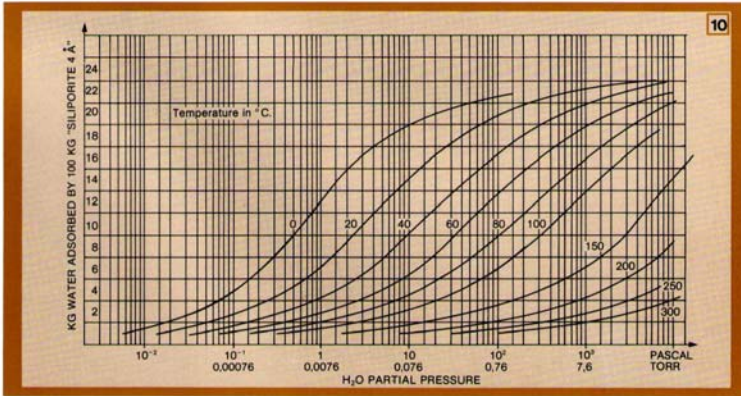


STATIC AND DYNAMIC ADSORPTION CAPACITY

Molecular Sieves data sheets usually mention the adsorption capacity of water at a certain water concentration, partial pressure or relative humidity and a certain temperature. This value is obtained by leaving the adsorbent during several days under controlled conditions and measuring its weight increase.



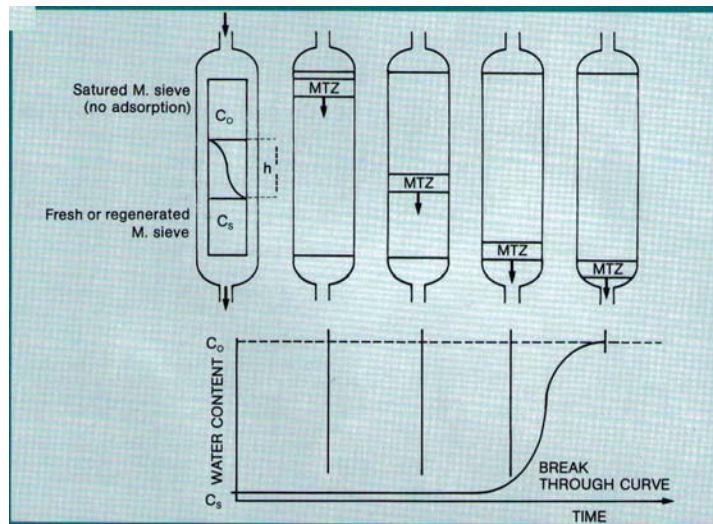
The value obtained is the STATIC adsorption capacity. The water adsorbed on the sieves is in equilibrium with the water partial pressure (concentration) in the gas phase.

For 4A sieves these values are in the range of 22-23% at 25°C (77°F) and 11.88 mmHg (0.23 psi) water partial pressure.

Other values for the STATIC adsorption capacity can be obtained by isotherms. See above diagram shows the isotherm for water on a 4A molecular sieve.

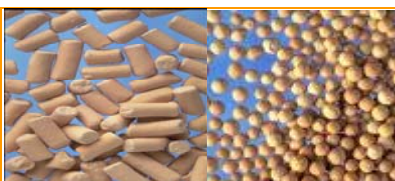
In industrial molecular sieve units the DYNAMIC (or OVERALL ADSORPTION) capacity is more important. Its value can be calculated by taking the amount of water adsorbed on an adsorbent bed and by dividing it by the quantity (mass) of the adsorbent bed. Its value is different for every unit as it depends on the design.

Why is there a difference between STATIC and DYNAMIC adsorption capacity? The DYNAMIC adsorption capacity takes into account that only a part of the bed, the equilibrium zone (EZ) is saturated. Another part, the mass transfer zone (MTZ), where the gas is dried to the specifications, is only partially saturated. There might be a third part of fresh sieve, entirely unsaturated, if the unit works with a fixed adsorption time. This part will serve for drying once the EZ and MTZ are aged and have lost in adsorption capacity.



Typical values for a DYNAMIC adsorption capacity for gas drying would be in the range of 11-13%. For liquid drying about 10-12%.

If you wish to know more about vessel loading preparation, be sure to read the next issue of the "On-Spec" Newsletter...



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