

坩埚

行 业:	Geology / mineralogy, Ceramics / glass industry
进料尺寸:	< 2 cm
最终精度:	< 220 µm
样 品 量:	~ 18 g
研磨建议:	Vibrating Cup Mill PULVERISETTE 9 is suitable for comminution. For each sample and desired grinding set, most suitable speed setting and cup size needs to be determined previously. Setting as recommended will not achieve desired fineness in desired time for some of the possible grinding sets.



VIBRATING CUP MILL PULVERISETTE 9

speed setting: 1400 rpm

50 ml grinding set made of tempered steel

Feed quantity:	~ 18 g crucible
Feed Size:	< 2 cm
Grinding time:	25 s
Final fineness:	99,8 % < 224 µm
Comments:	Several grinding sets are available for comminution, but we don't provide all different sets in our application laboratory. At the moment, we use to have the grinding sets of 50 ml temp. steel / 50 ml hardmetal tungsten carbide. zirconium oxide and chromium free steel is not available to the laboratory at the moment.

Even if we would provide all different grinding sets in our laboratory, traces of previous ground samples might be found in following analyses. Even after a cleaning step with sand and water, still some traces might be found next to a significant concentration of SiO₂ which will be determined for sure.

Just for demonstration, we started comminuting the first sample of crucible, using our 50 ml grinding set made of tempered steel. This cup is suitable to comminute between 15-50 ml of sample; less of sample can lead to damages (especially when agate, zirconium oxide or hardmetal tungsten carbide will be used as cup material).

As desired, we adjusted a speed setting of 1400 rpm with 10 seconds of grinding. Afterwards, we sieved the ground crucible to check how much of sample was ground as desired. We found ~ 95 % < 224 µm.

After a total grinding time of 15 seconds, already 97,7 % < 224 µm has been reached. After a total grinding time of 25 seconds, the fineness rose to 99,8 % < 224 µm. We packed both fractions in separate bags for demonstration.

It needs to be figured out which speed setting is optimum to comminute the 18 grams of sample with the 50 ml steel grinding set. Eventually the required grinding time will be improved when only 1300 rpm or even 1500 rpms will be adjusted. A further problem will be the grinding set itself. With tungsten carbide, the density will be higher (~ 14,9 g/ml compared to 7,9 g/ml), much more impact force will be generated, compared to tempered steel. We are guessing that such a grinding set will comminute the sample much faster to desired level of fineness (with its best grinding speed setting).

With the gravel sample, most likely a grinding set of 100 ml / 250 ml might be required. There, we are facing the same problem in behalf of speed setting and grinding time which needs to be optimized.



Crucible placed next to the core of the 50 ml steel grinding set. A pre crushing of sample does not need to be performed.



After 10 seconds of grinding, the majority of particles (~ 95 %) already use to be < 224 μm (the test sieve we provided in our application laboratory).



VIBRATING CUP MILL PULVERISETTE 9

speed setting: 1400 rpm

100 ml grinding set made of tempered steel

Feed quantity:	~ 18 g crucible sample (1x)
Feed Size:	< 1,5 cm pre crushed
Grinding time:	20 s
Final fineness:	99,8 % < 224 µm
Comments:	One crucible uses to be too large in diameter to fit between core and ring / nor between ring and 100ml grinding set. It was necessary to pre crush manually before feeding.

We placed the crucible into a plastic bag and used a single hit with a small hammer for pre crushing. Afterwards, the crucible pieces could be fed to the grinding set. We placed about 1/3 of sample between ring and core and about 2/3 between ring and housing. Usually, a distribution like this will have an optimum grinding effect.

With the speed setting of 1400 rpm, we ground for 20 seconds. Afterwards, about 5,6 grams of ground sample has been taken out and got sieved with our Vibratory Sieve Shaker ANALYSETTE 3 Pro and a test sieve of 224 µm mesh.

Only a few particles are left loose on top of the test sieve (~ 0,01 g) which will be about 99,8 % of fed sample.



After 10 seconds of grinding, the majority of particles (~ 95 %) already use to be < 224 μm (the test sieve we provided in our application laboratory).



Picture of two pre crushed crucibles, fed into the 100 ml grinding set made of tempered steel.



VIBRATING CUP MILL PULVERISETTE 9

speed setting: 1400 rpm

100 ml grinding set made of tempered steel

Feed quantity: ~ 36 g crucible sample (2x)
Feed Size: < 1,5 cm pre crushed
Grinding time: 20 s
Final fineness: 99,9 % < 224 µm
Comments: Because we recommend to feed a minimum of sample of 30 ml, we would recommend to grind more crucibles per batch to avoid damages. This is specially counting for other grinding materials like ceramics (zirconium oxide), hardmetal tungsten carbide or agate. With too less of sample, ring or housing might become damaged. Steel will become less affected because it might have some ductile properties. When 2 of the crucibles will be pre crushed and ground, a similar result to result 2 got achieved in the same time.

After 20 seconds, about 10 grams of sample have been taken out for sieving. It has shown that also this sample was ground to 99,9 % < 224 µm, too. Sieved fractions and ground sample have been packed separately.