

Catalysts

Efficient measurement of diameter, length and surface area



What are catalysts?

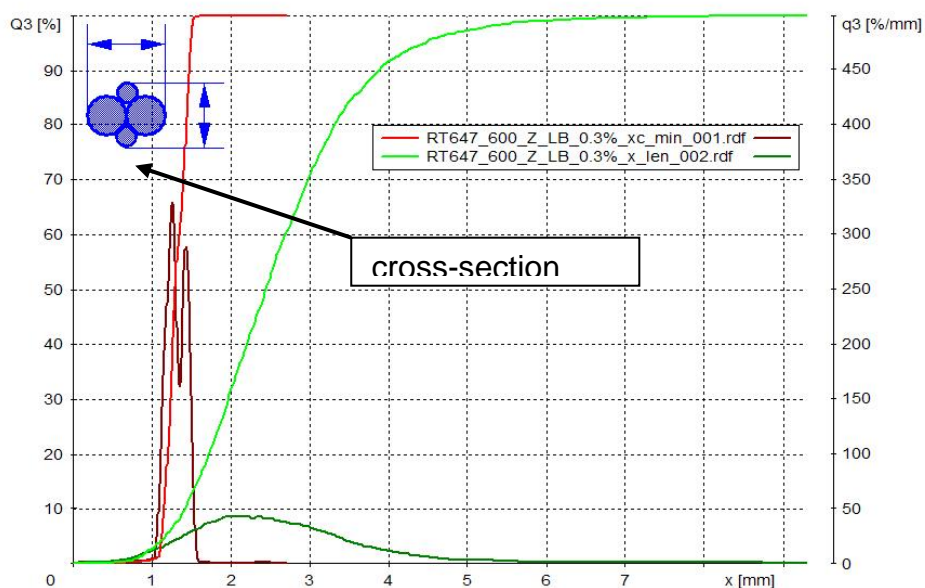
Catalysts are widely used in the pharmaceutical and chemical industry, especially in petrochemistry¹. They are able to accelerate chemical reactions by lowering the activation energy, i.e. they change reaction kinetics. Thus, using catalysts in industrial processes has the advantage of higher productivity at shorter time combined with less energy consumption. Catalysts are therefore involved in more than 80% of all processes in the chemical industry. Depending on

the processes taking place in the reactor, catalysts can be made of very different materials like ceramics, Al_2O_3 , zeolites, metals or alloys. They are spheres of up to 10 mm diameter or elongated extrudates with a round, ellipsoidal, tri- or quadrolobal cross-section.

The size and shape of the catalyst particles is crucial for the efficiency of a chemical process in a reactor column, as the available reactive surface area and free volume depend on these properties. Production and refurbishment of catalyst materials therefore requires precise and fast measurement of size and shape, amounts of broken particles, surface area, and relative density. The CAMSIZER replaces time-consuming measurements with sieves and calipers or microscopes, and enables better statistics and objective, reproducible results.



Particle Analysis of catalysts



¹ Petrochemistry is the branch of chemistry that studies the transformation of crude oil (petroleum) and natural gas into useful products and raw materials.

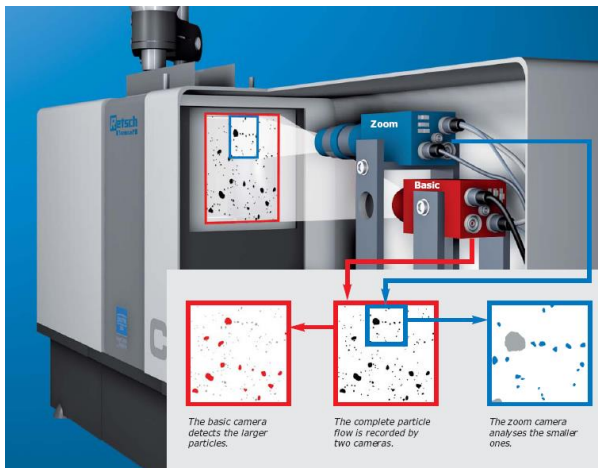
Size analysis of catalysts has to provide information on width, length and length distribution of the particles and has to show the amount of dust in the sample. The CAMSIZER by Retsch Technology offers a particularly easy and reliable measurement with digital image analysis.

The graph shows the measurement results of a catalyst sample: the green curve represents the length distribution of the rod-shaped catalysts; the red curve represents the width distribution. The width distribution shows two maxima due to the quadrolobal cross-section of the material.

Benefits at a glance

- Reliable measurement of various parameters (e.g. shape, length distribution)
- Short measuring time
- Easy to use

Measuring Principle



The patented measuring setup of the CAMSIZER – two digital cameras as an adaptive measuring unit – improves and optimises particle analysis by digital image processing. Therefore, it is possible to measure a wide range of particles from 30 µm to 30 mm with extreme accuracy, **without having to switch measuring ranges or make adjustments**. The sample is fed in from the feed channel so that all particles fall through the measurement field. During the measurement procedure the two digital cameras (CCD) perform different tasks. The basic camera (CCD-B) records large

particles, the zoom camera (CCD-Z) records the small ones. The contact-free optical measurement is carried out in real time and simultaneously obtains all the required information about particle size and particle shape. A modularly configurable online version of the instrument has been developed to allow automated measurements to be conducted continuously.

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