

SILICA

Protocol number: M130031

Industry: Chemistry

Feed Size: < 30 μm

Characteristics: hellbeiges Pulver, aufgrund der Feinheit schon klumpiger rieselnd.

Desired Fineness: $d_{50} < 360 \text{ nm}$; ($d_{50} < 100 \text{ nm}$ desired)

Quantity: 100 g

Recommendation: We recommend grinding the sample with a Planetary Mono Mill PULVERISETTE 6 classic line. Desired endfineness cannot be achieved with such high amounts. Only $d_{50} < 360 \text{ nm}$ can be reached rapidly.

Result 1



PLANETARY MILL PULVERISETTE 5 CLASSIC LINE WITH 2 GRINDING BOWL FASTENERS

main disk speed: 400 rpm

250 ml bowl made of zirconium oxide (ZrO_2)

+ 400g of 1 mm \varnothing ZrO_2 grinding balls.

Feed quantity: 60 g

Feed Size: < 30 μm

Additive: + 45ml water (H_2O)

Grinding time: 60 min

Final fineness: $d_{50} < 360 \text{ nm}$

Comments: In our first trial, we wanted to testify grinding results of higher amounts with our classic line mills.

60g of sample have been ground in a 250ml bowl. It is necessary adding ~ 45ml of water to maintain motor oil like viscosity for optimum

grinding result. It might be possible grinding up to 80-100g per bowl as well.

To avoid overpressure, we ground the sample in steps of 5 minutes, followed by a programmed pausing time of 10 minutes. After several cycles, the outside temperature of the bowl should be checked (remain below 80°C); grinding time or programmed pausing time might be readjusted afterwards.

After 15 minutes of grinding in suspension, fineness has been checked with our Laser Particle Sizer ANALYSETTE 22 NanoTec plus (see meas. no. 62042 on separate page); $d_{50} < 819\text{nm}$ has been achieved.

After 30 minutes of grinding, a $d_{50} < 452\text{nm}$ has been found (see meas. no. 62053). After a total grinding time of 60 minutes, d_{50} of $< 360\text{nm}$ has been reached. By longer grinding time, d_{50} value will become lowered only minimal. For this, we recommend interrupting the grinding process after maximum 60 minutes.

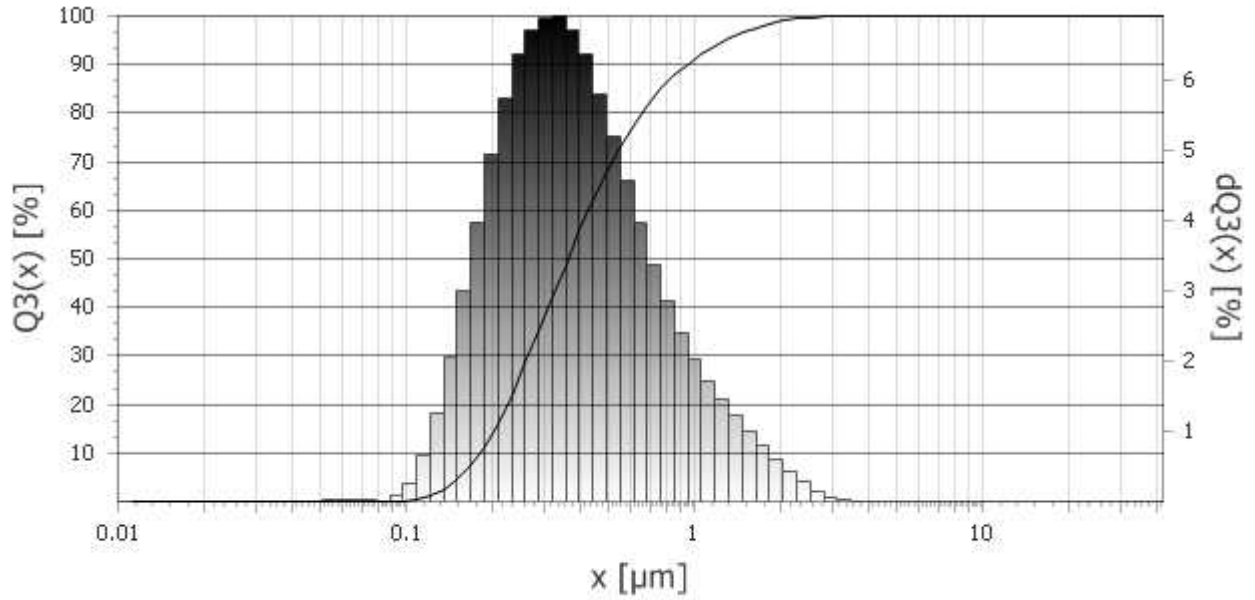
Probably a better grinding success will be achieved when solvents will be used with less surface tension. Also change in pH-value or a adding of grinding agents (salts or tensides might influence the result).

For 100g of sample, a 500ml bowl with 800g of grinding balls will achieve a faster grinding result. Also by using the Planetary Mono Mill PULVERISETTE 6 classic line instead of a Planetary Mill PULVERISETTE 5 classic line, speed of grinding might be improved lightly. A change of ball diameter (smaller balls) usually will not show an improvement with classic line ball mills.

