# Organic Acid Separation Using Membrane Technology

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**Abstract:**

Separation of organic compounds and salts from liquid foods is critical in producing products with the desired functional and nutritional properties. Removal of organic acids from dairy protein-rich liquids and fruit juices, for example, can improve flavour intensity and consumer acceptability. Further, the recovery of organic acids from by-product streams in food processing can maximise by-production utilisation, minimising waste disposal and reducing environmental impact.

This presentation will discuss the opportunities and challenges for recovering organic acids from two mixtures: (i) lactic acid and salts, and (ii) monobasic lactic acid and polybasic citric acid. In the first case we investigated the separation of lactic acid from a waste stream using low energy reverse osmosis and electrodialysis. The waste stream is generated from the lactic acid removal processes for the recovery of proteins and lactose in acid whey (a by-product of cheese and yogurt manufacture). Partial separation between lactic acid and potassium chloride could be achieved by both reverse osmosis and electrolysis. The addition of sodium chloride to the mixture, however, reduced the separation efficacy due to the increased complexity of the feed solution.

In the second case, we demonstrated that electrodialysis with bipolar membranes could be used to effectively purify organic acids from a simulated beet molasses feed containing lactic acid and citric acid. The feed pH, the configuration of the membrane stack and the applied voltage were optimised to maximise the selectivity of the process. The use of monovalent selective anion exchange membranes in this application could produce a lactic acid product with a purity of at least 97%. By varying the volume ratio between the acid and feed streams, we found that the highest achievable lactic acid concentration was ~150 g/L at a purity greater than 95%, due to the osmotic flow of water during the process.

**Keywords**: organic acid, lactic acid, electrodialysis, bipolar membrane, reverse osmosis.