An introduction to Hengye Inc.
Adsorbent and Catalyst Manufacturer
The global history of Hengye starts in 1992 in Shanghai, China...

**Shanghai Hengye Enters Public Market**

- **Creating Hengye Inc:** 2014
- **Expands in the US:** 2008
- **Vertical and Horizontal Growth:** 2005
- **Business Diversification:** 2000
- **Entrance Into the US:** 1999
- **Entrance into Global Dynamics:** 1995
- **The Birth of Hengye:** 1992

**Timeline Events**

- 1995: Exports products throughout Asia and other regions.
- 2000: Expands product line to include other adsorbents and chemicals.
- 2005: Implements a logistics company, expands capacity, & acquires an Alumina production facility.
- 2014: Begins active sale of products in the US Market through a distributor.
- 2015: Hengye Inc. offers support from a local perspective & expands the Hengye group. Joins the Chinese stock market as a publicly traded company on October 28, 2015.

...and continues with Hengye Inc.
What we do

Our Products
• One of the first privately-owned Zeolite Manufacturers in China
• In-house Research & Development and product quality testing
• We offer a wide range of adsorbents and catalysts and have the flexibility to manufacture products that meet unique requirements
• One of the highest volume manufacturers in the world
  • Production capacity 38,000 MT per year
• We can supply all the needed materials to fill dehydration units

We Manufacture:
• Molecular Sieve (beads, powder, and pellets)
• Activated Alumina (beads and powder)
• Catalysts
• Support Material

We Supply:
• Silica Gel (beads and granular)
• Silica Alumina
• and more...
Process of Making Molecular Sieve

1. Raw Goods Warehouse
   - Raw Material
   - Quality Control Check
   - Below Quality
   - Rejected

2. Batching

3. Crystal Formation

4. Bead Formation
   - Quality Control Check
   - Drying
     - Screening
     - Activating
     - Screening
     - Large and Small Beads
   - Below Quality
   - Repurposing

5. Finished Goods Warehouse
   - Quality Control Check
   - Large and Small Beads

6. Screening

7. Large and Small Beads
Process of Making Molecular Sieve

- Batching
- Crystal Formation
- Bead Formation
- Quality Control Check
- Finish Goods Warehouse

Flow:
1. Raw Goods Warehouse
2. Raw Material → Quality Control Check → Bead Formation
3. Quality Control Check → Screening → Quality Control Check
4. Bead Formation → Drying → Screen → Quality Control Check
   - Large and Small Beads
5. Repurposing
# Making Sieve Right

## Samples of Quality

*Pulled before drying and activating to evaluate quality*
- Crush strength
- Water adsorption
- Bulk density

*Pulled after third and final screening*
- Physical properties are checked three times to ensure conformity to specifications
- Positive pressure wind used to release dust during activation
- Any material that does not meet specification is promptly rejected and does not enter the finished product warehouse

## Production

- Trial run data used for adjusting Production Control Plan to prevent potential errors, improve techniques, and ensure consistent quality over time
- Different products can have unique production lines to prevent cross-contamination
- Measures taken to ensure quality of raw material for uniformity and reliable quality
- Produce our own crystals and powder in a strictly controlled synthesis process to facilitate uniform crystal growth
## Sample Specification Sheet

