

Dairy Plant Produces Demineralized Whey with ED

Electrodialysis (ED) provides flexible demineralization levels in a competitive market

Project Summary

end-user dairy processing plant
location Europe
commissioned 2016
application whey demineralization
technologies electro dialysis
capacity 4,000 kg/hour total solids

factors impacting technology selection – ever-changing market and customer demand for varying levels of demineralized whey, such as D50, D70 and D90; strict regulations and food standards

operational results – 50-90% of ions removed as required by market

winning value proposition – established expertise in whey demineralization and electro dialysis; willingness to pilot; operational life of ED membranes; complementary expertise in membrane treatments for water recycling

keywords – dairy; whey demineralization; D70; D90; electro dialysis; electro dialysis reversal; food & beverage; flexibility; Ionics



Figure 1: An example SUEZ ED stack as could be used for whey demineralization

Challenge

A dairy processing plant in Europe needed to respond to greater demand for demineralized whey than production capacity could supply. Demineralized whey is a key ingredient in the production of infant formula and thus is subject to strict regulations and food standards. For use in infant formula, whey typically requires 70-90% demineralization. There are various classifications of demineralized whey products with a range of specifications, such as D50, D70, and D90 with the latter two having greater levels of ions removed as is required for infant formula. The market demand and price for these products change regularly which presents a challenge for dairy processing plants to respond quickly and cost effectively.

Dairy processing plants are complex operations that require establishing confidence in the performance of the technology and reliability of the equipment, including downstream water recycling. This plant had a history of success with electro dialysis but was willing to consider both ion exchange technology as well as other electro dialysis suppliers.

Solution

SUEZ has a long history of successful whey demineralization applications, dating back to the first application of electro dialysis for this use in 1962. SUEZ was also able to provide a more comprehensive solution than electro dialysis competitors due to additional expertise in membrane processes for water recycling. SUEZ used this expertise in the design of an electro dialysis process consisting of Ionics ED stacks with AR103 anion exchange membrane and CR61 cation exchange membrane. Each stack utilized 150 cell pairs and the polarity reversal feature more commonly known as electro dialysis reversal (EDR). After a successful pilot, a 4,000 kg total solids per hour commercial system was commissioned in 2016.

The system can make a variety of demineralization levels and recipes to respond to customer demands. This flexibility to change recipe without sacrificing production capacity or requiring extended equipment adjustments is a distinct advantage of using electro dialysis. In many cases, ion exchange is considered as the technology alternative to electro dialysis for this application. Ion exchange is generally regarded as a less flexible operation both with regard to

changing the product quality, but also with regard to the ability to handle variations in the whey content fed to the process. As such, electro dialysis also minimizes the product risk of removing too many valuable constituent “milk minerals” such as calcium and magnesium. Electro dialysis also does not change the pH of the product, thus reducing risk of denaturing the desirable protein content.

Lastly, electro dialysis is regarded as a process with a better environment, health, and safety risk profile than ion exchange due to the ability of electro dialysis to avoid risks with regeneration chemical use, storage, handling and disposal requirements.

Results

The ED-based system has been successfully operating since 2016 and meeting the high reliability requirements expected in such as application. The operational life of the ion exchange membranes has proven to be a differentiator for SUEZ. Further, reliability, price and competitiveness of the SUEZ solution has been boosted by the ability of the customer to share electro dialysis spare parts through various plants that also utilize this technology.

Contact Us

If you would like to learn more about how SUEZ can provide an ED solution for your whey demineralization needs, please visit:

www.suezwatertechnologies.com/contact-us