POROCheck Application Note   No. 01

Pore Size Investigation of Catalyst Supports

Many catalysts are deposited on substrates to improve catalyst handling and ease their removal from the reaction mixture. However, the catalyst support should not hinder access of the reactants to the catalyst site or interfere in any other way. Therefore highly porous inorganic matrices have been used. The quality of the support will depend on pore size, pore size distribution, pore volume and the accessibility of reactants into the pore structure (architecture effect). In this work two different inorganic matrices have been studied optimum suitability.

POROCheck detects big differences in the samples which were selected as catalyst supports. Fig. 1 shows the overlay of the pore size distribution.

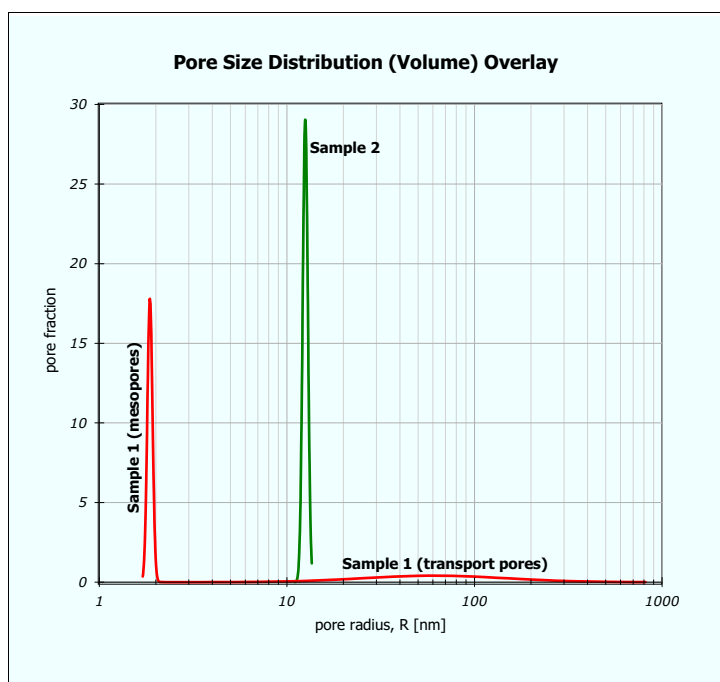| Equipment & Experimental Conditions:	
Instrument:	PSS AT-System
Eluent:	THF
Standards:	PSS Polystyrene Kit
Detection:	UV @ 254 nm
Processing:	PSS WINGPC (Acq.)
	PSS POROCheck

Fig. 1:   Overlay of pore size distributions determined by PSS POROCheck

Obviously, sample 1 has very large and very small pores and is not well suitable for the homogeneous deposition of the catalyst. Sample 2 performs very well in the application, because of the uniform nature of the pores and their correct pore size.

This is just on of the many graphical representations PSS POROCheck generates from results. This makes it very simple to find important parameters and do comparisons.

Detailed analysis of sample no. 2 (cf. results in following table) shows that this sample also has a high pore volume. An important parameter is also the optimal size (or molar mass) of a guest molecule which must diffuse into the porous structure in order to undergo the reaction.

PSS Pore Size Analysis Results

Pore volume fraction:	0,453
Pore surface / pore volume	159,8 ± 14,1 m²/ml
Average pore radius	13,1 ± 1,1 nm
Width of the PSD	0,0 ± 1,4 nm
Optimal guest molecule size	5,0 nm
Optimal guest molar mass	23400 D