<table>
<thead>
<tr>
<th>Molecular Sieve</th>
<th>Standard 4A</th>
<th>Beads</th>
<th>8x12 Mesh</th>
<th>1/8 Inch</th>
<th>1/16 Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property</strong></td>
<td><strong>Unit</strong></td>
<td><strong>4x8 Mesh</strong></td>
<td><strong>8x12 Mesh</strong></td>
<td><strong>1/8 Inch</strong></td>
<td><strong>1/16 Inch</strong></td>
</tr>
<tr>
<td>Diameter</td>
<td>mm</td>
<td>2.5 - 5.0</td>
<td>1.6 - 2.5</td>
<td>3.0 - 3.3</td>
<td>1.5 - 1.8</td>
</tr>
<tr>
<td>Bulk Density</td>
<td>g/mL (lb/ft³)</td>
<td>0.70-0.76 (43.7-47.4)</td>
<td>0.75-0.81 (46.8-50.6)</td>
<td>0.65-0.71 (40.6-44.3)</td>
<td>0.66-0.72 (41.2-44.9)</td>
</tr>
<tr>
<td>Crush Strength</td>
<td>N (lbm*ft/s²)</td>
<td>≥90 (≥20)</td>
<td>≥45 (≥10)</td>
<td>≥80 (≥18)</td>
<td>≥40 (≥9)</td>
</tr>
<tr>
<td>Static Water Adsorption</td>
<td>wt%</td>
<td>≥21.5</td>
<td>≥21.5</td>
<td>≥21.5</td>
<td>≥21.5</td>
</tr>
<tr>
<td>Attrition</td>
<td>wt%</td>
<td>≤0.1</td>
<td>≤0.1</td>
<td>≤0.4</td>
<td>≤0.4</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>wt%</td>
<td>≤1.5</td>
<td>≤1.5</td>
<td>≤1.5</td>
<td>≤1.5</td>
</tr>
<tr>
<td>Packaging Options</td>
<td></td>
<td>Beads</td>
<td>1,000 kg (2,204.6 lb) / Super Sack; 150 kg (330.7 lb) / Drum</td>
<td>1,000 kg (2,204.6 lb) / Super Sack;</td>
<td>125 kg (275.6 lb) / Drum</td>
</tr>
</tbody>
</table>
All Products

**We Manufacture**

**Molecular Sieve**
- Type 3A, 4A, and 5A
- Type 13X, CalciumX, SodiumX, LithiumX
- Carbon molecular sieve

**Activated Alumina**
- Standard grade alumina
- Catalyst grade activated alumina
- Promoted aluminas
- High alumina support material
- Pseudoboehmte

**Catalysts**
- HYZSM5
- Claus catalysts and tail gas units
- Steam methane reforming catalysts
- Nitrogen or Hydrogen generation
- Air purification catalysts

**We Supply**
- Everything required to fill dehydration or purification units!
  - Silica gel
  - Silica alumina
  - Activated Carbon
  - Ceramic support material
  - and more...
- Engineering services for new constructions and existing units
- Turnkey contracting services
Molecular Sieve

**Type 3A**
- Polar solvent drying (ethanol, methanol, etc.)
- Olefin dehydration (ethylene, xylene, etc.)
- Hydrocarbon dehydration (natural gas, etc.)

**Type 4A**
- Commonly used in dehydration applications
- Cryogenic separation of hydrocarbons
- Desiccant air dryers

**Type 5A**
- Acid gas removal
- Gas drying (cracked, synthesis, more)
- Hydrogen purification
- Oxygen concentration

**Type 13X**
- Cryogenic air separation
- Acid gas removal
- Oxygen concentration

**Other Molecular Sieves**
- CalciumX
- SodiumX
- LithiumX
- CMS
- HYZSM5
Activated Alumina

**Non-promoted**
- Bulk dehydration
- Desiccant air dryers
- Water purification
- Natural gas dehydration

**Typical Form**
- Beads (generally 1/16”, 1/8”, 3/16”, 1/4”, 7x14 mesh)
- Powder (including pseudoboehmite)
- 1-ton Super Sack (2,204 pounds)
- 25-kg Bags with liner (55 pounds)

**Promoted**
- Air contaminant filtration
- Sour gas removal
- Mixed C4 stream purification
- Chloride removal

**Differences from Non-promoted**
- Offers special chemical adsorption advantages that non-promoted aluminas cannot
- Can operate at higher temperatures
- Typically cannot be regenerated
Additional Products

**Catalysts**
- Fluid Catalytic Cracking (FCCUs)
- Steam Methane Reforming (hydrogen production)
- Deoxidant catalyst (inert gas purification)
- Sulfur Recovery (Claus and tail gas catalysts)

**Silica Gel**
- White, non-indicating (beads and granular)
- Blue, indicating
- Yellow, indicating
- Specialized silica gels

**Silica Alumina**
- HY-H and HY-W

**Activated Carbon**
- Coconut shell
- Carbon based

**Support Material**
- High alumina support balls
- Ceramic support material
- Filters and screens

**Everything to Fill Purification Units**
- We can provide all materials needed to fill your dehydration units to keep things simple
# Supporting Our Products

## Technical Services

**Engineering Assistance**
- Custom design work for dehydration units and adsorption processes
- New build design capabilities, existing unit bed sizing
- Evaluation of capacity and efficiency
- Spent material analysis

**On-site Services**
- Change-out / Turnkey reload services
- Reload instruction and assistance
- On-site service and support, remote service capabilities available
- Optimization guidance and assistance

