CLAIMS

1. A method of filtering a liquid feed, comprising:

a) passing a liquid feed through a single pass tangential flow filtration (SPTFF) system that consists of one filtration module comprising:

a single manifold segment comprising a first manifold for receiving and carrying the feed into the filtration module, a second manifold for receiving and carrying retentate out of the filtration module, and a third manifold for receiving and carrying permeate through the filtration module, to create a serial liquid flow path for feed, retentate and permeate through the system;

two or more TFF capsules that are positioned on one or both faces of, and are fluidly connected to, the manifold segment;

a feed inlet; and

a retentate outlet,

the system having a liquid flow path that is parallel into the capsules and serial through the manifold segment; and

b) recovering the retentate and permeate from the system in separate containers without recirculation through the SPTFF system, thereby filtering the liquid feed.

2. The method of Claim 1, wherein the filtration area for the filtration module is 20 m^2 or less.

3. The method of Claim 1, further comprising a diafiltration step prior to passing the liquid feed through the SPTFF system, wherein the diafiltration step includes concentration and dilution steps.

4. The method of Claim 3, wherein the SPTFF system further comprises a diafiltration solution reservoir for diafiltration solution and a conduit for delivering diafiltration solution to a feed reservoir.

5. The method of Claim 1, wherein the SPTFF system further comprises one or more of: sampling ports, a T-line for in-line buffer addition, a pressure sensor and a diaphragm for a pressure sensor.

6. The method of Claim 3, wherein SPTFF system includes a diafiltrate solution pump having multiple pump heads, each containing diafiltrate solution addition and permeate removal flow lines.

7. The method of Claim 1, wherein the filtration area for the filtration module is 10 m^2; 1 m^2; or 0.1 m^2.

8. A method of filtering a liquid feed, comprising:

a) passing a liquid feed through a tangential flow filtration (TFF) system that consists of one filtration module comprising:

a single manifold segment comprising a first manifold for receiving and carrying the feed into the filtration module, a second manifold for receiving and carrying retentate out of the filtration module, and a third manifold for receiving and carrying permeate through the filtration module, to create a serial liquid flow path for feed, retentate and permeate through the system;

two or more TFF capsules that are positioned on one or both faces of, and are fluidly connected to, the manifold segment;

a feed inlet; and

a retentate outlet,

the system having a liquid flow path that is parallel into the capsules and serial through the manifold segment;

b) recovering permeate from the filter modules through the manifold in a permeate container and a portion of the retentate from the filter modules through the manifold in a retentate container without recirculation through the TFF system; and

c) recirculating the remainder of the retentate, recovered from the filter modules through the manifold, to the liquid feed and through the TFF system at least once, thereby filtering the liquid feed.

9. The method of Claim 8, wherein 10% or less of the retentate is recirculated after the first pass through the TFF system.

10. The method of Claim 8, wherein the TFF system includes a valve or flow meter

that is positioned on the retentate outlet or conduit carrying retentate from the system to the retentate container to control the amount of retentate that is recirculated.

11. The method of Claim 8, wherein retentate is recirculated back to a feed container in the TFF system or back to a feed line after a feed pump in the TFF system.

12. The method of Claim 8, wherein the filtration area for the filtration module is 20 m^2 or less.

13. The method of Claim 8, further comprising a diafiltration step prior to passing the liquid feed through the TFF system, wherein the diafiltration step includes concentration and dilution steps.

14. The method of Claim 13, wherein the TFF system further comprises a diafiltration solution reservoir for diafiltration solution and a conduit for delivering diafiltration solution to a feed reservoir.

15. The method of Claim 8, wherein the TFF system further comprises one or more of: sampling ports, a T-line for in-line buffer addition, a pressure sensor and a diaphragm for a pressure sensor.

16. The method of Claim 13, wherein TFF system includes a diafiltrate solution pump having multiple pump heads, each containing diafiltrate solution addition and permeate removal flow lines.