

ZEOCHEM®



Zeochem  
**Molecular Sieve Adsorbents**

Chemistry. Pure. Efficient.

A Company of CPH Chemie & Papier Holding AG

# ZEOCHEM

ZEOCHEM is a premier global manufacturer of molecular sieve products. With roots in Switzerland, we have a rich culture of environmental sustainability, customer service and quality products. For over 40 years, ZEOCHEM has been a trusted supplier and our customers rely on us to identify the products and service solutions they need.



ZEOCHEM's technical sales and service teams have decades of experience and are available to answer questions and find solutions for your adsorption needs. We strive to be your partner and pride ourselves on our responsiveness.

With manufacturing facilities in the USA, Bosnia & Herzegovina, and China, ZEOCHEM offers a range of high-performance products and global support. Timely answers and troubleshooting are provided by our sales and technical experts located strategically around the world.

**Consistent.**  
**Responsive.**  
**Innovative.**

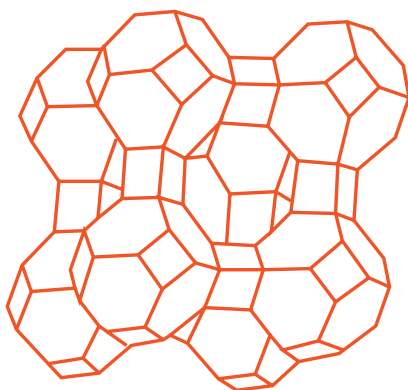
*“We work together with our customers to provide the best solution for their needs. Our technical sales and service personnel are known for their responsiveness to our customers.”*

## What are Molecular Sieves?

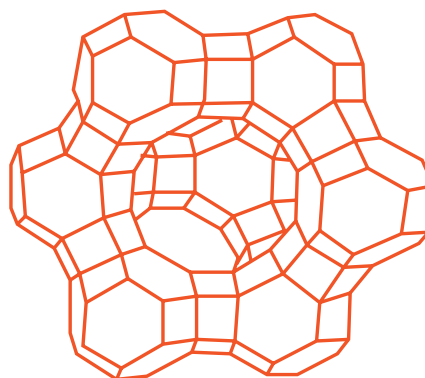
Molecular sieve adsorbents are crystalline aluminosilicates, known as zeolites. Their unique structure allows the water of crystallization to be removed, leaving a porous crystalline structure. These pores, or cages, have a high affinity to re-adsorb water or other polar molecules. Aided by strong ionic forces (electrostatic fields) due to the presence of cations such as sodium, calcium and potassium, and by the enormous internal surface area of up to 1,000 m<sup>2</sup>/g, molecular sieves will adsorb a considerable amount of water or other fluids. If the fluid to be adsorbed is a polar compound, it can be adsorbed with high loading, even at very low concentrations of the fluid. Molecular sieves can remove gas or liquid impurities to very low levels (ppm or less).

Another feature of molecular sieve adsorbents is their ability to separate gases or liquids by molecular size or polarity. The pore, or cage, openings are the same size as many molecules, e.g., in the case of hydrocarbon paraffins, straight-chained molecules can fit into the pores and be adsorbed, while the branched-chain molecules cannot enter the pores and pass through the molecular sieve bed unadsorbed.

ZEOCHEM molecular sieve adsorbents utilize either Type A or Type X Structures.



Type A Structure



Type X Structure

# ZEOCHEM MOLECULAR SIEVES



## 3Å

The 3A molecular sieve has a pore opening of approximately 3 angstroms. Type 3A is made by ion-exchanging the sodium in the type 4A sieve with potassium. The 3A molecular sieve will exclude most molecules except water, making it very selective. This type of bead also has advantages in crush strength, durability and high rate of adsorption. The 3A molecular sieve can remove moisture in both liquid and gas applications. Type 3A is used in the drying of natural gas, hydrocarbon liquids, ethanol and reactive monomers such as olefins. It is also used in the production of insulated glass, refrigerant drying, and general moisture removal.

## 4Å

The 4A molecular sieve has a pore opening of approximately 4 angstroms. This sodium form of type A is widely used as a general-purpose drying agent and has good physical and adsorption properties. Type 4A beads can be used to adsorb water, ammonia, methanol, ethanol and carbon dioxide. This type of molecular sieve is often used to remove moisture from gas and liquid streams, where co-adsorption of sulfur compounds and carbon dioxide is not a concern.

