~~What is claimed is:~~

CLAIMS

1. An electrochlorination system comprising:

an electrolyzer fluidically connectable between a source of feed fluid and a product fluid outlet; and

a sub-system configured to ~~one of~~ increase a pH of the feed fluid~~, or~~ and increase a ratio of monovalent to divalent ions in the feed fluid, upstream of the electrolyzer.

2. The system of claim 1, wherein the sub-system comprises a nanofiltration unit having an inlet fluidly connectable to the source of feed fluid and configured to separate the feed fluid into a retentate and a permeate, the retentate having a higher ratio of divalent ions to monovalent ions than the permeate, and a permeate outlet configured to provide the permeate to an inlet of the electrolyzer.

3. The system of claim 2, wherein the nanofiltration unit is configured to produce the permeate with a monovalent ion concentration of from 2% to 10% lower than a monovalent ion concentration in the feed fluid.

4. The system of claim 2, wherein the nanofiltration unit is configured to produce the permeate with a divalent ion concentration of from 50% to 90% lower than a divalent ion concentration in the feed fluid.

5. The system of claim 1, wherein the sub-system comprises an electrodialysis unit having an inlet fluidly connectable to the source of feed fluid, one or more monovalent selective membranes, and a concentrate stream outlet in fluid communication with an inlet of the electrolyzer.

6. The system of claim 5, wherein the electrodialysis unit is configured to separate the feed fluid into a diluate stream and a concentrate stream and preferentially transport monovalent ions from the diluate stream to the concentrate stream.

7. The system of claim 6, wherein the electrodialysis unit is configured to increase a concentration of monovalent ions in the concentrate stream by from 3% to 400% relative to the feed liquid.

~~8. The system of claim 1, wherein the sub-system comprises an electrodialysis unit having an inlet fluidly connectable to the source of feed fluid, one or more bipolar membranes, and an outlet configured to provide a fluid stream having an increased acidity relative to the feed fluid to an inlet of the electrolyzer.~~

~~9. The system of claim 1, wherein the sub-system comprises an electrodialysis unit having an inlet fluidly connectable to the source of feed fluid, one or more bipolar membranes, and an outlet configured to provide a fluid stream having an increased acidity relative to the feed fluid to an inlet of a nanofiltration unit disposed upstream of the electrolyzer.~~

~~10. The system of claim 9, wherein the nanofiltration unit is configured to separate the fluid stream into a retentate and a permeate, the retentate having a higher ratio of divalent ions to monovalent ions than the permeate and includes a permeate outlet configured to provide the permeate to an inlet of the electrolyzer.~~

~~11~~8. The system of claim 1, wherein the sub-system comprises a nanofiltration unit having an inlet fluidly connectable to the source of feed fluid and an outlet in fluid communication with an electrodialysis unit, the electrodialysis unit including one or more monovalent selective membranes and a concentrate stream outlet in fluid communication with an inlet of the electrolyzer.

~~12~~9. The system of claim ~~11~~8, further comprising an oxygen saturation unit in fluid communication between the electrodialysis unit and the electrolyzer and configured to add oxygen to the concentrate stream prior to the concentrate stream entering the inlet of the electrolyzer.

~~13~~10. ~~The system of claim 1, wherein~~ An electrochlorination system comprising:

an electrolyzer fluidically connectable between a source of feed fluid and a product fluid outlet; and

a sub-system configured to one of increase a pH of the feed fluid or increase a ratio of monovalent to divalent ions in the feed fluid, upstream of the electrolyzer, the sub-system ~~comprises~~ comprising an electrodialysis unit having an inlet fluidly connectable to the source of feed fluid, one or more monovalent selective membranes, a diluate stream outlet in fluid communication with an inlet of a nanofiltration unit, a concentrate stream inlet in fluid communication with a permeate outlet of the nanofiltration unit, and a concentrate stream outlet in fluid communication with an inlet of the electrolyzer.

~~14. A method of operating an electrochlorination system, the method comprising:~~

~~operating a sub-system in fluid communication between a source of feed fluid and an electrolyzer to one of increase a pH of the feed fluid, or increase a ratio of monovalent to divalent ions in the feed fluid, to form a modified feed fluid; and~~

~~introducing the modified feed fluid into the electrolyzer.~~

~~15. The method of claim 14, wherein operating the sub-system includes separating the feed fluid in a nanofiltration unit into a retentate and a permeate, the retentate having a higher ratio of divalent ions to monovalent ions than the permeate.~~

~~16. The method of claim 15, comprising producing the permeate with a monovalent ion concentration of from 2% to 10% lower than a monovalent ion concentration in the feed fluid.~~

~~17. The method of claim 15, comprising producing the permeate with a divalent ion concentration of from 50% to 90% lower than a divalent ion concentration in the feed fluid.~~

~~18. The method of claim 14, wherein operating the sub-system includes treating the feed fluid in an electrodialysis unit having one or more monovalent selective membranes.~~

~~19. The method of claim 18, comprising separating the feed fluid into a diluate stream and a concentrate stream and preferentially transport monovalent ions from the diluate stream to the concentrate stream in the electrodialysis unit.~~

~~20. The method of claim 19, comprising increasing a concentration of monovalent ions in the concentrate stream by from 3% to 400% relative to the feed liquid.~~

~~21. The method of claim 14, wherein operating the sub-system includes treating the feed fluid in an electrodialysis unit having one or more bipolar membranes and providing a fluid stream having an increased acidity relative to the feed fluid from an outlet of the electrodialysis unit to an inlet of the electrolyzer.~~

~~22. The method of claim 14, wherein operating the sub-system includes treating the feed fluid in an electrodialysis unit having one or more bipolar membranes and providing a fluid stream having an increased acidity relative to the feed fluid from an outlet of the electrodialysis unit to an inlet of a nanofiltration unit disposed upstream of the electrolyzer.~~

~~23. The method of claim 22, further comprising separating the fluid stream into a retentate and a permeate with the nanofiltration unit, the retentate having a higher ratio of divalent ions to monovalent ions than the permeate and providing the permeate to an inlet of the electrolyzer.~~

~~24. The method of claim 14, wherein operating the sub-system includes treating the feed fluid in a nanofiltration unit having an outlet in fluid communication with an electrodialysis unit, the electrodialysis unit including one or more monovalent selective membranes, and delivering a concentrate stream from the electrodialysis unit to an inlet of the electrolyzer.~~

~~25. The method of claim 24, further comprising adding oxygen to the concentrate stream prior to the concentrate stream entering the inlet of the electrolyzer.~~

~~26. The method of claim 14, wherein operating the sub-system includes treating the feed fluid in an electrodialysis unit having one or more monovalent selective membranes, delivering a~~

~~diluate stream from the electrodialysis unit to an inlet of a nanofiltration unit, delivering permeate from the nanofiltration unit to a concentrate stream inlet of the electrodialysis unit, and delivering a concentrate stream from the electrodialysis unit to an inlet of the electrolyzer.~~