



MOLECULAR SIEVES + ACTIVATED ALUMINA ADSORBENTS

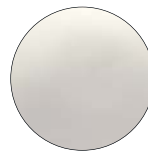
ASGE stocks UOP MOLSIIV™ 3A, 4A, 5A, 13X beads, pellets, activated powders and Activated Alumina A-201 and D-201



Beads



Mesh



Powder



Pellets



Spheres

Uop

A Honeywell Company

UOP MOLSIV™ Molecular Sieve and Activated Alumina Adsorbents marketed and distributed by Advanced Specialty Gas Equipment (ASGE) are available for shipment from our New Jersey warehouse for immediate delivery within 24 hours of ordering. Synthetic adsorbents manufactured by UOP are used in a broad spectrum of applications ranging from plastic resin drying, polymer formulations, industrial gas purification and air separation.



ADSORBENT PRODUCTS

Product	Type	Form	Package Sizes (lbs)
Molecular Sieve	3A	Powder	1/2, 2, 12, 30, 200, 1200 (24 bags)
	3A	Pellets	1, 5, 25, 50, 300
Molecular Sieve	4A	Powder	1/2, 2, 12, 30, 200, 1200 (24 bags)
	4A	Pellets, Beads, Mesh	1, 5, 25, 50, 300
Molecular Sieve	5A	Powder	1/2, 2, 12, 30, 200, 1200 (24 bags)
	5A	Pellets	1, 5, 25, 50, 300
Molecular Sieve	13X	Powder	1/2, 2, 12, 30, 200, 1200 (24 bags)
	13X	Pellets, Beads	1, 5, 25, 50, 300
Activated Alumina	A-201	Spheres	1, 5, 25, 50, 300
	D-201	Spheres	1, 5, 25, 50, 300

MOLECULAR SIEVE DESICCANT APPLICATIONS

Product Formulation

UOP is the world's largest supplier of activated molecular sieve powders for formulating and compounding applications. Activated powders provide moisture removal to extremely low levels with high adsorption capacity. Unlike chemical drying agents, these adsorbents function by a physical process only, so no reaction by-products are formed that can adversely affect product properties. MOLSIV powders can be added to plastic formulations to physically adsorb odor-source molecules that are generated from polymer oxidation, migration of external contaminants, or dissolution of additives.



Coating, Adhesive, Sealant and Elastomeric Treating (CASE): Molecular sieve powders remove moisture from epoxies, coatings, adhesives, sealants, elastomers, metal rich paints to eliminate curing problems such as CO₂ off-gassing, blistering and degradation of other physical properties.

Vinyl Based Foam Dehydration: Molecular sieve powders dehydrate to eliminate pinholes and blemishes on vinyl surfaces during high-temperature curing.



Polymers: Molecular sieve powders have been proven effective for their ability to reduce taste and odor problems in injection and extrusion blow-molded containers, tie-layer and sealant polymers, extrusion coatings and multi-layered packaging.

Industrial Gas Purification + Air Separation



High purity industrial gases such as O₂, N₂, H₂ and CO are produced in a variety of ways. UOP's MOLSIV adsorbents play an essential role in these processes because of their high adsorption selectivity and capacity. In addition, UOP's aluminas are often used for dehydration applications.

H₂ & CO Production: Molecular sieves remove water and CO₂ to prevent freezing in downstream cryogenic separation processes.

O₂ & N₂ Production: Molecular sieves remove water and CO₂ from compressed air to prevent freezing in downstream cryogenic separation processes.

H₂ Production: Molecular sieves remove impurities such as hydrocarbons, CO and N₂ from gas phase H₂ production.

Dehydration: Spherical activated aluminas are used for dehydration systems as in pressure swing adsorption systems.

Packaging + Storage

Molecular sieves physically adsorb water molecules, reducing water concentration levels to less than 1 ppm in many applications. MOLSIV adsorbents are incorporated directly into plastics packaging and used in desiccant dehumidifiers (dry boxes) to protect moisture-sensitive contents.

