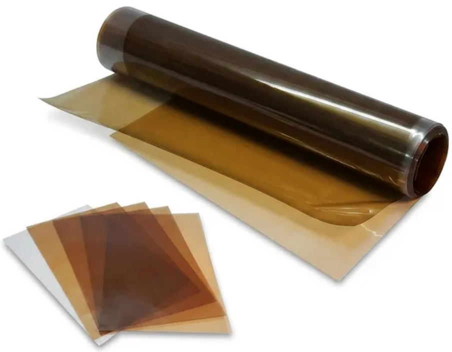
High-Performance Anion Exchange Membrane For Green Hydrogen Production

Item Number: PL-GM02



Introduction

Discover our premium anion exchange membrane (AEM) engineered for alkaline water electrolysis, fuel cells, and CO2 reduction. Delivers high conductivity, excellent alkali resistance, and mechanical durability. Ideal for cost-effective green hydrogen, available with custom thicknesses and PTFE reinforcement.

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Application	Description	Key Benefit
Alkaline Water Electrolysis	Core separator in AEM electrolyzers producing green hydrogen from water using renewable electricity; the membrane’s high OH^- conductivity and low gas crossover enable high-efficiency, low-voltage operation.	Enables cost-effective H_2 production with non-noble metal catalysts, reducing levelized hydrogen cost.
AEM Fuel Cells	Converts chemical energy from hydrogen, methanol, or hydrazine into electricity; the alkaline environment permits the use of silver-based cathodes and nickel-based anodes.	Lower catalyst costs and greater fuel flexibility compared to PEM fuel cells, with enhanced durability.
CO_2 Electroreduction	Facilitates the one-step conversion of CO_2 into syngas, formate, ethylene, or ethanol within alkaline flow electrolyzers, leveraging the membrane’s selective anion transport to separate anolyte and catholyte.	High product selectivity and stable operation under continuous CO_2 feed, contributing to carbon recycling.
Electrodialysis & Salt Splitting	Used in stacks for demineralization, brine concentration, or acid/base production; the membrane’s anion-selective permeability enables efficient separation of salts into their constituent acids and bases.	Low energy consumption and long-lasting separation efficiency in high-salinity environments.
Redox Flow Batteries	Acts as the ion-conducting separator in alkaline zinc-air or all-iron flow batteries, allowing OH^- transport while preventing cross-mixing of redox couples.	Reliable long-duration energy storage with minimal capacity fade over thousands of cycles.
Direct Borohydride Fuel Cells	Serves as the solid polymer electrolyte in direct borohydride systems, where the membrane’s high ionic conductivity and chemical stability support high power densities even under intermittent operation.	Non-precious metal electrodes and liquid fuel simplify system design and lower operational costs.
Chlor-Alkali Electrolysis	Deployed in membrane-cell chlor-alkali processes to produce chlorine and caustic soda, where the membrane must withstand concentrated brine and chlorine without degrading.	Superior chlorine resistance and dimensional stability extend service life and reduce maintenance shutdowns.
Electrochemical Wastewater Treatment	Utilized in electro-oxidation or electro-Fenton systems for industrial wastewater remediation; the membrane separates anodic and cathodic compartments, enabling targeted pollutant destruction.	Robust performance in aggressive chemical matrices, offering a sustainable treatment pathway with minimal chemical additives.

Parameter	Description
Product Model	PL-GM02
Membrane Type	Anion Exchange Membrane (AEM)
Fixed Charge Groups	Quaternary ammonium or imidazolium covalently bonded to the polymer matrix, providing permanent positive charges for selective anion transport.
Polymer Backbone	High-performance engineering polymer designed for chemical and thermal resilience in alkaline environments.
Functional Group Density	High density ensures elevated ion exchange capacity (IEC) and consistently high conductivity. IEC values are customizable to balance water uptake and mechanical stability.
Reinforcement Options	Two configurations available: (1) PTFE mesh reinforced – offers superior dimensional stability and handling strength; (2) Self-supporting – provides maximum flexibility and lower thickness for compact assemblies.

Parameter	Description
Thickness	Customizable within a range (typically 20–200 µm); specific thickness can be matched to compression and conductivity requirements.
Ion Exchange Capacity	Customizable; typical range 1.0–2.5 mmol/g. The exact value is selected to optimize performance for your specific electrolyte concentration and temperature.
Alkaline Stability	Proven resistance to degradation in 1–6 M KOH solutions at operating temperatures up to 80°C. Long-term immersion tests confirm stable conductivity and IEC retention over 5,000+ hours.
Hydroxide Conductivity	High OH^- conduction; exact value depends on IEC, thickness, and temperature. Under optimal conditions, membranes achieve conductivity comparable to liquid alkaline electrolytes.
Gas Permeability	Extremely low H_2 and O_2 permeability (<1 Barrer typical), minimizing crossover and ensuring safe, efficient operation in pressurized electrolyzers.
Tensile Strength	>25 MPa (reinforced variant) and >15 MPa (self-supporting) in dry state; wet strength maintained due to minimal water-induced plasticization.
Elongation at Break	>100% for reinforced, >200% for self-supporting, ensuring flexibility during cell compression without cracking.
Pretreatment Protocol	Immerse membrane in 1M KOH or NaOH solution for 12–24 hours to fully exchange counter-ions to OH^- form. Rinse with DI water before assembly.
Storage Conditions	Store in sealed packaging in a cool, dry, dust-free environment. Some formulations may require storage in DI water or dilute alkali to maintain hydration and ionic activity.