

ZEOLITE SOLUTIONS

*Indigenous Advanced Materials for
Gas Dehydration & Solvent
Purification*



INDIA'S FIRST INDIGENOUS CHOICE

NxTBrane is redefining the molecular sieve landscape in India. Our proprietary binder-less process ensures high-performance zeolite beads tailored for critical applications in Biofuels, Oil & Gas, and Pharmaceuticals.



HIGH CRUSH STRENGTH

Optimized for industrial
pressure swing
adsorption units.



RAPID KINETICS

Fast adsorption cycles
for high-throughput
processing.

OUR PORTFOLIO

- 3A** Ethanol & Solvent Dehydration
- 4A** General Gas & Static Drying
- 5A** Paraffin & H₂ Purification
- 13X** Air Separation & Gas Sweetening
- CAT** Zeolite as Catalyst

**Supporting India's Biofuel
Mission**

Overview & Technology

Our indigenous zeolite molecular sieves & Powders (3A, 4A, 5A, 13X) are a specific type of crystalline aluminosilicates with pore sizes of 3Å, 4Å, 5Å, and 10Å respectively, designed for selective adsorption of molecules up to the pore diameter while excluding larger ones.



These high quality beads deliver excellent adsorption capacity, rapid kinetics, high crushing strength, high selectivity, outstanding durability, and dependable regeneration using thermal or pressure swing methods for economical, eco-friendly operations. Perfect for high-purity solvent dehydration, such as achieving >99.5% fuel-grade ethanol in India's biofuel industry.

NxTBrane's zeolite beads represent a fully indigenous breakthrough in molecular sieve technology. Our proprietary binder-less formulation ensures high mechanical integrity and extended lifespan, supporting India's ethanol blending targets and sustainable energy goals.

— KEY FEATURES

- › High water adsorption capacity and fast kinetics.
- › Excellent crush strength and attrition resistance.
- › Superior regeneration (thermal or pressure swing) for repeated cycles.
- › Low dust and high purity for clean

— BENEFITS

- › Superior Purity: Achieves <0.1% residual water in ethanol streams.
- › Cost Efficiency: Reduces energy costs vs. traditional distillation.
- › Indigenous Excellence: 100% made in India for reliable supply and import substitution.

3A MOLECULAR SIEVE

POTASSIUM EXCHANGED ALLUMINOSILICATE | 3Å PORE SIZE

3Å



NxTBrane's **3A zeolite beads** represent a fully indigenous breakthrough in molecular sieve technology. With precise 3 angstrom pores, these potassium-exchanged aluminosilicates selectively adsorb water molecules while rejecting ethanol and other organics—enabling ultra-dry outputs for biofuels and industrial processes. Our proprietary binder-less formulation ensures high mechanical integrity and extended lifespan, supporting India's ethanol blending targets and sustainable energy goals.

🔍 Technical Data Sheet (TDS)

PARAMETER	SPECIFICATION		TESTING METHOD OR CONDITIONS
Bead diameter (mm)	1.6-2.5	3.0-5.0	—
Static Water Adsorption (wt%)	≥ 21.50	≥ 21.50	RH 75%, 25°C
Crush Strength (N/Granule)	≥ 40	≥ 120	Avg. 25 granule
Bulk Density (g/ml)	0.70 – 0.80	0.70 – 0.80	Tapped
Particle Ratio (%)	≥ 98	≥ 98	—
Loss on Attrition (wt%)	≤ 0.10	≤ 0.10	—
Water Content (wt%)	≤ 1.50	≤ 1.50	550°C, 1h

Note: Values are typical; refer to attached COA for batch-specific details. Contact us for customized grades.

🛡️ APPLICATIONS



Biofuel production

Dehydration of ethanol to fuel-grade purity (>99.5%) for India's 1G/2G blending programs—prevents phase separation, boosts efficiency, and supports renewable fuel.



Solvent Drying

Removal of trace water from methanol, isopropanol, and other alcohols in pharmaceuticals, cosmetics, and chemicals.