## Support Services

**Pricing and Availability**
- Inventory in Shanghai, China; Houston, Texas; and Omaha, NE
- Special pricing for CIF door-to-door
- Direct from manufacturer pricing
- Flexible lead times, able to meet delivery deadlines
- Logistics support and shipping arrangements can be provided
- Credit terms for qualified orders

**Quality**
- Warranties can be granted
- Multiple samples tested from each lot to ensure specifications are met and/or exceeded
Gas Processing & LNG

**Dehydration**

**Molecular Sieves – WateRyd**
- Natural Gas Dehydration (<0.1ppm)
- Cryogenic Natural Gas Liquids extraction
- Liquefaction, Cryogenic separation
- Import and Export Terminals, Peak Shaving

**Sulfur Removal**

**Various Adsorbents – SulfuRyd**
- Molecular sieves and activated aluminas
- Acid Gas Removal, Sweetening
- Increase value of product stream
- Meet environmental regulations

**Mercury Removal**

**Molecular Sieves – MercuRyd**
- Improve safety, protect Cold Box
- Increase value of product stream
- Meet environmental regulations

**Nitrogen Rejection**

**Various Adsorbents – MercuRyd**
- Molecular sieve and activated carbons
- Increase value of product stream
- Improve transportation efficiency

**Hydrocarbon Dew Point Control (DPCUs)**

**silica alumina products – HY-H and HY-W**
- Reduces hydrocarbon and water dew points
Refining

Steam Methane Reforming
Hydrogen Production – HydroFlo
• Specialized catalyst for producing high purity hydrogen streams
• Offers a high single-pass conversion rate to increase the efficiency of your operation

Catalytic Reforming
Chloride Adsorbents – ChloriClear
• Adsorbents with high HCl adsorption capacity for use in chloride traps
• Minimizes polymer formation and adsorbs chlorides that damage equipment

Isomerization
Molecular Sieves
• Adsorbents for dehydrating and purifying feed streams prior to refining processes

Refining Catalysts
Catalysts and Adsorbents
• Methanol-to-Gasoline (MTG)
• Hydrocarbon isomerization and alkylation
• Syngas production (HyCO)

Fluid Catalytic Cracking (FCCUs)
• HYZSM5
• Pseudoboehmite
Air Purification Applications

**Cryogenic Air Pre-purification Processes**
- Molecular sieves remove water, carbon dioxide, etc. to prevent freezing in cryogenic separation processes

**Oxygen Purification**
- Molecular sieves for concentrating oxygen streams with purities above 90%
- Industrial air, pneumatic equipment, breathing oxygen, and more...

**Hydrogen Purification**
- Molecular sieves and catalysts for generating high purity hydrogen streams

**Nitrogen Purification**
- Adsorbents and catalysts for creating high purity nitrogen streams

**Desiccant Air Dryers**
- Adsorbents for removing water and other impurities from compressed air in desiccant dryers

**Air Purification Products**
- Molecular sieves
  - Type 5A
  - Type 13X
  - SodiumX
  - LithiumX
  - CMS
- Catalysts
- Activated carbon
- and more…
Additional Applications

Ethanol Production
Molecular Sieve – EthaDry
• Specialized Type 3A that minimizes the undesirable adsorption of ethanol molecules

Sulfur Recovery Units (SRUs)
Claus Catalysts – SulCat Series
• Standard catalyst
  • high alumina content catalyst
• Hydrolyzing catalysts
  • promoted catalyst
  • titanium dioxide blended catalyst
  • high TiO₂ content catalyst

Tail Gas Units (TGUs)
Tail Gas Catalysts – SulCat Series
• Tail gas hydrogenation catalyst

Petrochemicals
Olefin Dehydration – OleCleanse Series
• Molecular sieves for dehydrating various olefin cracked gas streams
• Specialized products depending on feed stream: ethylene, butylene, propylene, etc.

Olefin Purification – SulfuRyd
• Acid Gas Removal

Other Applications
• Siloxane removal from landfill gas
• Biofuel purification
• Air breather desiccant
• Insulating glass
• Paint, coatings, polymers, etc.
Connect with Hengye...

Toll-Free: +1 (844) 308-3271
Houston: (832) 288-4288
Fax: (832) 288-4230
Email: info@hengyeinc.com
11999 Katy Freeway, Suite 588
Houston, Texas 77079 USA