## 5Å

The 5A molecular sieve has a pore opening of approximately 5 angstroms and is the calcium-exchanged form of the type A zeolite. The strong ionic forces of the divalent calcium cation make 5A an excellent choice for removing carbon dioxide, carbon monoxide, alcohols and other oxygenates, hydrogen sulfide, methyl and ethyl mercaptans, and other polar molecules. This product is also effective for the bulk separation of normal and iso-paraffin hydrocarbons. The 5A has a high rate of adsorption and desorption, a higher rate of contamination resistance and a high crush strength.

## 13X

The 13X molecular sieve is the sodium form of zeolite X and has a much larger pore opening than the type A crystals, with an approximate pore diameter of 10 angstroms. It also has the highest theoretical capacity of the common adsorbents and excellent mass transfer rates. Type 13X offers enhanced adsorption performance over the type A zeolite, and it can remove impurities too large to fit into the type A zeolite crystal cages. It is also often used to separate nitrogen from the air to produce a high-purity oxygen stream. Our 13X materials are physically robust and have high adsorption capacity for water, nitrogen, alcohols and other oxygenates, sulfur compounds and carbon dioxide.

## Calcium X

Calcium X (CaX) and Calcium LSX (CaLSX) are the calcium-exchanged forms of the 13X and LSX type zeolites. These molecular sieves have various applications throughout the process industry.

In the production of industrial oxygen, CaX and CaLSX sieves are used for direct oxygen concentration in VPSA oxygen plants. In addition, adsorbents are used in the front-end purification section of cryogenic oxygen plants to remove NO<sub>x</sub> and lighter hydrocarbons from the inlet air.

In the manufacturing of industrial hydrogen, CaX and CaLSX sieves are used as one of the adsorbent layers in hydrogen pressure swing adsorption (PSA) plants, typically for CO adsorption.

## Lithium X

Lithium X molecular sieves offer proven performance, as exhibited by the thousands of tons used in air separation across the globe. Lithium adsorbents have exceptional nitrogen capacity, extraordinary kinetics and superior selectivity to yield high-purity oxygen streams from the air. These molecular sieves are used in industrial oxygen generation processes using vacuum pressure swing adsorption (VPSA) and in medical oxygen generation, allowing customers to produce high-purity oxygen-rich streams for stationary and portable oxygen concentrators (POCs). ZEOCHEM's patented binding system provides unrivaled physical characteristics, such as outstanding mechanical strength and durability.

## Purmol Zeolite Powder

Purmol adsorbents are synthetic zeolites in powder form with a complex alkali aluminosilicate crystalline structure. This structure is very open and contains pores of a precisely defined size. This allows Purmol products to adsorb molecules selectively based on molecular size and polarity. Purmol products adsorb water but not solvents, resins, or pigments. Purmol powder is used in a wide variety of applications and can be used in numerous formulations where selective adsorption of small polar molecules is required within a liquid or solid medium. The fine particle size of the powder ensures intimate mixing and excellent dispersion. The powder serves as an additive for polyurethane chemistries to remove unwanted moisture.

# ZEOCHEM

## Molecular Sieve Applications and Services

Molecular sieve adsorbents are used in a broad range of applications from removing moisture from natural gas to removing nitrogen from the air for oxygen generation. Our applications and services include:

### Applications

#### Natural Gas Processing & Liquefied Natural Gas (LNG)

- Dehydration of Hydrocarbon Gas and Liquid Streams
- Sulfur Removal
- Oxygenate Removal
- Carbon Dioxide Removal

#### Ethanol Dehydration

- Fuel Ethanol Dehydration
- Industrial and Pharmaceutical Ethanol
- Food-and-Beverage-Grade Ethanol

#### Refining Drying and Treating

- LERU
- Isomertization Feed
- Refinery Hydrogen

#### Petrochemicals & Syn Gas

- Cracked Gas Drying / Ethylene Product
- Olefin Treating
- Feed Stream and Product Stream Drying
- EB/SM (Ethylbenzene / Styrene Monomer)
- Ammonia Syngas

#### Solvent Drying and Treating

#### Medical Oxygen Generation

- Portable Oxygen Concentrators
- Stationary Oxygen Concentrators

#### Industrial Oxygen Generation

- VPSA
- PSA
- Cryogenic

#### PSA Hydrogen Purification

#### Industrial Drying

- Air Brake Systems
- Air Drying Equipment
- Air Compressor Units
- Refrigerants Drying
- Insulated Glass
- High and Medium Voltage Switch Gears