Industrial Gas & Hydrocarbon Drying

Drying natural gas, unsaturated hydrocarbons (e.g., ethylene, propylene), and petrochemical streams.



Other Specialized Uses

Refrigerant drying, insulated glass manufacturing, and air/hydrogen purification.

In ethanol dehydration, our beads break azeotrope limits post-distillation, delivering consistent high-purity output with lower energy use and longer bed life compared to imports.

>99.8%
Ethanol Purity



NxTBrane's **4A zeolite beads** are the sodium form of the Type A crystal structure, featuring an effective pore opening of 4 angstroms (0.4 nm). It is primarily used for the dehydration of gases and liquids where the critical diameter of molecules to be excluded is greater than 4Å. Our indigenous binder-less process ensures these beads maintain superior adsorption kinetics and high mechanical strength, making them the industry standard for versatile industrial drying.

🔍 Technical Data Sheet (TDS)

PARAMETER	SPECIFICATION		TESTING METHOD OR CONDITIONS
Bead diameter (mm)	1.6-2.5	3.0-5.0	—
Static Water Adsorption (wt%)	≥ 21.50	≥ 21.50	RH 75%, 25°C
Crush Strength (N/Granule)	≥ 40	≥ 120	Avg. 25 granule
Bulk Density (g/ml)	0.70 – 0.80	0.70 – 0.80	Tapped
Particle Ratio (%)	≥ 98	≥ 98	—
Loss on Attrition (wt%)	≤ 0.10	≤ 0.10	—
Water Content (wt%)	≤ 1.50	≤ 1.50	550°C, 1h

Note: Values are typical; refer to attached COA for batch-specific details. Contact us for customized grades.

🛡️ APPLICATIONS



Natural Gas & LPG Drying

Deep dehydration of natural gas and liquefied petroleum gas (LPG) to prevent hydrate formation and corrosion in pipelines.



Air Compression Systems

Used in heated and heatless pressure swing adsorption (PSA) dryers for instrument air and industrial gas purification.



Hydrocarbon Dehydration

Removal of moisture from saturated hydrocarbons, solvent streams, and liquid alkanes in petrochemical refineries.



Static Dehydration

Ideal for use in electronic components, pharmaceutical packaging, and closed-circuit systems to maintain ultra-low humidity.

Our 4A beads offer a versatile solution for moisture removal across a wide range of pressures and temperatures. The high attrition resistance ensures minimal dust formation, protecting downstream valves and compressors.

4.0 Å
Critical Diameter

5A MOLECULAR SIEVE

CALCIUM ALLUMINOSILICATE | 5Å PORE SIZE

5Å



NxTBrane's **5A zeolite beads** are the calcium-exchanged form of the Type A crystal structure. With an effective pore opening of 5 angstroms (0.5 nm), it adsorbs molecules with a critical diameter smaller than 5Å, including n-paraffins. Our indigenous binder-less process ensures high crushing strength and superior adsorption kinetics, making it the preferred choice for industrial gas purification and separation.

🔍 Technical Data Sheet (TDS)

PARAMETER	SPECIFICATION		TESTING METHOD OR CONDITIONS
Bead diameter (mm)	1.6-2.5	3.0-5.0	—
Static Water Adsorption (wt%)	≥ 21.50	≥ 21.50	RH 75%, 25°C
Crush Strength (N/Granule)	≥ 40	≥ 120	Avg. 25 granule
Bulk Density (g/ml)	0.70 – 0.80	0.70 – 0.80	Tapped
Particle Ratio (%)	≥ 98	≥ 98	—
Loss on Attrition (wt%)	≤ 0.10	≤ 0.10	—
Water Content (wt%)	≤ 1.50	≤ 1.50	550°C, 1h

Note: Values are typical; refer to attached COA for batch-specific details. Contact us for customized grades.

🛡️ APPLICATIONS



n-Paraffin Separation

Separation of normal paraffins from branched-chain and cyclic hydrocarbons, a key process in petrochemical refining.



