DESALT

ELECTRODIALYSIS & BIPOLAR ED TEST EQUIPMENT

info@yasa.ltd
www.yasa.ltd

YASA ET

DESALT Electrodialysis and Bipolar Electrodialysis

We specialize in planning, designing, and installing lab test systems, pilot plants, and commercial skid systems for electrodialysis and bipolar electrodialysis technologies. With extensive experience in the field, we provide advanced manufacturing and customization of test equipment, pilot plants, and industrial-scale units. Our testing equipment and services are used across various industries, with highly satisfied clients worldwide.

Content

1. DESALT® Test Equipment

Thanks to the Electrodialysis and Bipolar Electrodialysis Test Equipment our clients can extensively test the water and wastewater treatment system and save money, time, and avoid any mistakes in the treatment process.

While conventional ED and DESALT Electrodialysis find application in a broad range of industries for ion and salt removal, bipolar electrodialysis is often used in more specialized processes that require precise control over ion transport and electrochemical reactions, making it suitable for chemical manufacturing, electrochemical processes, and research applications.

Fig.1 DESALT - ED & EBDM Test Equipment

DESALT test equipment allows for extensive testing and can be used to assess the effect of Electrodialysis or Bipolar Electrodialysis on any kind of inlet feed. The test equipment enables accurate assessment of the membranes' performance, such as water splitting efficiency and ion transport characteristics. Through testing, researchers and engineers can optimize the design and operation of electrodialysis systems, leading to improved electrolysis efficiency, reduced energy consumption, and increased product purity.

The electrodialyzer is made by the components shown in Fig.1 above.

*Images for reference only

1.1 ED TEST EQUIPMENT SPECIFICATIONS

Specifications	
Model	DESALT-ED
Membrane layers size	100x200 mm
Membrane effective area	0.0084 m² / layer
Repeating units	10
Spacers size	100x200 mm
Electrode plate size	70x120 mm
Clamping plate size	150x250 mm
Inlet-Outlet Ports	1/4" pipes
Pump	High precision gear pumps x3
Power supply	DC 30V/5A, 2 channels
ED membrane stack size	150 mm(W) x250 mm(H) x75 mm(D), 5.3 Kg
Power supply size	255 mm(W) x 145 mm(H) x265 mm(D), 11 Kg
Equipment skid size	400 mm(W) x 200 mm(H) x300 mm(D), 9 Kg

1.2 ED MEMBRANES SPECIFICATIONS

Parameter	Unit	EDA Results	EDC Results
Ion Exchange Capacity	mmolg-1	0.90 ~ 1.10	0.90 ~ 1.10
Thickness (wet)	µm	40 ~ 50	40 ~ 50
Uptake in H2O at 25C	wt%	15 ~ 20	15 ~ 20
Area electric resistance	ohm•cm²	≤2.50	≤3.00
Stability	pH	0 ~ 14	0 ~ 14
Temperature	°C	15~40	15~40

1.3 EDBM TEST EQUIPMENT SPECIFICATIONS

Specifications	
Model	DESALT-EDBM
Membrane layers size	100x230 mm
Membrane effective area	0.0084 m² / layer
Repeating units	10
Spacers size	100x230 mm
Electrode plate size	70x120 mm
Clamping plate size	150x250 mm
Inlet-Outlet Ports	1/4" pipes
Pump	High precision gear pumps x4
Power supply	DC 30V/5A, 2 channels
EDBM membrane stack size	150 mm(W) x250 mm(H) x75 mm(D), 5.7 Kg
Power supply size	255 mm(W) x 145 mm(H) x265 mm(D), 11 Kg
Equipment skid size	400 mm(W) x 200 mm(H) x300 mm(D), 10 Kg

1.4 EDBM MEMBRANES SPECIFICATIONS

Parameter	Unit	BIPOLAR Results
Thickness (wet)	µm	200 ~ 220
Membrane Voltage	V	0.7 ~ 0.9
Selective permeability	%	≥95
Pressure	mPa	≥0.2

1.5 ION EXCHANGE MEMBRANES

The ion exchange membrane is a polymer membrane containing ionic groups and having the ability to selectively permeate the ions in the solution. Two standard membrane stack for DESALT Electrodialysis and Bipolar Electrodialysis test equipment are shown in Fig.2 below:

Fig.2 DESALT - ED and BPED Membrane Stacks

According to the different types of charge, the membrane layers are mainly divided into anion exchange membrane (negative membrane) and cation exchange membrane(positive membrane).

The fixed groups of the anion membrane polymer are positively charged and can selectively pass through anions and block cations. Negative charge, selectively permeating cations and blocking anions. The diagram of negative membrane and positive membrane working principle is shown in Fig.3.

