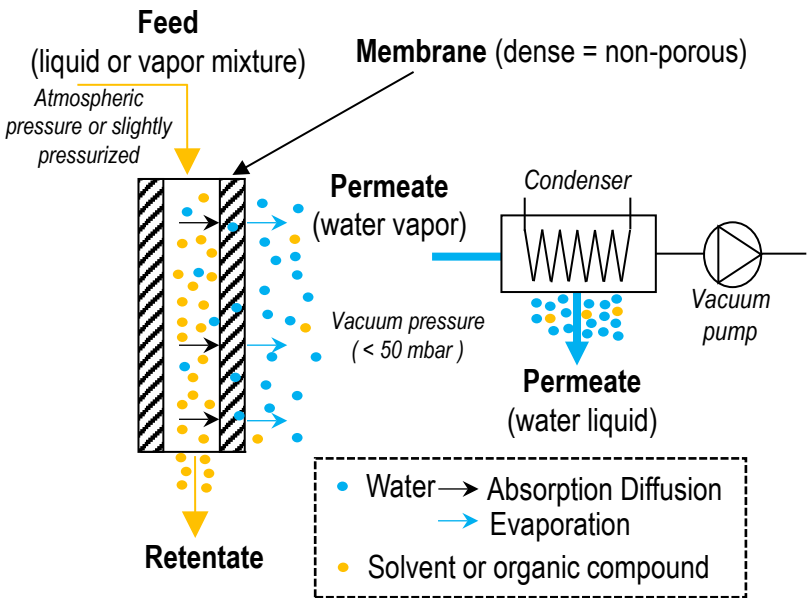
PERVAPORATION Applications

Hydrophilic ceramic membrane and pilot plant system

Pervaporation is a process for the separation of mixtures by partial vaporisation

Innovating for the sustainability and reliability of industrial processes, ORELIS Environnement has various capabilities in the field of pervaporation:

- ORELIS has experiences in the applications of **dehydration**: solvent recycling by dehydration (Pharmaceutical), concentration of aromatic mixtures (Fine chemistry) and improvement of esterification processes by selectively eliminating water from the reaction mixtures (Chemicals).
- ORELIS provides the **Hybsi® and Zeolite-A** technology on tubular **multichannel ceramic membranes** which offer the highest resistance and permeate flux on the market.
- ORELIS owns a versatile range of **pilot plants** to provide best feasibility and process design studies.



ALSYS experiences in the field of pervaporation technology

Industries	Applications	Benefits
- Fine chemistry - Flavor & Fragrances - Food & Beverage	Concentration of aromatic mixtures	- Simple process - Unaltered stability of aromatic compounds
Pharmaceutical	Solvent recycling by dehydration	- High selectivity - Low energy consumption - Process intensification
- Biofuels - Chemicals - Petrochemicals	- Alcohols dehydration (Ethanol, IPA, Butanol, Acetone, Organic acids...) - Esterification mixtures dehydration - Azeotropic breaking	- Implementation with minimum process modification - Flexible for batch or continuous processes

Main benefits of pervaporation vs. distillation or molecular sieves

- 70% less energy: only latent heat duty for permeate evaporation
- 30% less CAPEX: simple process with compact installation and low foot-print
- No waste generated
- No product contamination
- Low temperature separation possible, compatible with heat sensitive products

Performances with hydrophilic ceramic membrane (hybrid silica)

Feed composition // Membrane	Membrane	Temperature (°C)	Flux (kg/h.m ²)	Permeate composition
95% n-Butanol, 5% Water	Hybsi®	120	12	3% n-Butanol, 97% Water
88% Ethanol, 5% Methyl isobutyl ketone, 7% Water	Hybsi®	70	2,5	80% Water
92% Ethyl acetate, 2% Ethanol, 2% Toluene, 1% Acetic acid, 3% Water	Hybsi®	70	1,5	87% Water
Ester acrylate, Alcohol, Acrylic acid, 15% Water	Hybsi®	80	12	Ester acrylate, Alcohol, Acrylic acid, 96% Water
Water, 30g/L Polyphenols and aromatic compounds	Hybsi®	40	2,5	Containing traces of organic compounds
95% Ethanol, 5% Water	Zeolite-A	120	4,5	2% Ethanol, 98% Water

BROAD OFFERING, FROM LAB PILOTS TO FULL-SCALE SKID UNITS

Pervaporation systems optimized for diverse scales

OneD-Pervaporation Pilot

Tabletop laboratory pilot

- Feed Volume : 2-5L
- Max Temperature : 80°C
- Permeation capacity : 0,5kg/h
- 1 electrical plug 220V, 1,4kW
- No need for liquid N₂



K01 Pervaporation Pilot

Mobile industrial pilot

- Feed Volume : 10-20L
- Max Temperature : 120°C
- Permeation capacity : 3kg/h
- 1 electrical plug 3p-400V 5kW
- Datalogging



Pervaporation Skid Unit

Mobile production skid

- Feed Volume : 20-500L
- Max Temperature : 150°C
- Permeation capacity : 20kg/h
- Automation with touchscreen panel



Versatile offers with multiple choices

- Lab or industrial scale
- Pervaporation or vapor permeation
- Ceramic Hybsi® or Zeolite-A membrane
- Dehydration at steady conditions or extremely quick purification
- Manual or automatic control

What makes ORELIS PERVAPORATION SYSTEMS unique?

- Compact design, small footprint with large membrane area
- Robust multichannel ceramic membrane, long lifetime
- Very high permeation flowrate
- Fast and complete dehydration of organic mixtures (<1% of water at the end of the purification)
- Compatible with most types of solvents
- Easy-to-use systems, user-friendly, even for beginner in pervaporation
- Easy integration into an industrial plant
- Extrapolation / Scaling-up: x 100

Contacts:

Europe: +33 (0)4 66 85 95 36
North America: +1 857 504 2250
Asia: +86 (0)21 6350 3377



orelis@alsys-group.com
www.alsys-group.com

ALSY'S