PSA Hydrogen Purification

Used in Pressure Swing Adsorption (PSA) units to remove water, CO₂, and light hydrocarbons from hydrogen streams.



Air Separation (O₂/N₂)

Efficient removal of moisture and CO₂ from air prior to cryogenic separation or in oxygen concentrators.



SF₆ Gas Drying

Dehydration of Sulfur Hexafluoride (SF₆) for high-voltage power equipment and electrical transformers.

Our 5A series is engineered for high-selectivity separation tasks. The calcium-exchange process provides the specific electrostatic potential required to capture n-alkanes while excluding branched molecules, ideal for octane boosting in refinery streams.

5.0 Å
Critical Diameter



NxTBrane's **13X zeolite beads** are the sodium form of the Type X crystal structure. Boasting a significantly larger pore opening of 10 angstroms, it offers the highest theoretical capacity among common adsorbents. This versatile sieve is essential for removing larger molecular species like mercaptans and branched hydrocarbons, while simultaneously handling moisture and carbon dioxide at high efficiency.

🔍 Technical Data Sheet (TDS)

PARAMETER	SPECIFICATION		TESTING METHOD OR CONDITIONS
Bead diameter (mm)	1.6-2.5	3.0-5.0	—
Static Water Adsorption (wt%)	≥ 24	≥ 24	RH 75%, 25°C
Static CO₂ Adsorption (wt%)	≥ 19	≥ 19	250mmHg, 25°C
Crush Strength (N/Granule)	≥ 40	≥ 120	Avg. 25 granule
Bulk Density (g/ml)	0.70 – 0.80	0.70 – 0.80	Tapped
Particle Ratio (%)	≥ 98	≥ 98	—
Loss on Attrition (wt%)	≤ 0.10	≤ 0.10	—
Water Content (wt%)	≤ 1.50	≤ 1.50	550°C, 1h

Note: Values are typical; refer to attached COA for batch-specific details. Contact us for customized grades.

🛡️ APPLICATIONS



Biogas Upgradation

High-capacity removal of CO₂ and H₂S from raw biogas to produce pipeline-quality biomethane (CBG).



Gas Sweetening

Removal of H₂S, mercaptans, and other sulfur compounds from natural gas and liquid hydrocarbon streams (LPG).



Medical Oxygen (PSA)

Standard material for oxygen concentrators, effectively separating nitrogen from air to produce high-purity medical O₂.



Cryogenic Separation

Purification of air by removing trace CO₂ and moisture to prevent freezing in cryogenic air separation units (ASU).

Our 13X series is engineered to support India's Bio-CNG vision. By providing exceptional selectivity for CO₂, NxTBrane beads facilitate the efficient upgradation of raw biogas into high-purity biomethane. This indigenous solution reduces energy consumption in PSA units and supports sustainable, carbon-neutral fuel production.

BIOGAS
Upgradation
Specialist

THE CATALYTIC FRAMEWORK

Zeolites stand out for their exceptional catalytic capabilities, driven by their intricate porous framework that enables targeted molecule capture. Their consistent pore dimensions function as precise filters, permitting only specific molecules to access the internal cavities (active sites) where reactions occur.

1 Adsorption: Reactants stick to tiny pores



2 Reaction: Chemical change inside pores



3 Desorption: Product release & site renewal

ZSM-5

Zeolite Y

Beta

Mordenite

AVAILABLE PRODUCT FORMS

Powder

For slurry
reactors &
formulation

Beads

Spherical
(1.6mm - 5.0mm)

Pellets

Cylindrical
extrudates

Custom

Specialized
binder-less
shapes

***Note:** Catalyst morphology is optimized for specific reactor designs (Fixed-bed, Fluidized-bed, or Batch reactors).*

CATALYST SPECIFICATION PARAMETERS

Acid Site Density NH ₃ -TPD	Customizable (High/Medium/Low)	Si/Al Ratio ICP-OES / XRF	5 - 280+
Surface Area (BET) N ₂ Adsorption	350 - 1000 m²/g	Crystal Size SEM / XRD	0.2 - 2.0 µm
Thermal Stability Calcination Test	Up to 750°C	Purity XRD Phase Analysis	≥ 99%

APPLICATIONS



BIOMASS TO FUEL

Upgrading bio-oils and biomass waste into fine chemical products and renewable green fuels.



