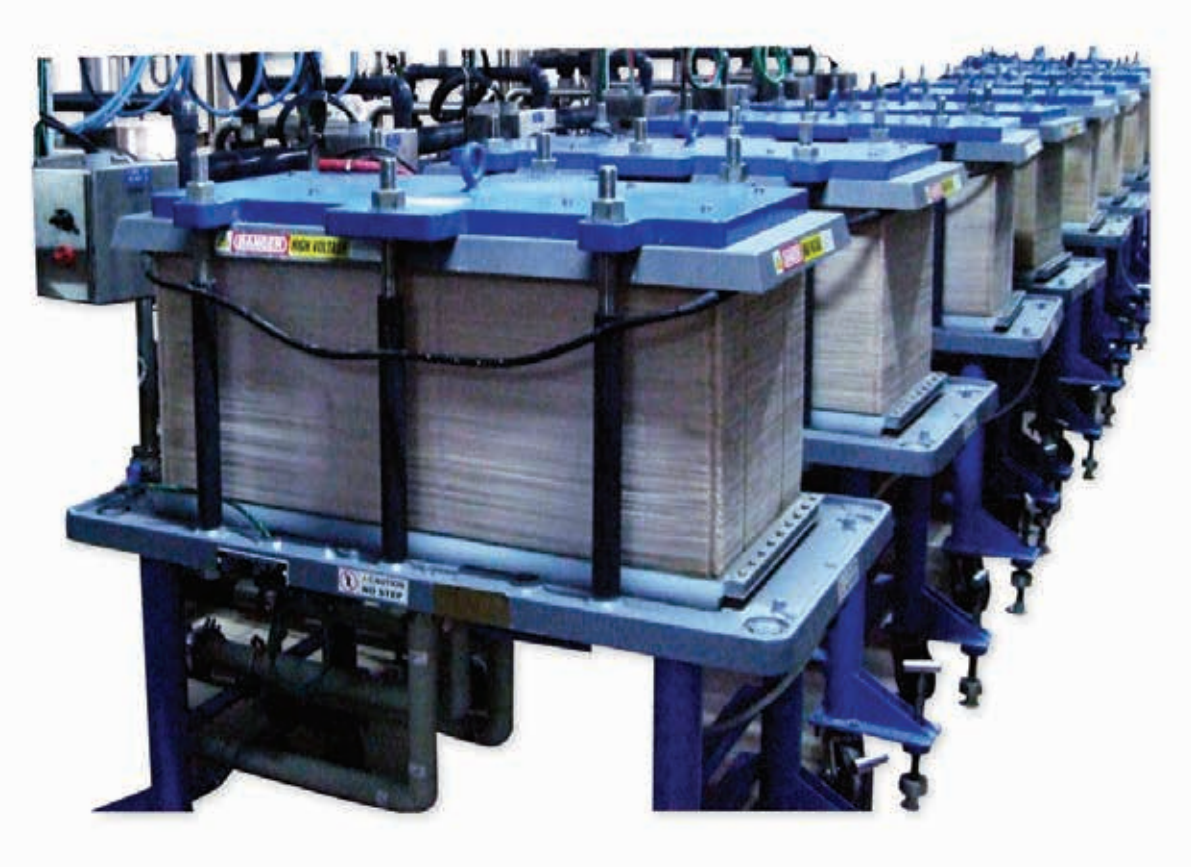
Water Technologies & Solutions

Electromat*

electrodialysis (ED) and bipolar electrodialysis (BPED)



ready for the resource revolution

suez

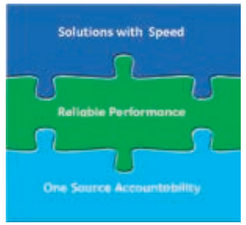
rely on SUEZ's technology and experience

SUEZ focuses on improving our customers' processes and enhancing their products with our Electromat ED and BPED Technologies. We have experience with whey demineralization, glycerine desalting, fruit juice deacidification, glycol recovery, and numerous other applications.

our ED advantage

- Enhances product value, reduces processing costs, and derives value from waste streams
- Removes only ionized species, leaving valuable constituents behind
- Reduces chemical consumption and salt effluent
- Processes can be tuned to meet any product set point, eliminating wasted energy, time, and product
- Skid mounted and automated to operate in continuous or batch mode for simple, reliable operation
- Modular system designs allow for easy expansion

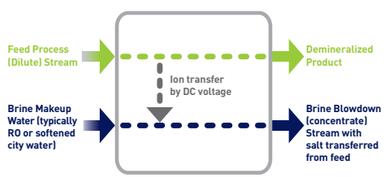
the SUEZ advantage



Speed
- Quick delivery
- Configurable options
- Experience that creates quick solutions

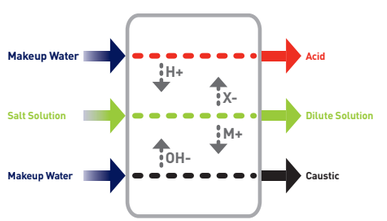
Reliable
- World-class designs
- Customized systems to meet product specifications
- Worldwide installations
- 50+ years of experience

One Source
- Vertical technology system integration
- Trusted performance
- Technical expertise
- Core membrane design and manufacturing capability



what is ED?

