**Task:**

**Application field:** Chemistry / Plastics

**Material:** Barium ferrite (BaFe12O19)

**Feed size:** 6 - 100 µm

**Feed quantity:**
- Test 1 in PM 400: 250 g (for each jar)
- Test 2 in Emax: 50 g (for each jar)

**Material specification(s):** dry, hard-brittle

**Customer requirements(s):** d50 = 1 - 1,5 µm

**Subsequent analysis:** Particle size analysis

**Solution**

**Selected Instrument(s):**
- Planetary Ball Mill PM 400
- High Energy Ball Mill Emax

**Configuration(s) Item nos.:**
- PM 400:
  - 1 x PM 400, 220-230 V, 50/60 Hz
  - 4 x Grinding jar "comfort", zirconium oxide, 500 ml
  - 8 x Grinding balls, zirconium oxide, ø 3 mm, 500 g, approx. 140 ml
  - 4 x Safety closure device for grinding jars "comfort", 500 ml
- Emax:
  - 1 x High Energy Ball Mill Emax 200-230 V, 50/60 Hz
  - 2 x Grinding jar Emax, zirconium oxide, 125 ml
  - 1 x Grinding balls, zirconium oxide, ø 3 mm, 500 g, approx. 140 ml

**Parameter(s):**
- Test 1 in PM 400: Revolution speed 350 rpm
- Test 2 in Emax: Revolution speed 2000 rpm

**Time:**
- Test 1 in PM 400: 3 h
- Test 2 in Emax: 30 min

**Achieved result(s):**
- See measuring report HORIBA LA-960
  - PM 400 (after 3 h): D90 = 6,4 µm; D50 = 4,1 µm; D10 = 2,3 µm
  - Emax (after 30 min): D90 = 3,8 µm; D50 = 2,7 µm; D10 = 1,7 µm
Remark(s):  
PM 400:  
Each grinding jar 500 ml is filled with 1000 g grinding balls Ø 3 mm, 250 g sample and 220 ml water. Grinding is performed in the PM 400 for up to 3 h at 350 rpm. Due to the high frictional forces and the temperature increase the safety closure device is recommended. In order to keep the temperature low during grinding interval breaks have been programmed.

Emax:  
Each grinding jar 125 ml is filled with 250 g grinding balls Ø 3 mm, 50 g sample and 55 ml water. Grinding is performed in the Emax for 30 min at 2000 rpm. For additional cooling an external chiller has been connected to the Emax.

Recommendation:  
The Planetary Ball Mill PM 400 and the High Energy Ball Mill Emax are suitable to grind the sample material under the above mentioned conditions.
D10 Median size: 1.73271 (µm)
D90 Mean size: 2.68046 (µm)
Median size: 2.72390 (µm)
St. Dev.: 0.7938 (µm)
St. Dev.: 0.7938 (µm)
Geo. mean size: 2.6033 (µm)
Geo. mean size: 2.6033 (µm)
Mode size: 2.7880 (µm)
Mode size: 2.7880 (µm)

Laser Scattering Particle Size Distribution Analyzer LA-960

Data name: 17316_Emax_125mlZrO2250gØ3mm_50g55ml_30min2000rpm
Sample Name: 17316_Emax_125mlZrO2_250g_25mmballs_50g_sample_2000rpm_30min
Material: BaFe12O19
Transmittance (R): 78.9 (%)
Transmittance (B): 71.3 (%)
Circulation speed: 5
Agitation speed: 5
Ultrasound: 01:37 (7)
Iteration mode: Manual
Distribution base: Volume
Refractive index (R): [2.20-0.10, 2.20-0.10], 1.33 (1.33)
Refractive index (B): [2.20-0.10, 2.20-0.10], 1.33 (1.33)
Test-No.: R17316