PETROCHEMICALS

Fluid Catalytic Cracking (FCC), Hydrocracking, and Isomerization processes for high-octane output.



FINE CHEMICALS

Selective alkylation, acylation, and synthesis of pharmaceutical intermediates with high yield.



Why NxTBrane Catalysts?

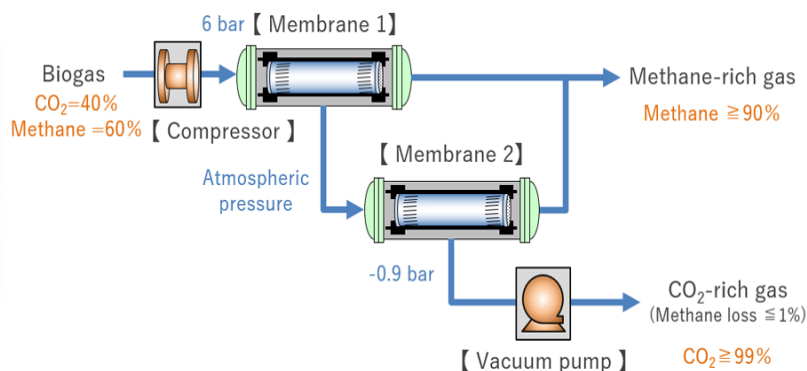
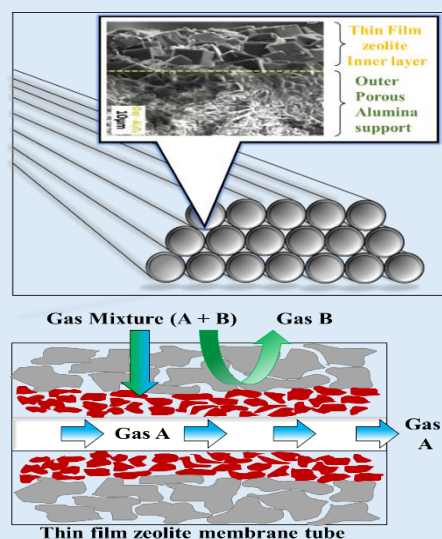


Shape Selectivity: Engineered pore structures ensure only target molecules react, reducing side-products and waste.



Thermal Integrity: Superior hydrothermal stability allows for multiple regeneration cycles without structural collapse.

Our Zeolite membranes, crafted from robust crystalline aluminosilicate materials, distinguish themselves with exceptional chemical and thermal stability, along with high selectivity. They enable precise separation of liquid mixtures (paraffin isomers, xylene isomers, etc.), Gas/Hydrocarbons separation (biogas, natural gas, and CO₂ capture), and water desalination, utilizing molecular sieving, diffusion, and adsorption mechanisms. The zeolite membrane system offers a straightforward continuous process with reduced energy consumption and a smaller footprint.



APPLICATIONS



BIOGAS PLANT UPGRADE

Optimizing Bio-CNG production by stripping CO₂ and H₂S with minimal methane slip and zero chemical consumption.



RENEWABLE FUELS INDUSTRY

Delivering fuel-grade ethanol and butanol through energy-efficient pervaporation and superior water removal technology.



OIL & GAS INDUSTRY

Achieving molecular-level precision in isomer separation and natural gas sweetening where traditional distillation is inefficient.



MAIN MECHANISM

Molecular Sieving

Size-based rejection

Diffusion

Preferential mobility of CO₂/H₂O

Adsorption

Selective surface interaction

Reduced Footprint

Lower energy consumption & smaller plant size vs traditional scrubbing.

Operational Excellence