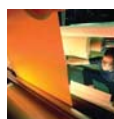


Packaging: Molecular sieves are added to protect products such as pharmaceuticals, batteries, film, fuel propellants, machine parts and electronic components. The selective adsorption characteristics of molecular sieves can be useful when it is necessary to dry a package without removing other desirable compounds from a system.

Storage: Molecular sieve are used in cabinets and enclosures as desiccants to trap airborne moisture. Common applications include the prevention and protection against oxidation (rust), growth of fungus on optics, the preservation of lab materials and protection of moisture sensitive devices.

Air Drying

Compressed air is dried for use with plastics processing, air brakes, sterile environments, sensitive instruments, packaging and other critical process operations. UOP's MOLSIV adsorbents play an essential role in these processes because of their high dew point depression and dynamic drying capacity. High strength and attrition resistant characteristics guarantee thousands of cycles under extreme conditions over a long lifetime.



Plastic Resin Drying: Molecular sieves are used in desiccant dryers to dry hygroscopic plastic resins for applications such as PET pre-form molding, high-volume extrusion of sheet and film, or large part injection molding. Because of their high affinity for moisture at very low dewpoints, molecular sieve desiccant dried air can produce dewpoints of -40°F and lower.

Instrument Air Drying: Molecular sieves are used in desiccant dryers to produce instrument grade air from compressor air.



Brake Air: Molecular sieves are used in heavy and medium-duty truck, bus, and train air brakes as self-renewing dehydrators. Dehydrating the compressed air keeps the brake lines from freezing and corroding.

Specialty Air Applications: Molecular sieves are used to dry air for use in pharmaceutical, electronic and food packaging applications.

MOLECULAR SIEVE CHARACTERISTICS

Type	Nominal Pore Diameter Angstroms	Form	Bulk Density lb/cu-ft	Heat of Adsorption (max) btu/lb H ₂ O	Molecules Adsorbed*	Molecules Excluded
3A	3	Powder 1/16" Pellets 1/8" Pellets	35 40 40	1800	Molecules with an effective diameter <3 angstroms including H ₂ O and NH ₃	Molecules with an effective diameter >3 angstroms (ethane)
4A	4	Powder 1/16" Pellets 1/8" Pellets 8 x 12 Beads 4 x 8 Beads 14 x 30 Mesh	32 44 44 44 44	1800	Molecules with an effective diameter <4 angstroms including H ₂ O, CO ₂ , SO ₂ , C ₂ H ₄ , C ₂ H ₆ , and C ₃ H ₆	Molecules with an effective diameter >4 angstroms (propane)
5A	5	Powder 1/16" Pellets 1/8" Pellets	32 44 44	1800	Molecules with an effective diameter <5 angstroms including n-C ₄ H ₉ OH, n-C ₄ H ₁₀ , C ₃ H ₈ to C ₂₂ H ₄₆ , R-12	Molecules with an effective diameter >5 angstroms (iso compounds and all 4-carbon rings)
13X	8	Powder 1/16" Pellets 1/8" Pellets 8 x 12 Beads 4 x 8 Beads	27 40 40 40 40	1800	Molecules with an effective diameter <8 angstroms including C ₆ H ₆ , C ₇ H ₈	Molecules with an effective diameter >8 angstroms (C ₄ F ₉) ₃ N

*Each type adsorbs listed molecules plus those of preceding type.

ACTIVATED ALUMINA CHARACTERISTICS

Type	Form	Nominal Size (in.)	Mesh Size (Tyler Screens)	Loss on Ignition wt-%	Surface Area (m ² /g)	Bulk Density Packed (lb/ft ³)	Applications
A-201	Spheres	3/16 1/8 1/16	3 x 6 Mesh 5 x 8 Mesh 7 x 12 Mesh	6	350	46	Widely used in all drying applications
D-201	Spheres	3/16 1/8 1/16	3 x 6 Mesh 5 x 8 Mesh 7 x 12 Mesh	5	350	47	Recommended for harsh mechanical conditions due to high abrasion resistance