ION EXCHANGE MEMBRANE

离子交换膜

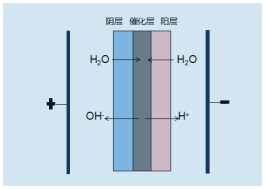
离子交换膜是许多关键工业技术的核心组件，其性能直接影响设备的效率、稳定性和成本。海普通过自主研发高性能离子膜能够打破技术垄断，降低生产成本，提升市场竞争力。为企业客户在复杂工况下的应用提供定制化解决方案，满足客户的多样化需求，在激烈的市场竞争中脱颖而出。

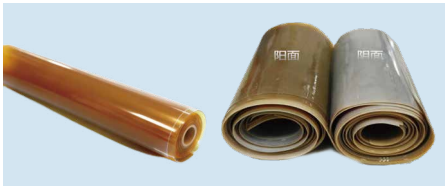
Ion exchange membranes are core components of many critical industrial technologies, and their performance directly affects the efficiency, stability, and cost of equipment. Through independent research and development of high-performance ion membranes, Hiapu is able to break technological monopolies, reduce production costs, and enhance market competitiveness. We provide customized solutions for enterprise clients operating under complex conditions, meeting their diverse needs and enabling them to stand out in the fierce market competition.

双极膜产品简介

Bipolar Membrane Product Introduction

双极膜（Bipolar Membrane，BPM）是一种特殊的离子交换膜，由阴离子交换层（AEL），阳离子交换层（CEL）和中间催化层复合而成。在电场作用下，双极膜能够将水分子解离为H^+和OH^-，从而实现酸和碱的同步生成。这一特性使得双极膜在制备氢氧化锂（LiOH）等化学物质中具有独特的优势。





Bipolar membrane (BPM) is a special type of ion exchange membrane composed of an anion exchange layer (AEL), a cation exchange layer (CEL), and an intermediate catalytic layer. Under the action of an electric field, bipolar membranes can dissociate water molecules into H^+ and OH^-, thereby achieving synchronous generation of acids and bases. This characteristic gives bipolar membranes a unique advantage in the preparation of chemical substances such as lithium hydroxide (LiOH).

海普提供多种型号的双极膜产品，以满足不同应用需求：

Haipu offers a wide range of bipolar membrane products to meet different application requirements:

	产品型号 Product Models	尺寸 Size(cm)	厚度 Thickness(um)	破裂强度 Rupture Strength(MPa)	使用温度 Operating Temperature(°C)	pH	碱浓度 alkali concentration(mol/L)	酸碱纯度 Acid base purity
双极膜 Bipolar membrane	BPM-100（标准型Standard type）	20*40、40*80、55*110 可定制尺寸 (Customizable Size)	150±20	≥0.5	15~40	0~14	2.5	97.5%
	BPM-200（高性能型High performance type）		150±20	≥0.5	15~40	0~14	3	99%
	BPM-300（定制型Customized type）		150±20	≥0.5	15~40	0~14	≥2.5	≥97.5%

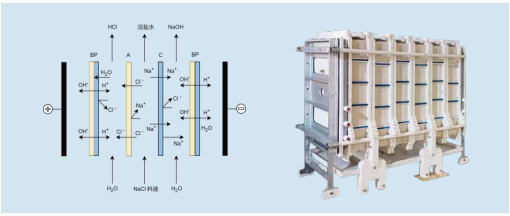
产品优点 Advantages

- **效率高：**可在低电压下进行水解，效率稳定。
- High efficiency: Hydrolysis can be carried out at low voltage with stable efficiency.
- **能耗低：**单片型双极膜工艺，界面电阻低，运行能耗低。
- Low energy consumption: The single-chip bipolar membrane process has low interface resistance and low operating energy consumption.
- **寿命长：**采用优质材料，且双极膜界面阴阳膜互相交联、融合，耐溶胀，具有优异的化学稳定性和机械强度，使用寿命长。
- Long service life: Made of high-quality materials, the bipolar membrane features interconne- cted and fused anion and cation membranes at the interface, which is resistant to swelling and possesses excellent chemical stability and mechanical strength, ensuring a long service life.
- **绿色环保：**双极膜技术可使传统工艺减少使用化学试剂，减少污染物排放，变废为宝，实现资源的循环利用，符合绿色化学理念。
- Green environmental protection: Bipolar membrane technology can reduce the use of chemical reagents in traditional processes, decrease pollutant emissions, turn waste into treasure, and achieve resource recycling, aligning with the concept of green chemistry.