#### Moisture Scavenging (CASE industry)

- Polyurethane (PUR) coatings, adhesives, or sealants
- Metallic pigment coatings
- Polysulfide and Silicone Systems
- PUR, PVC and silicone foams
- Silicone and polysulfide coating systems
- Elastomers

# Services

## Molecular Sieve Regeneration Services

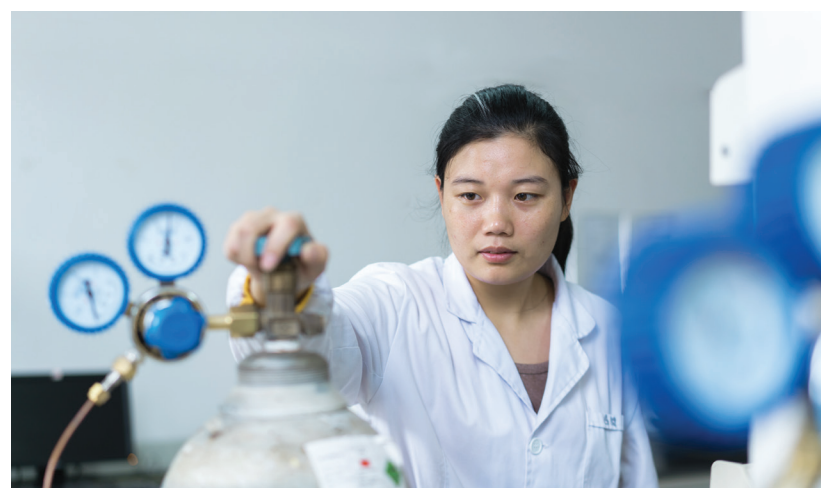
- Medical Oxygen Generation
- Industrial Oxygen Generation

## Industry-leading R&D

Since its founding, ZEOCHEM has been at the leading edge of technology. Our global R&D teams focus on new product development, existing product improvement and understanding how our products are used. By working together to better understand our customers' needs, we can create new products and customized solutions.

## Pilot Plant

ZEOCHEM's state-of-the-art product development, manufacturing specific, pilot facility was constructed in 2017 to better support our efforts in bringing new technology to the market. The installed equipment serves all molecular sieve businesses, including our specialty zeolites, and assists the global manufacturing efforts. We are continuing to invest in pilot plant equipment as we advance technology and commercialize new products.



# TECHNICAL SUPPORT

## Global Technical Service and Support

ZEOCHEM's team of highly trained engineers and scientists has decades of experience in process design, performance evaluations, and troubleshooting. Our team provides service and support focused around increasing performance and unlocking new technologies along with conceptual advice and design concepts.

Of increasing importance is the training we can provide to your engineers, supervisors and operators. Let us share our knowledge about the proper operation of adsorption units and their optimization.



## Global Quality System

ZEOCHEM's global manufacturing plants are committed to providing quality products and services. We achieve this by promoting an empowered and responsive, quality-driven culture with the active engagement of all individuals, including top management.

All finished products are analyzed and certified against specifications by our quality control lab, which is independent of the manufacturing operation. We use test methods according to international norms and have also developed proprietary test procedures to ensure our products give the expected performance.

We are in compliance with the standard of international quality system boards (ISO 9001) and with those of scores of critical customers in demanding industries.



## Environmental, Health and Safety (EHS)

We are focused on environmental sustainability, reducing CO<sub>2</sub> and conducting business in a manner that ensures a safe and secure environment for customers, employees, and communities. This is achieved by maintaining an Environmental Management System (EMS) that is continuously improving.

We are committed to a strong safety program that protects our staff and community. Commitment to health and safety is an integral part of who we are. Employees are responsible for following procedures, working safely and, wherever possible, improving safety measures. An injury and accident-free workplace is our goal. This is accomplished by training, adhering to the safety policy and conforming to governmental safety regulations.



This commitment includes the following objectives:

- Complying with environmental laws and policies on local, national and global levels
- Promoting the prevention of pollution
- Conserving natural resources
- Recycling materials and reducing waste
- Adhering to appropriate environmental objectives

## The ZEOCHEM Team

ZEOCHEM has Sales, R&D, and Manufacturing locations throughout the world to better serve our customers. Please contact your local ZEOCHEM sales office or visit [www.zeochem.com](http://www.zeochem.com) for more information.

● Sales ● Manufacturing ● Research & Development



# Investing in the Future

ZEOCHEM is dedicated to investing in our global production facilities and fulfilling your growing needs.



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