

2x seeds (rape and flex)

Protocol number: M120132

Industry: Agriculture and forestry

Feed Size: 2-4mm

Desired Fineness: < 0,5mm

Quantity: 100-150g

Recommendation: For a dry grinding as desired, our Variable Speed Rotor Mill PULVERISETTE 14 is capable to grind the samples with a 1,0mm sieve ring. Most of the resulting particles should be < 500µm afterwards.

Result 1

Variable-Speed Rotor Mill PULVERISETTE 14

speed: 20.000 rpm

impact rotor with 12 ribs

+ sieve ring 0,75 mm trapezoidal perforation



Material attributes: **rape seed sample**

Feed quantity: 16 g

Feed Size: 2 mm

Grinding time: 25 s

Final fineness: sieve openings are blocked with sample

Comments: With the used 0,75mm sieve ring, the openings use to become closed with sample during grinding. Probably the rape seed sample use to contain too much oil which will be pressed out by the impact rotor during grinding. Eventually, the additional impact bar might improve the output (see result 2).

Pictures: Oily sample uses to block the openings of the used 0,75mm sieve ring rapidly. A grinding of higher amounts is not possible.



Result 2

Variable-Speed Rotor Mill PULVERISETTE 14

speed: 20.000 rpm

impact rotor with 12 ribs
+ impact bar with sieve ring 0,75 mm trapezoidal perforation



Material attributes: **rape seed sample**

Feed quantity: 17 g

Feed Size: 2 mm

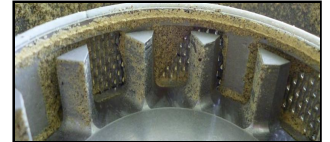
Grinding time: 25 s

Final fineness: sieve openings are blocked with sample

Comments: Also with the additional impact bar, particles use to stick to the bar and the sieve ring behind. The grinding has been aborted after 25s.

Probably with lower speed and a 1mm sieve ring, the sample can be ground properly (see result 3).

Pictures: Also by using the impact bar (for temperature sensitive samples), the openings started to become closed with sample.



Result 3

Variable-Speed Rotor Mill PULVERISETTE 14

speed: 16.000 rpm

impact rotor with 12 ribs
+ sieve ring 1,0 mm trapezoidal perforation



Material attributes: **rape seed sample**

Feed quantity: 30 g

Feed Size: 2 mm

Grinding time: 60 s

Final fineness: < 1 mm (majority use to be finer)

Comments: With a lower speed setting (16,000 rpms), probably less oil will become pressed out of the sample. Less sticking might be expected.

With the used 1mm sieve ring, almost all openings use to stay free after grinding of 30g of sample. A grinding of higher amounts is still possible.

For a grinding of 100-150g of sample, eventually a batch wise grinding might be required. Also the accessories for grinding large quantities can be used for a direct grinding of 150g of sample. Unfortunately, not enough sample has been send for testing this.

Not further mentioned will be trials with previous embrittlement in liquid nitrogen with sieve rings of 0,5mm and 0,75mm trapezoidal perforation with different grinding speeds. None of them have been successful.

Pictures: By using the 1,0mm sieve ring, all fed sample has been ground successfully. Higher amounts can be ground without problems.



Result 4

Planetary Mono Mill PULVERISETTE 6 classic line

main disk speed: 650 rpm

80 ml grinding bowl made of zirconium oxide (ZrO₂)
+ 5x 20 mm Ø ZrO₂ balls



Material attributes: **rape seeds**

Feed quantity: 15 g (rest of sample)

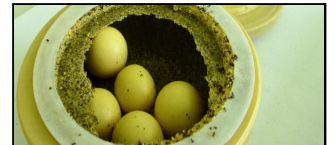
Feed Size: 2 mm

Grinding time: 60 s

Final fineness: mashed sample

Comments: By grinding with our Planetary Mono Mill PULVERISETTE 6 classic line, sample will become meshed up. It should be possible receiving a homogeneous ground pulp / suspension by adding liquids (e.g. water, isopropyl alcohol or other organic solvents). Also higher amounts can be ground with e.g. 250ml bowls (useful volume of up to 125ml).

Pictures: By using a ball mill, the sample will become pressed to mush within one minute. For a further grinding, it should be possible adding some solvents and receiving a homogeneous slurry / suspension.



Result 5

Variable-Speed Rotor Mill PULVERISETTE 14

speed: 16.000 rpm

impact rotor with 12 ribs

+ sieve ring 0,75 mm trapezoidal perforation



Material attributes: **flex seed sample**

Feed quantity: 20 g

Feed Size: 4 mm

Grinding time: 50 s

Final fineness: sieve openings are blocked with sample

Comments: With the used 0,75mm sieve ring, the openings use to become closed with sample during grinding.

Also a grinding with higher speed (20.000 rpm) didn't improve the result.

Probably a grinding analogous result 3 (1mm trapezoidal perforated sieve ring with lower speed setting) will be beneficial.

Result 6

Variable-Speed Rotor Mill PULVERISETTE 14

speed: 16.000 rpm

impact rotor with 12 ribs

+ sieve ring 1,0 mm trapezoidal perforation



Material attributes: **flex seed sample**

Feed quantity: 30 g

Feed Size: 4 mm

Grinding time: 70 s

Final fineness: < 1 mm

Comments: A bit of mashed up sample use to stick at the upper radius of the sieve ring (where it uses to touch the lid). Probably a grinding of higher amounts might be hindered.

By using the accessories for grinding large quantities, better airflow might improve the grinding result. Also a change in speed or a previous embrittlement with liquid nitrogen might be beneficial.

Pictures:

Only a bit of sample uses to stick at the top of the used sieve ring (where it uses to touch the lid). The rotors ribs does not reach that high – so we expect that a grinding of higher amounts still should be possible.



Result 7

Cutting Mill PULVERISETTE 15

rotor with straight cutting edges and fixed knives made of tool steel
+ sieve insert 1 mm trapezoidal perforation



Material attributes: **flex seed sample**

Feed quantity: 30 g

Feed Size: 4 mm

Grinding time: 90 s

Final fineness: < 1 mm

Comments: The majority of sample has been ground within 15 seconds. Only small amount of ground sample left the grinding chamber after 30s.
The used sieve insert is mainly free of sample, higher amounts might be grindable, but the inside of the grinding chamber contains mushed up sample. An output of ~ 25g has been found inside of the collecting vessel. The rest uses to be sample which was sticking to knives or rotor.

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