双极膜电渗析装置

Bipolar membrane electrodialysis device

双极膜电渗析装置是在传统电渗析基础上创新的高效集成系统。其核心由阴、阳膜与关键的双极膜交替排列构成。该装置实现了“盐转化”与“酸碱再生”的革命性功能。它无需外加酸、碱，即可将盐溶液(如氯化钠、硫酸锂)直接转化为对应的酸(如盐酸)和碱(如氢氧化钠)，同时完成物料的分离与浓缩。



The bipolar membrane electrodialysis device consists of alternating anion and cation membranes and key bipolar membranes, which can directly convert salt solution into corresponding acids and bases without the need for external acids or bases, while completing material separation and concentration.

应用场景 Application scenarios

- 制备高纯酸、碱：装置采用耐酸碱阴阳离子模、双极膜，可用无机盐制备相应的无机酸/碱。适用于氯化钠、硫酸钠、硝酸钾等强酸强碱无机盐。

Preparation of high-purity acids and alkalis:The system features acid- and alkali-resistant anion, cation, and bipolar membranes, enabling the conversion of inorganic salts (e.g., ,NaCl, Na_2SO_4, KNO_3) into corresponding acids/bases.trong base inorganic salts such as lithium sulfate, sodium chloride, sodium sulfate, and potassium nitrate.

- 制备高纯氢氧化锂：在直流电场中将水直接电离为H^+和OH^-，OH^-通过膜与含锂盐溶液（如硫酸锂）中的Li^+结合，即可直接生成高纯度氢氧化锂溶液，同时联产相应的酸，实现资源的高效循环利用。

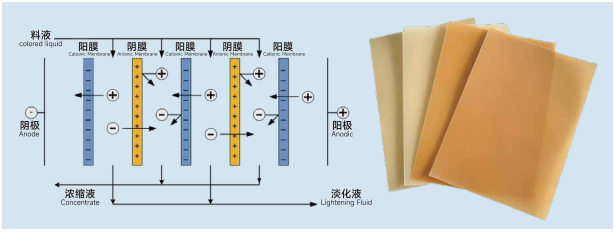
Preparation of high-purity lithium hydroxide: Under a direct-current electric field, water is split into H^+ and OH^-. The OH^- migrates through the membrane and combines with Li^+ from a lithium salt solution (e.g., Li_2SO_4) to directly produce high-purity LiOH solution, while simultaneously co-generating the corresponding acid—achieving efficient resource recycling.

电渗析均相膜产品简介

Product Profile of Electrodialysis Homogeneous Membrane

电渗析均相膜一种具有离子交换功能的高分子材料制成的薄膜，其内部的离子交换基团在整个膜内呈均匀分布，从微观结构上看，膜内的高分子聚合物基体与离子交换基团之间不存在明显的相界面，是一种高度均匀的体系。通常分为均相阳离子膜和均相阴离子膜。

Electrodialysis homogeneous membrane is a thin film made of polymer material with ion exchange function. The ion exchange groups inside the membrane are uniformly distributed throughout the membrane. From a microscopic perspective, there is no obvious phase interface between the polymer matrix and the ion exchange groups inside the membrane, making it a highly uniform system. Usually divided into homogeneous cation membrane and homogeneous anion membrane.



海普提供多种型号的电渗析均相膜产品，以满足不同应用需求：

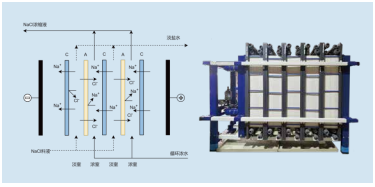
Haipu offers a wide range of electrodialysis homogeneous membranes to meet the needs of different applications:

