



## An Overview of Ultra-Filtration Membrane

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### DESCRIPTION

Ultra-Filtration (UF) membrane is a type of membrane filtration in which forces such as pressure or pressure gradient differences between the two across a semipermeable membrane. Suspended particles and high-molecular-weight solutes are maintained in the solvent, whereas water and low-molecular-weight solutes pass through the membrane in the permeate (filtrate). In both industry and research, this separation process is used to purify and concentrate macro molecular (103-106 Da) solutions, particularly protein solutions.

Ultra-Filtration (UF) and Micro Filtration (MF) membranes are not significantly different. Both of these are differentiated by size separation or particulate capture. It differs fundamentally from membrane gas separation, which separates based on different levels of absorption and rates of diffusion. The Molecular Weight Cut-Off (MWCO) the membrane has been using to describe ultrafiltration membranes. Cross-flow or dead-end ultrafiltration is used.

### APPLICATIONS OF ULTRA-FILTRATION (UF) MEMBRANE

Ultrafiltration membrane is used in industries such as chemical and pharmaceutical manufacturing, food and beverage processing, and waste water treatment to recycle flow or add value to later products. Ultrafiltration is also used in medical therapy.

#### Drinking water

To produce water sources, ultrafiltration can be used to remove suspended solids and macro-molecules from raw water. It has been used to replace existing secondary (chemical precipitation, dissolved air flotation, sedimentation) and tertiary filtration (sand filtration and chlorination) systems in water treatment plants, as well as stand - alone systems in remote areas with increasing population. When treating water with high suspended solids, UF membrane is frequently integrated into

the process as a pre-treatment stage, along with primary (screening, flotation, and filtration) as well as some secondary treatments.

For the following reasons, UF processes are currently preferred over conventional treatment methods: There are no chemicals required (aside from removing). Product quality remains constant irrespective of feed quality. Plant size is small. Significantly increasing governmental water quality requirements and accomplishing 90-100% micro-organisms removal, UF membrane processes are currently limited by the high cost of membrane fouling and replacement. To avoid excessive damage to the membrane components, additional pre - treatment of the feed water is required. In many cases UF membrane is used for pre filtration in Reverse Osmosis (RO) plants to protect the RO membranes.

#### Protein concentration

Ultra-Filtration (UF) membrane is widely used in the dairy industry, particularly in the production of Whey Protein Concentrate (WPC) and lactose-rich permeate from cheese production. A UF process can concentrate protein powder 10-30 times the feed in a single stage. Steam heating followed by drum drying or spray drying was the original alternative to membrane filtration of protein powder. Because of its granular texture and poor solubility, the product of these methods had limited applications. Conventional systems also had variations in product composition, high operating and capital costs, and decomposed some proteins due to the excessive heat used in evaporation.

In comparison to traditional methods, the following Ultra-Filtration (UF) membrane processes are used for this application: Product quality must be consistent, with 35-80% protein content depending on operating conditions. Protein concentration is more ecologically responsible. Proteins are not inactivated because they operate under moderate conditions. The possibility of fouling is widely discussed, and it has been identified as a significant contributor to productivity decrease. Cheese protein powder contains high levels of calcium

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phosphate, which can cause scale deposit accounts on the membrane surface. As a result, significant pre-treatment is

required to balance the pH and temperature of the stream in order to maintain calcium salt solubility.