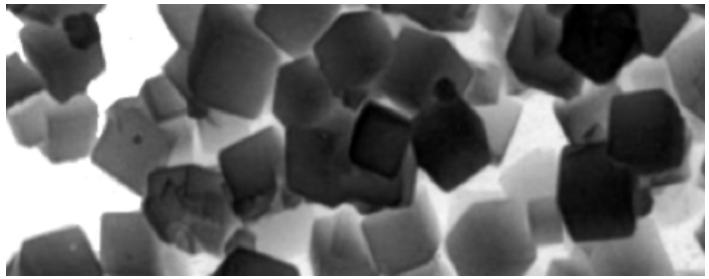
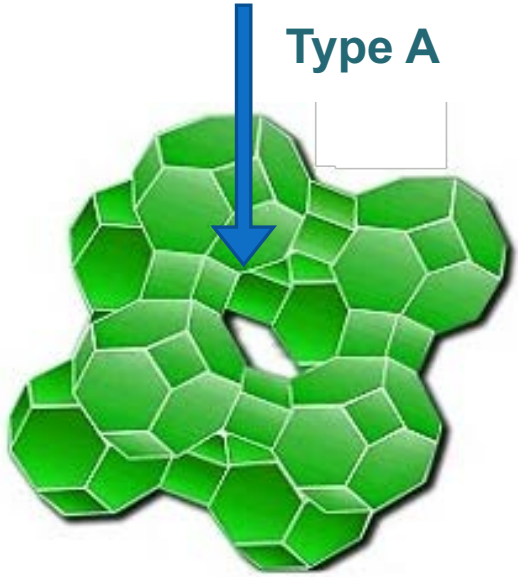
What is Molecular Sieve?



- also called zeolite and mole sieve
- tiny, hollow crystals that separate smaller molecules from larger molecules
- able to selectively adsorb molecules due to pore diameter of the crystals
- used in dehydration units or beds

Water Molecule size = 2.8A
Molecular Sieve Pore size = 3A
Ethanol Molecule size = 3.6A



Things to Avoid

NO WET FEED

- keep feed stream more than 50˚F above the condensation temperature of the feed composition
- liquid phase water coats sieve beds and prevents adsorption

PRESSURE CHANGES

- sudden or extreme pressure changes should be avoided
  - causes fluidization in the bed
  - primary cause of bead break up
- Valve Maintenance
  - Protect against pressure surges

pH LEVELS

- extreme pH levels can melt sieve
- avoid strong acids and bases
- Clean in Place (CIP) liquids must not be exposed to sieve beds

CONTAMINATION

- avoid organic contaminants in sieve beds
- coking – have you ever seen old beads with black spots?

Always pay attention

SYMPTOMS OF BAD BEADS

- frequent filter changes
  - caused by dust in system
  - beads break and crack over time
- high regeneration proof
  - caused by loss of adsorption capacity
- rapid changes in *Pressure Drop*
  - can be caused by wide bead distribution
  - broken and cracked beads cause irregularities
  - reductions of *Cycle Times*

Always pay attention

REMEMBER

- keep units topped off
- take care of the system
- keeping records of your day to day is vital
- follow proper plant maintenance
- you can ask for help and advice, there's always opportunity to optimize your process
- production can almost always be increased
- costs can be reduced
- questions are always welcome

OPTIMIZATION

- use minimum heat, high enough to avoid liquid phase "super heat" >50˚F
- safe maximum pressure on valves
- highest possible feed rate, but still meets required ethanol purity
- material with enough strength to withstand harsh conditions
- minimize mass transfer zone to increase output per cycle