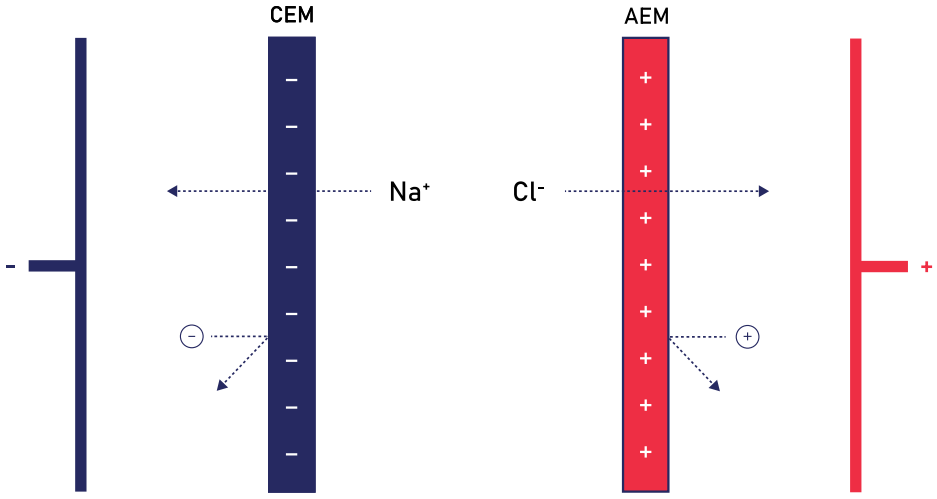

Fig.3 Schematic diagram of DESALT-ED working principle

*Images for reference only

Applications for DESALT-ED Electrodialysis Test Equipment

Electrodialysis (ED) is a process used for separation and concentration of ions in solution by means of selective ion-exchange membranes, under the influence of an electric field. It has various applications in diverse industries. Below is a list of applications for electrodialysis testing:

Water Desalination and Demineralization:

- Used in both drinking water treatment and industrial water purification.
- Electrodialysis can be employed to remove salts from seawater or brackish water.
- Brine concentration and valorisation.

Food and Beverage Industry:

- Salt Removal: ED is used to reduce the salt content in various food products, such as cheeses and soups.
- Concentration of Fruit Juices: It is used for demineralization and concentration without heat, preserving flavour and nutrients.
- Production of High Purity Water: Used in beverage manufacturing to ensure water quality.

Wastewater Treatment:

- Removal of Undesired Ions: Electrodialysis is used to extract heavy metals and ions from industrial wastewater.
- Removal of Salts from Waste Streams: It helps in reducing the environmental impact of wastewater discharge from industrial processes like food processing and pharmaceuticals.

And in many other applications.

INDUSTRIAL APPLICATIONS

- Water Desalination and Demineralization
- Wastewater Treatment
- Chemical and Pharmaceutical Industry
- Energy Production (Energy-Efficient Desalination)
- Biotechnology and Bioengineering
- Desalination of Brine from Reverse Osmosis Plants

DESALT-EDBM Test Equipment Membranes

In bipolar electrodialysis, the membrane stack has additional bipolar membranes that contain both anion and cation exchange groups. The use of bipolar membranes in electrodialysis allows for the simultaneous removal of both anions and cations from a solution.

When an electric potential is applied across the bipolar membrane, water molecules dissociate into H+ and OH- ions at the junction. This creates a pH gradient, allowing selective ion transport through the respective layers as shown in the Fig. 4 below:

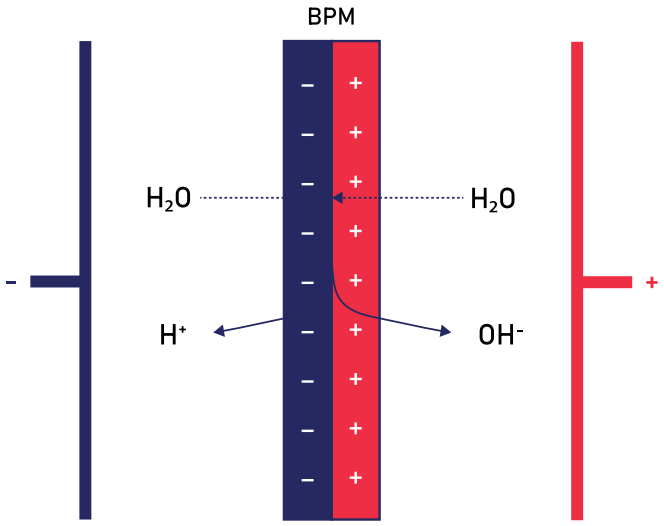

Fig.4 Water Dissociation with DESALT-EDBM Bipolar Membranes

Applications for DESALT-EDBM Electrodialysis Test Equipment

The concept of a circular economy has gained prominence in recent years, emphasizing the importance of resource recovery and recycling.

Electrodialysis, coupled with bipolar membranes, enables the recovery of valuable substances from chemical process streams. Bipolar membrane test equipment plays a crucial role in assessing the membranes' performance in extracting acids, bases, and metals from these streams.