Because many different samples will be ground in our application laboratory (metals, dies, and different minerals and chemicals), we like to advice checking the elemental analysis (available by the dealer or on our homepage) of grinding materials to see, what kind of traces should be found later on.

If fineness will be checked at your side too, we like to mention that fine ground particles tend to attach to each other again. We recommend using a strong Ultrasonic Cleaner to disperse the sample for several minutes again (dispersing agents like e.g. sodium di-phosphate should be used too).

% <	mean μm	CV [%]	M62073
10.0	0.18	0.00	0
50.0	0.36	0.00	0
90.0	0.94	0.00	1



Silica

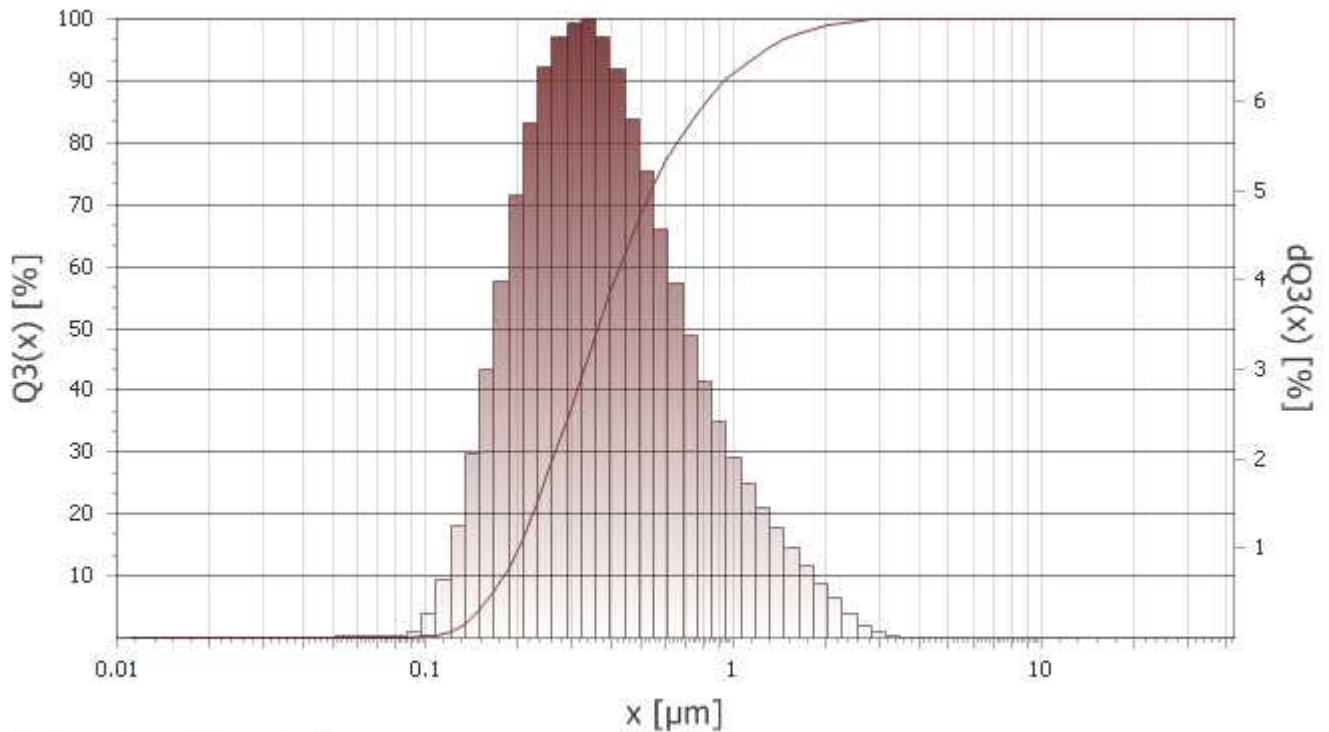
60min P5cl 250ml ZrO2 **M130031**
1mm

Meas.Nr. 62073 **Date** Montag, 11 März 2013 04:15 **Personal Report No.:**
Material Silica 60min P5cl 250ml ZrO2 1mm **M130031**
Description predisp.Dusazin 901 + 3min ultrasonic Laborette 17

Calculation Fraunhofer broad **TradeOff** 1.000000e+002
Scans Fine 100 **Scans Coarse** 0 **Channels** 108 **Beam Obscuration** 14.00 %
Meas. Range 0.01 [µm] - 42.30 [µm] **Pump** 5 **Ultrasonics** 10

%	< µm
5	0.15
10	0.18
15	0.20
20	0.22
25	0.24
30	0.27
40	0.31
50	0.36
60	0.43
70	0.52
80	0.66
90	0.94
95	1.28
98	1.71
99	2.01

%	< µm
0.0	0.0
0.0	0.0
0.0	0.1
0.1	0.1
0.2	0.1
4.3	0.2
14.4	0.2
37.7	0.3
68.3	0.5
86.1	0.8
91.2	1.0
99.0	2.0
99.9	3.0
100.0	5.0



▲ 62073 dQ3(x) — 62073 Q3(x)