	产品型号 Product Models	尺寸 Size(cm)	厚度 Thickness(um)	破裂强度 Rupture Strength(MPa)	使用温度 Operating Temperature(°C)	pH	选择性透过系数 Selective Permeability coeffcient	电阻 resistance(Ω.cm²)	浓缩上限值 Concentration upper limit value (g/L)
电渗析均相膜 Electrodialysis homogeneous membrane	HP-AM-100（浓缩型Concentrated type）	20*40、40*80、55*110 可定制尺寸 Customizable Size	70~100	≥1.0	15~40	0~12	≥98%	≤2.5	200
	HP-AM-200（脱盐-Ⅱ型Desalination－Type Ⅱ）		70~100	≥1.0	15~40	0~11	≥97%	≤2.5	180
	HP-AM-300（脱盐-Ⅱ型Desalination－Type Ⅱ）		70~100	≥1.0	15~40	0~11	≥98%	≤2.5	190
	HP-AM-400（耐酸碱型Acid and alkali resistant type）		70~100	≥1.0	15~40	0~14	≥97%	≤3	150
	HP-CM-100（浓缩型Concentrated type）		70~100	≥1.0	15~40	0~12	≥98%	≤2.5	170
	HP-CM-200（脱盐型Desalination type）		70~100	≥1.0	15~40	0~11	≥97%	≤2.5	180
	HP-CM-300（耐酸碱型Acid and alkali resistant type）		70~100	≥1.0	15~40	0~14	≥97%	≤3	150

电渗析装置

Bipolar membrane electrodialysis device

该系统由阳、阴离子交换膜交替堆叠而成，中间用隔板隔开，并配有电极板、端板和其他组件。工作原理为膜堆交替使用阴、阳离子膜，形成脱盐和浓缩系统。在直流电场影响下，当盐水被引入隔间时，阳离子只通过阳离子交换膜向阴极迁移，而阴离子只通过阴离子交换膜向阳极迁移，从而使得盐水在稀释区实现脱盐，在浓缩区完成浓缩。



The system is composed of alternating stacking of cation and anion exchange membranes, separated by partitions, and equipped with electrode plates, end plates, and other components. The working principle is that the membrane stack alternately uses anionic and cationic membranes to form a desalination and concentration system. Under the influence of a direct current electric field, when saltwater is introduced into the compartment, cations only migrate to the cathode through the cation exchange membrane, while anions only migrate to the anode through the anion exchange membrane, thereby achieving desalination of saltwater in the dilution zone and concentration in the concentration zone.

应用优势
Application advantages

- **离子交换容量高：**均相离子交换膜具有分布均匀的离子交换基团，且其含量较高，所以能够有效地与溶液中的离子进行交换反应，可用于高效的离子分离和富集。
- High efficiency: Homogeneous membranes have uniformly distributed ion exchange groups that can undergo ion exchange reactions and can be used for efficient ion separation and enrichment.
- **浓缩浓度高：**适合一价盐的高倍浓缩，浓缩浓度可达180g/L（以氯化钠计），比常规膜浓缩工艺高一倍，还可有效减少浓水水量。
- High concentration: suitable for high fold concentration of monovalent salts, with a concentration of up to 180g/L, twice as high as conventional membrane concentration processes, and can effectively reduce the amount of concentrated water.
- **纯度高：**不带电物质如COD、硼酸根、硅酸根、氨基酸等不会迁移，使制备的工业盐纯度更高。
- High purity: Non charged substances such as COD and silicate ions do not migrate, resulting in higher purity of industrial salts prepared;
- **能耗低：**结构均匀，离子在膜内的传输阻力小，膜电阻较低，较常规工艺（蒸发、反渗透等）节能50%以上，降低了处理负荷和电能消耗，提高了能源利用效率。
- Low energy consumption: uniform structure, low membrane resistance, energy saving of more than 50% compared to conventional processes, reducing load and electricity consumption, and improving energy utilization efficiency.
- **化学稳定性好：**在较宽的pH范围和多种化学环境下保持稳定，不易发生化学降解或结构破坏，可耐受强酸、强碱，适用于处理各种复杂的化学体系。
- Good chemical stability: Stable in a wide pH range and various chemical environments, resistant to strong acids, strong bases, suitable for handling complex chemical systems.
- **安全可靠：**运行压力0.05MPa，低温、低压运行安全可靠，抗冲击能力强。
- Safe and reliable: Operating pressure of 0.05MPa, safe and reliable operation at low temperature and low pressure, with strong impact resistance.