

# Filtration

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# Filtration

## *Membrane Configurations*

	<b>Cost</b>	<b>Packing Density</b>	<b>Operating Pressure Capacity</b>	<b>Membrane Types</b>	<b>Fouling Resistance</b>	<b>Cleanability</b>
<b>Traditional Spiral-Wound</b>	Low	High	High	Many	Fair	Fair
<b>Hollow Fiber</b>	Low	UF-High RO-Very High	UF-Low RO-High	Few	UF-Good RO-Poor	UF-Good RO-Poor
<b>Tubular</b>	High	Low	UF-Moderate	Few	<b>Very Good</b>	<b>Very Good</b>
<b>Plate &amp; Frame</b>	High	Moderate	High	Many	Fair	Fair

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## *Boeing UF Implementation '94*

- Hollow Fiber
- Spiral Wound
  - Tube type\*

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## *UF Pilot Tests*

- Lab Scale Membrane Units
- Manufacturer Application Tests
- In-plant Pilot Units\*
- Final System Design

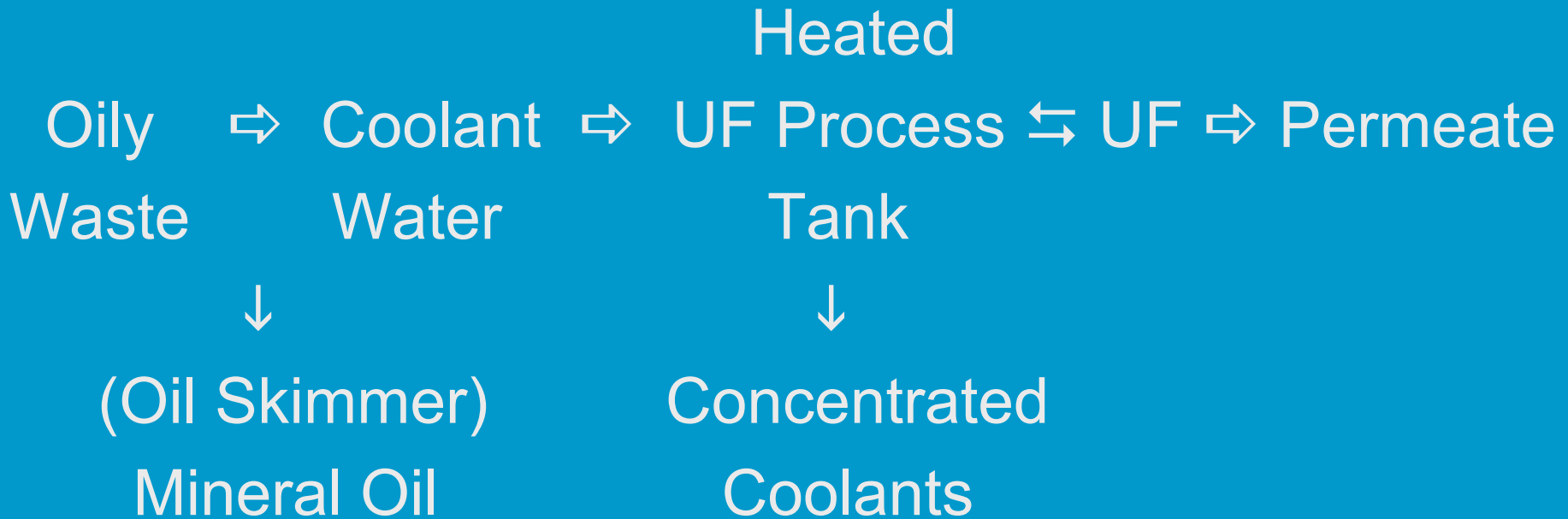
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## *UF Process Integration*



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## *Modes of UF Operation*

- Continuous operation
- Semi-batch operation\*
- Batch operation

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## *Maintenance of UF system*

1. Soap Cleaning
2. Mild Acid Cleaning
3. Oxidizer Cleaning

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## *Availability of Replacement Parts*

- Original Equipment Manufacturer
- Classic Industrial Products
- Lux Ultratech
- Some Industrial Chemical Suppliers

# Filtration

## *Lessons Learned from UF*

1. Stay focus in UF process integration design
2. Flash evaporator reduction
3. Removal of oil in UF feed
4. Conscious operator - cleaning
5. Runs by itself for days if properly maintained