Nickel (pure powder)

Protocol number: M002232
Industry: Metallurgy
Feed Size: ~ 500µm
Desired Fineness: d90 < 160µm
Quantity: 100g
Recommendation: We recommend using a Planetary Mono Mill PULVERISETTE 6 classic line for grinding your kind of sample.

Result 1

Planetary Mono Mill PULVERISETTE 6 classic line
main disk speed: 550 rpm

250 ml grinding bowl made of hartmetal tungsten carbide (WC)
+ 15x 20 mm WC grinding balls

Feed quantity: 100 g
Feed Size: ~ 500 µm
Grinding time: 10 min
Final fineness: 80,2% < 160 µm
Comments: The metal powder can be ground until sample starts sticking to bowl or balls.

The sample started sticking to bowl and balls. This uses to happen after the majority of particles reached a fineness of < 20-30µm. Interacting forces between fine ground particles will become bigger as their own g-force. Therefore, particles will stick to each other and just become compressed by the used grinding balls. These clusters of particles also contain bigger particles which will not be ground any further too.

In this case, sample started sticking after ~ 10 minutes of dry grinding. Fineness has been determined by sieving an aliquot with Vibratory Sieve Shaker ANALYSETTE 3 Pro and a test sieve of 160 mesh.
About 80,2% use to be smaller as 160µm.

To improve the dry grinding result, it is plausible separating desired fraction and proceed grinding the coarse fraction until sample starts sticking again.

Result 2

Vibratory Micro Mill PULVERISETTE 0
amplitude: 1,5 mm

hardmetal tungsten carbide (WC)
+ Cryo-Box

Feed quantity: 33 g (~ 10 ml)
Feed Size: ~ 500 µm
Additive: + liquid nitrogen (N2)
Grinding time: 10 min
Final fineness: < 400 µm
Comments: Liquid nitrogen has been used to embrittle the pure metal powder. It has shown that the size of sample only became slowly reduced. To reach desired endfineness, much longer grinding time will be required with Vibratory Micro Mill PULVERISETTE 0.

We don't recommend using a PULVERISETTE 0 for a grinding of those high amounts of sample.

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