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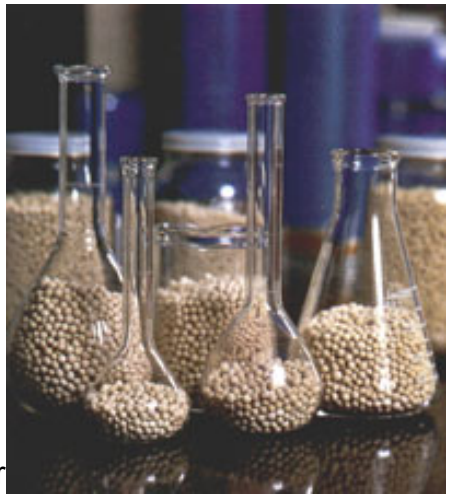
1. Molecular sieve



Molecular sieve (also called as synthesized zeolite) is a kind of silica-aluminates with micro-porous crystal. It is a frame-work which is constructed by SiO_2 and Al_2O_3. Molecular sieve has very similar aperture value (only several A) and large surface area. There are relevant positive ions in its lattice to balance the negative ions in the crystal frame. Different molecular sieves have different shapes and different aperture values. We could separate different kinds of molecular by selectively using different molecular sieves. Water is a sort of polar molecule, molecular sieve type A has dramatic affinity for water. For the above reasons, molecular sieve is considered as the most ideal desiccant. The molecular sieve here mentioned is type 3A which is only for adsorbing water. The water adoption depth of molecular sieve 3A is above several dozen times higher than other any other applicable desiccants.

2. Molecular sieve 3A

Most molecular sieves have been affinity to water, such as other molecular sieve 4A, 5A, 13X, type Y and so on. They all also adsorb other molecules from air. The pore of molecular sieve 3A is 3 angstrom, which can only adsorbs molecule smaller than this size, water molecule is just meet this size, so molecular sieve 3A can only adsorb water other than Nitrogen and Oxygen in air.

The following form lists 4 types of common desiccants often used in IG and their aperture values. This form also shows which kinds of molecules are likely to be absorbed by these desiccants.

Desiccant Type	Pore Size (angstrom)	Absorb Substances	Repel substances
3A	3	H_2O	All others
4A	4	H_2O, nitrogen	Ar, Kr, large molecule gases

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13X	8.5	H_2O, most gases, small molecule liquids	Large molecule liquids
Silica gel	200-300	All	Non

3. Molecular sieve 3A and insulating glass desiccant

If use other molecular sieve as desiccant, these molecular sieves can also adsorb nitrogen or oxygen in air at lower temperature, and could release air at higher temperature, the inflated and shrinking air could cause window to be distorted with the temperature changing at day-night or seasons changing. Up to now, molecular sieve 3A is the unique proper desiccant which is suitable for insulating glass unit.

4. Natergy sieve (insulating glass desiccant)

3A insulating glass (IG) desiccant (Natergy sieve) is made from molecular sieve 3A. This IG desiccant can deeply co-adsorb resident moisture and organics in insulating glass, keep the IG clear and transparent even at very low outside temperature, prevent the condense of inside vapor. More importantly, it can resolve the problem of window distortion caused by IG inflation and shrinking under season or day-night temperature changing; this would prolong the life span of IG windows considerably.

5. Technical parameter

Molecular formula：$0.4K_2O \cdot 0.6Na_2O \cdot Al_2O_3 \cdot 2SiO_2 \cdot 4.5H_2O$

Item	Unit	Target		
Diameter	mm	0.5-0.9	1.0-1.5	1.5-2.0

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Bulk density	g/ml	≥0.68	≥0.68	≥0.68
Size ratio up to grade	%	≥98.0	≥98.0	≥98.0
Water adsorption capacity (Effective)	%(RH60%, 25℃)	≥19(18)	≥19(18)	≥19(18)
	%(RH10%, 25℃)	≥16.5(15)	≥16.5(15)	≥16.5(15)
Delta T value	℃(25g sieves / 25ml H_2O)	≥50	≥45	≥45
	℃(10g sieves / 10ml H_2O)	≥38	≥35	≥35
Nitrogen adsorption	ml/g	≤1.0	≤1.0	≤1.0
Dew point	℃	≤-60	≤-60	≤-60
Dust drops	unit	≤15	≤12	≤12
Ignition loss	%(950℃)	≤2	≤2	≤2

6. Parameter analysis of molecular sieve 3A

1) Size ratio up to grade（mm,%): Size ratio is controlled up to 98%, higher value means better screen distribute. Bigger size molecular sieve is suitable for manual filling and the smaller one is suitable for automatic machine filling.

2) Moisture adsorption capacity (MAC)（mg/g,%): The MAC is positively correlated to the quality of molecular sieve at a certain relative humidity and temperature. The prerequisites here are relative humidity and temperature which are very important for testing MAC. Only higher MAC at low relative humidity can demonstrate the drying ability of molecular sieve, this parameter affects delta T value.

3) Compression strength (N/Unit): If the compression strength of molecular sieve is too low, the molecular sieve will be crushed or powered at the transportation or be filled in the IG spacers, which would cause serious quality problem.

4) Bulk density (g/ml): This parameter is only for customer reference.

5) Dust drops (unit): this parameter is much sensitive for customer; the important thing is to unify the testing method. Sometimes low dust drops value can not tell low dust drops, because testing method is different. Less dust drops

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means more clean of molecule sieve. It is very important to keep IG clean after installation and protect the auto filling machine.

6) RMC (%): Also called resident moisture content. The less RMC in molecular sieve means the better dew point control. Less RMC level indicates better dew point level, and also higher delta T value.

7) Delta T value (℃): The molecular sieve would release heats when it absorbs water. This parameter shows how much temperature would increase, when certain molecular sieve adsorbs water under certain condition. As the process of water adsorption is a heat releasing process, the momentary delta T value can be used as a method to judge adsorption rate of molecular sieve. At the same test method, the higher the momentary delta T value is, the stronger the water adsorption efficiency is. The higher delta T value can guarantee the ideal dew point of the IG.

There are several factors influencing delta T value:

A) Testing method

a) Related with the quantity of sample, for example 10g sieve/10gml water is different from 25g sieve/25ml water. The former one is low in value.

b) Related with the shape and material (weather or not suitable for heat releasing) of the measuring vessel.

c) Related with the sensitivity of thermometer, a more sensitive thermometer could get a more accurate and higher result.

B) Related with the absorption speed of molecular sieve. The higher of the absorption speed will contribute to a higher Delta T value.

C) Related with the RMC of molecular sieve. The delta T value becomes higher as adsorption occurs more severely because of the low moisture content.

D) Related with the moisture (water) adsorption capacity (MAC) of molecular sieve. If the MAC is higher, the effective moisture (water) adsorption capacity is higher, which will cause a higher delta T value.

E) Related with the substantial of the desiccant, the material that has a high delta T value may be not the real molecular sieve, just as CaO.

7. Attention

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Do not unpack the goods until using.

Avoid exposure in air for a long time. The desiccant should be stuffed as rapidly as possible during filling spacer.

If one package is not used up, the surplus desiccant should be airproofly sealed.

The end user should know how to test the molecular sieve, especially delta T and Nitrogen release.