

## Pore Size Distribution Characterization of 5A Molecular Sieve

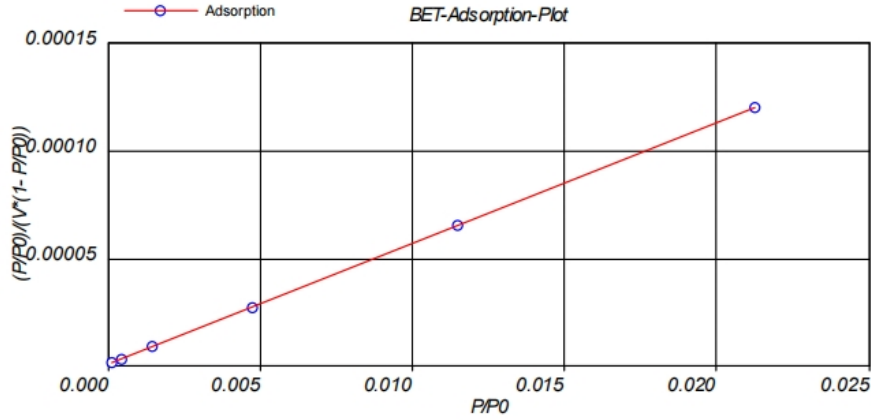
5A molecular sieve is a kind of calcium-type aluminosilicate with cubic lattice structure, also known as CaA-type zeolite. 5A molecular sieve has developed pore structure and excellent selective adsorption, which is widely used in the separation of n-isomerized alkanes, the separation of oxygen and nitrogen, as well as natural gas, ammonia decomposition gas, and the drying of other industrial gases and liquids. 5A molecular sieve has an effective pore size of 0.5 nm, and the determination of the pore distribution is generally characterized by gas adsorption using a physical adsorption instrument. The effective pore size of 5A molecular sieve is about 0.5 nm, and its pore size distribution is generally characterized by gas adsorption using physical adsorption instrument.

The specific surface and pore size distribution of 5A molecular sieves were characterized by CIQTEK EASY-V series specific surface and pore size analyzers.

Before testing, the samples were degassed by heating under vacuum at 300°C for 6 hours. As shown in Fig. 1, the specific surface area of the sample was calculated as 776.53 m<sup>2</sup>/g by the multi-point BET equation, and then the microporous area of the sample was obtained as 672.04 m<sup>2</sup>/g, the external surface area as 104.49 m<sup>2</sup>/g, and the volume of the microporous as 0.254 cm<sup>3</sup>/g by t-plot method, which showed that the microporous area of this molecular sieve accounted for about 86.5%. In addition, the analysis of the N<sub>2</sub> adsorption-desorption isotherm plot of this 5A molecular sieve (Fig. 2, left) reveals that the adsorption isotherm shows that the adsorption amount increases sharply with the increase of the relative pressure when the relative pressure is small, and the filling of micropores occurs, and the curve is relatively flat after reaching a certain value, which suggests that the sample is rich in micropores. The microporous pore size distribution calculation using the SF model (Fig. 2, right panel) yielded a concentrated microporous pore size distribution at 0.48 nm, which is consistent with the pore size of 5A molecular sieves.

**Analysis Information**

<b>Mass:</b> 0.10480 (g)	<b>Pretreatment:</b> 300°C,6h
<b>Method:</b>	
<b>Adsorption Temp.:</b> -196°C	<b>Multi-BET:</b> 776.526411 (m <sup>2</sup> /g)
<b>Analysis Time:</b>	

