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 increase a pH of the feed fluid 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 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.

9. The system of claim 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.

10. 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 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.