Membrane Manufacturing Apparatus

Hollow Fiber Manufacturing Machine

Flat Sheet Membrane Manufacturing Machine

Not just products... solutions!
Applications

PMI membrane manufacturing machines can be used to create cast flat sheet membranes and hollow fiber membranes. The machines permit adjustment of fabrication parameters so that membranes with different characteristics could be made for development, research, and many wide varieties of applications and filtration.

Principle

Solutions for making membranes are thoroughly mixed at desired temperature and pressure. The chemicals are shaped in to flat sheets or hollow fibers and allowed to coagulate at the desired temperature.

The Machines

Layout of the hollow fiber making machine is shown in Figure 1. One hundred PSI pressure tanks hold chemicals at the desired temperature and pressure. The chemicals are constantly stirred and pumped to the spinnerette. Flow regulators control the flow rates of the chemicals. The hollow fibers coming out of the spinnerette pass through a temperature controller coagulation tank and are washed. Figure 2 shows the layout of the flat sheet membrane making machine.
A variety of hollow fiber membranes and flat sheet membranes have been manufactured. Figure 3 shows typical hollow fiber membranes.

The pore structures of the membranes made in the PMI membrane making machines were determined by various pore structure characterization techniques. The pore structures of hydrophobic flat sheet membranes were measured by water intrusion porosimetry. Figure 4 shows variation of hydrophobic pore volume with pore diameter. Pores have diameter from about 50 to 0.01 microns. The pore distribution in Figure 5 shows that pores making maximum contribution to the pore volume are about 0.04 microns in diameter. The pore volume at 20 micron is probably due to pore mouths.
Some of the hollow fiber membranes made in the PMI membrane manufacturing machines were tested by Liquid-Liquid Porometry. The presence of small pores in the membrane are demonstrated by the plot of flow rate with pressure (Figure 6). The mean flow pore diameter was 0.015 microns. Most of the pores are present over a narrow size range as demonstrated by the pore distribution in Figure 7.
Specifications*

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Pore Size</td>
<td>0.01-50 microns</td>
</tr>
<tr>
<td>ID, OD and Wall Thickness</td>
<td>Dependant on Spinnerette Polymer before OD, Needle OD, Needle ID</td>
</tr>
<tr>
<td>Length</td>
<td>50 ft. plus</td>
</tr>
<tr>
<td>Mean Pore Size</td>
<td>0.01-50 microns</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.001&quot; - 0.02&quot;</td>
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<tr>
<td>Length</td>
<td>3-4 ft.</td>
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<tr>
<td>Width</td>
<td>6&quot; max</td>
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</tbody>
</table>

*Other specifications for this machine are available. Specifications are subject to change without notice.*

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