ED is an electrochemical separation process where ions are transferred through selective ion exchange membranes from one solution to another by means of a DC voltage.



what is BPED?

BPED is an ion exchange membrane process that uses a bipolar membrane to split water into H+ and OH-, generating acid and caustic streams. This process adjusts a solution's pH without adding bases or acids.

electrodialysis timeline:

1948
Ionics develops ion exchange membranes

1950
ED technology is developed

1959
Ionics, working with Wyeth & Foremost, develops ED process for whey demineralization

1961
First production system for whey ED

1980
Ionics introduces continuous ED process for whey demineralization

1986
Ionics installs ED system at a gas field in Colorado to reclaim glycol

1999
Ionics ED system installed in Italy for lactulose demineralization

2005
GE purchased Ionics and Electromat Nx4 for large volume whey demineralization introduced

2008
ED system installed in India for continuous 90% demineralization of acid casein whey

2009
Installed BPED system at a grape juice producer to adjust the pH of grape juice

2010
ED system used for glycerine desalting

2017
SUEZ purchases GE's Water & Process Technologies

a success story

whey demineralization

Rich in milk sugar (lactose) and whey proteins, reduced minerals whey is used in infant formula, ice cream, energy drinks, dry mixes and other food products. Since reduced minerals whey is becoming a more common ingredient in food, there is a growing need for efficient and effective deminerlization processes. SUEZ's ED Systems offer continuous demineralization from 25% to 90%+ without blending. ED provides stable pH and less denaturing of protein with no regeneration chemical effluent.

Challenge: A whey producer in Europe needed an efficient method to further process whey into profitable products.

Solution: SUEZ installed a continuous ED system to expand whey demineralization capacity and reduce production costs.

Results: The company is now the largest producer of demineralized whey, operating many of SUEZ's ED systems in multiple factories.

a success story

glycerine desalting

One of the by-products of biodiesel production is crude glycerine. Once purified, glycerine can be sold for personal care, food or pharmaceutical products or can be used in manufacturing other chemicals. SUEZ's ED Systems provide an efficient solution to purify glycerine. After pre-treatment to remove free fatty acids and other organics, SUEZ's ED Systems remove more than 98% of salt in the glycerine. If needed, additional polishing after ED can achieve more than 99% salt removal. SUEZ's ED technology provides a competitive solution to convert a waste stream into a valuable product. Compared to vacuum distillation, ED offers many advantages, including a simplified process; easy expandability; lower overall processing costs; and low energy usage.

Challenge: A specialty chemical manufacturer in Michigan, USA had an ED system that did not effectively desalt glycerine to its expected capacity.

Solution: After determining that the existing system was undersized and not properly designed to process the glycerine, SUEZ designed and replaced the system with an Electromat ED System.

Results: The new system successfully removes more than 98% of the salt from the crude glycerine.

a success story

wine and grape juice

Wine and grape juice contain tartrates, which can precipitate in the finished product if not removed. ED offers an energy efficient method to remove a portion of the tartrates to stabilize the finished product. Additionally, some producers need to lower pH. SUEZ's BPED system lowers the pH and removes potassium from the juice and wine. SUEZ's ED and BPED systems advantages include: no impact on wine characteristics (sugar content, alcohol level, taste), no chemical additives or temperature changes, lower energy consumption and faster processing compared to cold stabilization.

Challenge: A grape juice producer in California, USA needed to meet environmental discharge limits for tartrate stabilization.

Solution: SUEZ installed a combined ED and BPED system to lower the effluent levels, while adjusting the pH.

Results: The producer meets discharge limits and consistently achieves tartrate stabilization and their target grape juice pH.

fruit juices

BPED can also create low acid versions of orange, apple and cranberry juice. SUEZ's BPED system adjusts pH naturally without the addition of chemicals, providing a reliable, accurate pH for consistent product quality and taste. These juices can be marketed as "naturally sweetened juice."

a success story

glycol and amine

Glycol, used as a dehydrator for natural gas extraction, picks up mineral hardness that scales reboilers. Similarly, amine solutions are employed to remove H_2S, CO_2 and other impurities during gas treating — a process referred to as sweetening in refineries and petrochemical plants. ED reduces organic acids and other heat stable salts that build up in the amine solutions, thus improving their ability to extract acid gas. ED is an economic and environmentally-friendly alternative for removing ionic impurities from both glycol and amine solutions.

Challenge: An oil company operating a remote gas field in western Colorado, USA needed to find a method to purify their glycol solutions onsite.

Solution: SUEZ installed an ED system operating in continuous mode to maintain hardness at low levels, allowing glycol to be concentrated and reused without scaling.

Results: Scaling in the reboiler was virtually eliminated, allowing the plant to operate more efficiently, with lower glycol consumption.

other applications

- Purification of lactose, lactulose, and galactose
- Demineralization of nonfat milk
- Demineralization of corn syrup/sugar solutions
- Production of organic acids from salts
- Converting salt into dilute acid and base
- Purification of protein solutions

pilot testing

SUEZ can perform lab-scale ED pilot tests on customer-supplied feed samples. These tests help define operating parameters and provide customer product samples for evaluation. SUEZ can also arrange larger-scale ED pilot tests with one or more full-size ED stacks.

Find a contact near you by visiting www.suezwatertechnologies.com and clicking on "Contact Us."

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