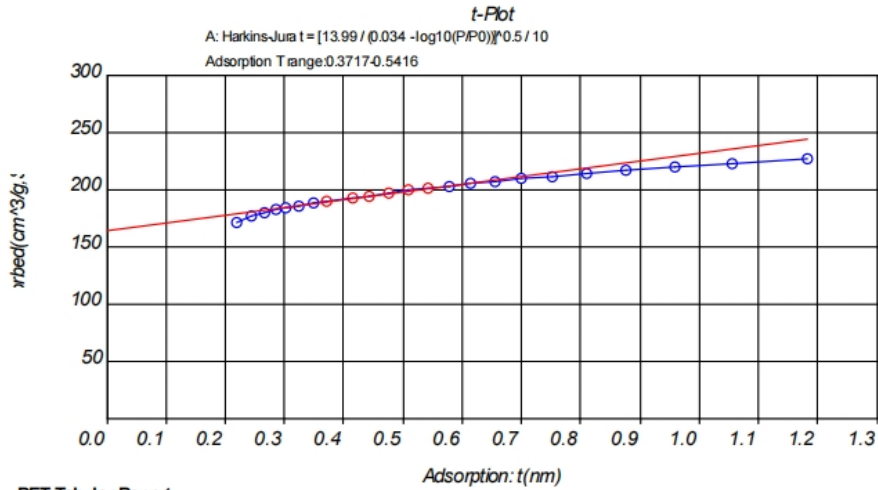


**BET Tabular Report**

$P/P_0$	Quantity Adsorbed(ml/g)	$(P/P_0)/(V*(1-P/P_0))$	Single point BET
0.021254493165	181.963248861783	0.000119343093	775.157336524012
0.011499758952	179.631183158989	0.000064763487	772.849460515844
0.004730404694	176.186790253414	0.000026976414	763.221294014468
0.001450234674	170.978240584403	0.000008494303	743.099477291488
0.000438107087	164.540068695904	0.000002663783	715.842968255074
0.000144451287	158.004709803866	0.000000914353	687.612387161362
<b>Slope</b>	<b>Intercept</b>	<b>Vm(ml/g)</b>	<b>C Value</b>
0.005604780588	0.000000278133	178.410262889449	20152.439593442261
<b>R</b>	<b>Multi-BET Area</b>	<b>Langmuir Area</b>	<b>Point selection mode</b>
0.999996259726	776.526410749899	792.967154537108	Manual point selection

**Analysis Information**

<b>Mass:</b> 0.10480 (g)	<b>Pretreatment:</b> 300°C, 6h
<b>Method:</b>	
<b>Adsorption Temp.:</b> -196°C	<b>Micro vol.:</b> 0.253986 (ml/g)
<b>Analysis Time:</b>	