By optimizing the recovery process through accurate testing, the chemical industry can contribute to resource conservation, reduced waste generation, and sustainable resource management.

As shown in the example below (Fig. 5), DESALT bipolar electrodialysis test equipment can be used to evaluate the recovery of NaOH and HCl from Reverse Osmosis brine in desalination plants, allowing for the end users to recover and reuse these chemicals in their processes.

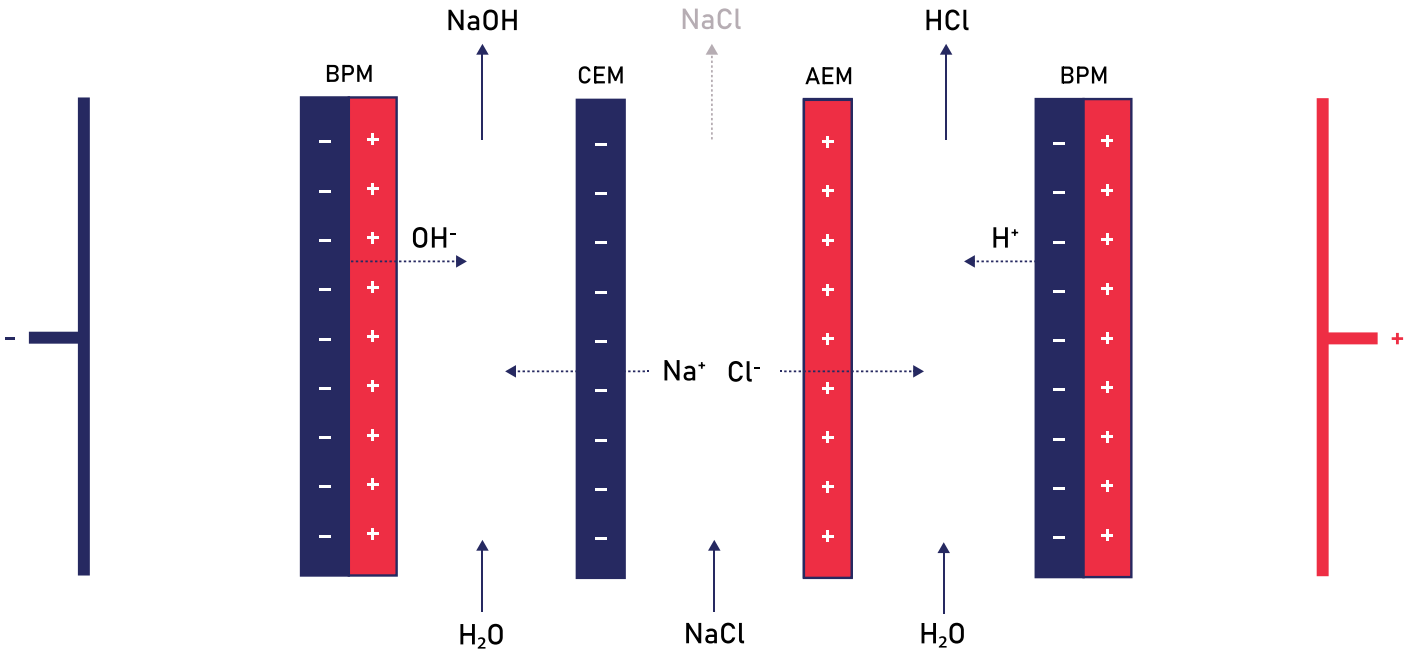

Fig.5 Schematic of DESALT Electrodialysis Bipolar Membrane Application

POSSIBLE APPLICATIONS

- Water Dissociation for Acid and Base Production
- Wastewater Treatment and Resource Recovery
- Electrosynthesis of Chemicals
- Biotechnology and Pharmaceutical Applications
- Desalination and Brine Treatment
- Production of Electrolytes for Energy Storage
- Waste Acid Recovery

2. References

2.1 LAB SCALE SYSTEMS

DESALT test equipment is currently used by many universities and companies from all around the world, including:

Client	Location
The University of Texas at Austin	
Weizmann Institute of Science	
Qatar University	
Ngee Ann Polytechnic University	
California State University	
Shanghai Jiao Tong University	
University of Alberta	
Diponegoro University	
Lucerne University of Applied Sciences and Arts	
University of Oklahoma	
East China University of Science and Technology	
Sherbrooke University	
Universidad de Cantabria	

3. Contact Us

For more information about our technology and services, kindly get in touch with our team:

info@yasa.ltd

www.yasa.ltd

www.desalt-iex.com

www.yashahuanjing.cn

Online Store

+86 136 3643 1077

THANK YOU FOR THE BUSINESS WITH US.

YASA ET (Shanghai) Co., Ltd.
2388, Xiupu Road, Pudong New Area,
Shanghai, China
Phone: +86 136 3643 1077
E-mail: info@yasa.ltd
Web: www.yasa.ltd