**Task:**

**Application field:** Analytic  
**Material:** Umbrellas  
**Feed size:** 60-80 mm  
**Feed quantity:** 500 bis 1000 g  
**Material specification(s):** dry, hard, soft, brittle  
**Customer requirements(s):** All parts of the umbrella have to be ground as fine as possible to achieve a representatively mixed sample.  
**Subsequent analysis:** Screening (analysis with several methods, e.g. GC, HPLC...) acc. to REACH

**Solution**

**Selected Instrument(s):** Cutting Mill SM 300  
Ultra Centrifugal Mill ZM 200  

**Configuration(s) Item nos.:**
1 x SM 300, 200 V, 50/60 Hz, cutting bars stainless steel  
1 x Universal hopper with plastic plunger, for SM 200 / SM 300  
1 x Parallel section rotor, stainless steel  
1 x 6-disc rotor, stainless steel, with reversible cutting tips of tungsten carbide  
1 x Bottom sieve, square holes, 10 mm, stainless steel  
1 x Bottom sieve, square holes, 2 mm, stainless steel  
1 x Cyclone unit incl. 1 sample bottle 500 ml (to be used with industrial vacuum cleaner)  
------------
1 x ZM 200, 200-240 V, 50/60 Hz  
1 x Push-fit rotor, 6 teeth, stainless steel  
1 x Cyclone with filter bag, with collecting receptacle 3 litres  
1 x Ring sieve, trapezoid holes, 1 mm, stainless steel  
1 x Push-fit rotor 12 teeth, stainless steel  
1 x Ring sieve, trapezoid holes, 0.75 mm, stainless steel

Please note: Other electrical versions of the instrument(s) are available with different item numbers.

**Parameter(s):**  
SM 300: Revolution speed 2200 rpm  
ZM 200: Revolution speed 18000 rpm

**Time:** see remarks
Achieved result(s):
cloth: SM 300 predominantly < 15 mm; ZM 200 fibrous, < 1 mm
stick: SM 300 predominantly < 8 mm; ZM 200 predominantly < 0,5
mm
level arms: SM 300 < 2 mm

Remark(s):
Prior to grinding the umbrella has to be disassembled: cloth, stick and
level armes are processed separately.
CLOTH
Pre-cutting with SM 300, parallel section rotor, bottom sieve 10 mm:
After manual pre-cutting the whole cloth is ground in 4-5 portions
within 1 min.
Fine grinding with ZM 200, 6-teeth rotor, ring sieve 1 mm, cyclone: 10
g of the pre-cut sample is mixed with dry ice in the ration 1:2 (v/v
sample/dry ice). The mixture is fed within 2 min to the ZM 200. Using
a 6-teeth rotor minimizes sample remainder in the grinding chamber.
The cyclone improves the sample discharge.
STICK
Pre-cutting with SM 300, 6-disc rotor in 2 steps: 1. without bottom
sieve. 2. with bottom sieve 10 mm within 1 min. The metal content is
removed with a magnet separator and has to be evaluated separately.
The plastic content is fine ground in the ZM 200 (12-teeth rotor, ring
sieve 0.75 mm): 20 g of the pre-cut sample are embrittled in liquid
nitrogen and directly fed to the ZM 200 within 1:30 min.
LEVEL ARMS
Pre-cutting with SM 300, 6-disc rotor in 2 steps: 1 with bottom sieve
10 mm. 2. with bottom sieve 2 mm and dust extraction within 2:30
min. Due to the high, non-magnetic metal content the sample only
can be ground in a cutting mill with a minimum sieve size of 2 mm.
While grinding any kind of metal containing sample a significant wear
and tear of the grinding tools has to be expected.

Recommendation:
The Cutting Mill SM 300 and the Ultra Centrifugal Mill ZM 200 are
suitable to grind the sample material under the above mentioned
conditions.
Pictures of the sample:

- Picture 1: Original sample umbrella
- Picture 2: Detail of opened umbrella
- Picture 3: Disassembled umbrella
- Picture 4: Stick and level arms
- Picture 5: Cloth after pre-cutting in SM 300, parallel section rotor, bottom sieve 10 mm
- Picture 6: Cloth after grinding in ZM 200, ring sieve 1 mm, dry ice
- Picture 7: Level arms after pre-cutting in SM 300, 6-disc rotor, bottom sieve 10 mm
- Picture 8: Level arms after grinding in SM 300, 6-disc rotor, bottom sieve 2 mm, cyclone
- Picture 9: Stick after pre-cutting in SM 300, parallel section rotor, bottom sieve 10 mm

The application report is based solely on the processing of the available sample material in the indicated amount. No legal claims shall be derived from this test report.

Subject to technical modification and errors.
© Retsch GmbH - www.retsch.com - lab@retsch.com
The application report is based solely on the processing of the available sample material in the indicated amount. No legal claims shall be derived from this test report. Subject to technical modification and errors.

© Retsch GmbH - www.retsch.com - lab@retsch.com