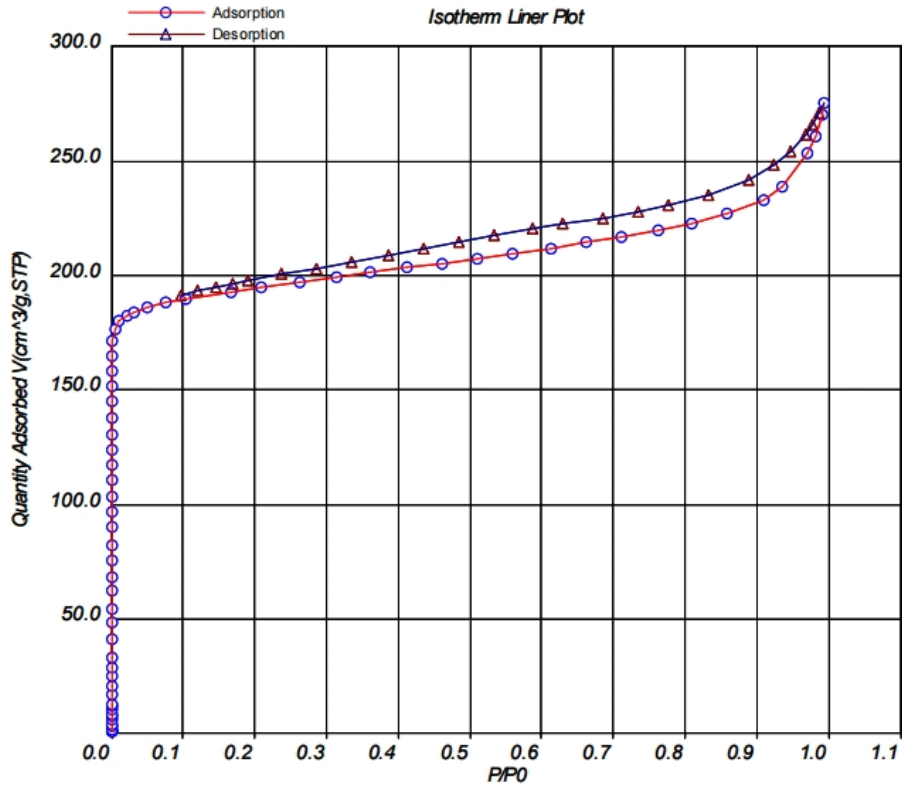
**BET Tabular Report**

P/P0	Adsorbed thickness(nm)	Quantity Adsorbed(ml/g)			
0.360582	0.541566	200.618642			
0.313174	0.509837	198.639936			
0.262043	0.476705	196.544639			
0.209115	0.442769	194.277739			
0.166188	0.414721	192.252562			
0.105082	0.371721	189.132770			
Slope	Intercept	C	Micro Vol.(ml/g)	Micro Area(m <sup>2</sup> /g)	External Area(m <sup>2</sup> /g)
67.551079	164.201068	0.999392	0.253986	672.038401	104.488010

**Fig. 1 Specific surface area test results (left) and t-Plot results (right) of 5A molecular sieve**

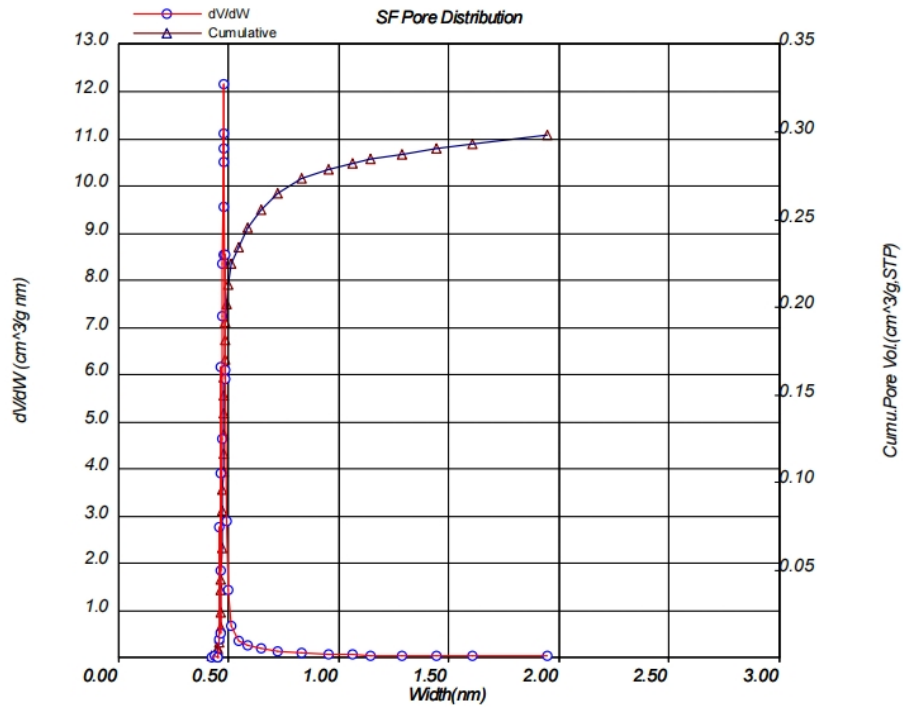
Analysis Information

Mass:	0.10480 (g)	Pretreatment:	300°C,6h
Method:			
Adsorption Temp.:	-196°C		
Analysis Time:			



**Analysis Information**

Mass:	0.10480 (g)	Pretreatment:	300°C,6h
Method:			
Adsorption Temp.:	-196°C	Median Pore:	0.47711 (nm)
Analysis Time:			



**Fig. 2 N<sub>2</sub>-sorption and desorption isotherms (left) and SF-pore size distribution plots (right) of 5A molecular sieve samples**