



# FORWARD OSMOSIS

## FORWARD OSMOSIS TECHNOLOGY

Forward Osmosis is a technology whereby a solvent (water) is transported from the dilute product to a draw solution using a difference of osmotic pressure. TEC Square provides these cold concentration solutions based on Ederna's evapEOs® technology. This process is ideal for Cold Brew products, but could equally be used for other aromatic extracts.



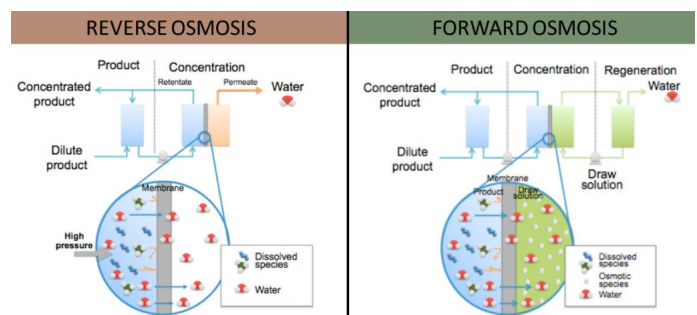
This system is characterized by the following:

- ◆ Working at ambient or lower temperatures.
- ◆ Simple compact design.
- ◆ Small footprint, requiring normally 2 stories.
- ◆ Low capacity solutions are possible.
- ◆ Integrated in-line CIP.

## TEC SQUARE FORWARD OSMOSIS PLANT

A TEC Square advanced Osmosis plant consists of a combination of 2 technologies:

- Reverse Osmosis—Pre-concentration to 12%, using hydraulic pressure as concentration force
- Forward Osmosis—Final concentration to 35-40%, using osmotic pressure as a concentration force



Differences in Reverse Osmosis and Forward Osmosis

# SPECIFICATIONS AND ADVANTAGES

	TEC Square Forward Osmosis Technology	Advantages
Concentration Technology	A combination of <b>Reverse Osmosis</b> (TS $\pm$ 12% using hydraulic pressure) and <b>Forward Osmosis</b> (TS 35-40%, using osmotic pressure)	<ul style="list-style-type: none"> <li>◆ Small Footprint</li> <li>◆ Possible at low capacities</li> <li>◆ Suitable for sensitive / foaming products</li> </ul>
Process Temperatures	Working at low process temperatures, guaranteeing a quality solution for temperature sensitive products	<ul style="list-style-type: none"> <li>◆ High quality of the product</li> <li>◆ High retention of nutritional values</li> <li>◆ Complete preservation of sensory profile</li> </ul>
Investment Costs	Lower capital expenditure as other high-end concentration methods.	<ul style="list-style-type: none"> <li>◆ Best value for money in cold processing</li> </ul>
Operational Costs	Normal operational costs (steam, cooling - and chilled water). Membranes are "wear and tear" parts and need replacement.	<ul style="list-style-type: none"> <li>◆ Taking yearly replacement costs into account, operational costs are still in line with competing technologies.</li> </ul>
Maximum Concentration	This technology can achieve up 35-40% TS, depending on product.	<ul style="list-style-type: none"> <li>◆ High end-product quality.</li> </ul>
Product Losses	Forward Osmosis membranes are not subjected to a pressure differential.	<ul style="list-style-type: none"> <li>◆ Low product losses, little fouling</li> <li>◆ Long running times</li> </ul>
CIP	Fully automated solution. For bigger plants rinsing of membranes can be done alternatively.	<ul style="list-style-type: none"> <li>◆ Short CIP times. CIP based on backflush.</li> <li>◆ Fully automatic solution</li> </ul>

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