Retsch®

Solutions in Milling & Sieving

NIR, Kjeldahl, Dumas, Falling Number

Sample Preparation of Food and Feed

Ultra Centrifugal Mill ZM 200

Knife Mill GRINDOMIX GM 200

Knife Mill GRINDOMIX GM 300

Cyclone Mill TWISTER

A VERDER COMPANY

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Retsch®

Solutions in Milling & Sieving

For optimum quality control

Application examples	TWISTER	ZM 200	GM 200 / GM 300
Raw material			
Wheat	+	+	o
Corn	o	+	+
Hay/straw	+	+	–
Feeds			
Pig food pellets	+	+	o
Pet food pellets	+	+	o
Fish food pellets	+	+	o
Dry food			
Rice	+	+	o
Cereals	+	+	o
Peanuts	–	o	+
Almonds	–	o	+
Soy beans	+	+	o
Sunflower seed	o	+	o
Cookies	–	–	+
Moist food			
Tomatoes	–	–	+
Cheese	–	–	+
Sausages	–	–	+
Cooked pasta	–	–	+

\+ highly suitable 0 suitable – not suitable

Within the RETSCH range of mills and grinders there is a specialist for every application. But what they have in common is that they produce a perfectly homogeneous, unaltered and uncontaminated sample so that the subsequent analysis is always trustworthy and meaningful. If you require professional solutions that combine high performance, ease of use, a maximum of operational safety and a long lifetime, then RETSCH's equipment is your only choice!

Ideal for forage, feeds and grains

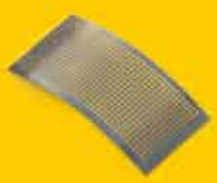
CYCLONE MILL TWISTER

- Rotor mill with sieve insert (1 mm or 2 mm) and grinding ring
- Sieve inserts 0.5 mm and 0.8 mm (option)
- 3 controlled rotor speeds
- Cyclone separator with 250 ml collecting bottle for quick extraction of sample
- Connection for vacuum cleaner
- No cross contamination thanks to easy cleaning
- Professional industrial design with long lifetime
- Convenient operating panel

www.retsch.com/twister

WET CHEMICAL AND ELEMENT ANALYSES

RETSCH laboratory mills are suitable for sample preparation not only to **NIR** analysis but a variety of analytical methods. Achievable grind sizes of approximately 500 microns are ideal for protein analysis according to **Kjeldahl** and **Dumas**. The same is true for the determination of **falling numbers**.
The grind size is also suitable for the determination of fat and organic contaminants through extraction, resp. of inorganic contaminants through digestion.



Cyclone Mill TWISTER

SAMPLE PREPARATION TO NIR ANALYSIS

Near Infrared Spectroscopy is the most important analysis method for the determination of protein content, moisture, fat and ash in feeds and forage. The advantage over classical methods such as Kjeldahl is the simultaneous determination of several parameters. Moreover, NIR spectroscopy is a quick method which neither requires consumables nor reagents. Therefore it is used whenever high sample throughput and great flexibility are required.

The identification and qualification of raw materials as well as the quantitative analysis of convenience products can be carried out within seconds to guarantee highest product quality and safety.

A much discussed issue related to NIR analysis is the necessity of sample preparation. Users often face the problem of having to decide whether sample preparation is required or not.

Sample preparation to NIR does not require digestion or extraction, it is mainly about size reduction of the sample material.

This involves two aspects:

1. **Homogenizing the sample**
2. **Achieving the required grind size**

Whereas an inhomogeneous sample leads to systematic errors in the subsequent analysis, a sample which is too coarse causes statistical errors (see example on next page).

Fine grinding of grains, oilseeds, corn, animal feed pellets, spices, dried pasta and plants, tea, cocoa and raw coffee

ULTRA CENTRIFUGAL MILL ZM 200

- High-throughput processing of samples for NIR and ICP
- Large ring sieve allows for quick sample processing
- Option for load-controlled automatic feeder
- Cyclone separator for 230 ml to 4.5 l sample material. Optional dust extraction for optimum material discharge
- Heavy-duty "Powerdrive"
- Speed range 6,000 rpm to 18,000 rpm
- Wide selection of accessories

www.retsch.com/zm200

Ultra Centrifugal Mill
ZM 200

Ideal for samples high in water and oil content

KNIFE MILL GRINDOMIX GM 300

- Homogenization of up to 4.5 liters sample material
- Variable speed from 500 – 4,000 rpm
- Autoclavable grinding tools
- Patented gravity lids ensure homogenization of the ENTIRE sample
- Mode for preliminary and fine grinding
- Sturdy industrial motor
- Comprehensive range of accessories

www.retsch.com/gm300

KNIFE MILL GRINDOMIX GM 200

- For up to 700 ml of sample material
- Variable speed from 2,000 to 10,000 rpm

www.retsch.com/gm200

Knife Mill
GRINDOMIX
GM 300

www.retsch.com

Improved results thanks to correct sample preparation

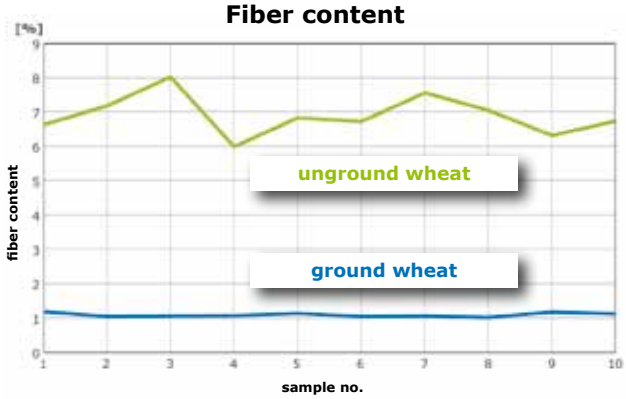
EXAMPLE: ANALYSIS OF WHEAT

The different properties of ground and unground samples when analyzed with NIR are demonstrated exemplarily with grains of wheat. The samples were analyzed 10 times, the spectrometer was refilled for every measurement. The wheat grains were previously ground in RETSCH's cyclone mill TWISTER.

The table shows a considerable difference between ground and unground sample, particularly with regards to ash and fiber content. This is due to the fact that only the surface of the unground wheat grains is analyzed resulting in an over representation of the kernel shell.

NIR spectroscopy allows to determine a series of relevant parameters in feeds and grains without great effort. The prevalent opinion is that sample preparation is not required for NIR analysis. However, the results presented here clearly indicate that it is beneficial to pulverize the samples with a suitable laboratory mill before analyzing it, particularly if the material is inhomogeneous. **That is the only way to guarantee meaningful and reliable analysis results**.

Parameter	Ash	Moisture	Fiber content	Fat	Protein
unground wheat					
average	0.10	9.80	**6.90**	1.38	8.46
standard deviation	0.10	0.25	**0.62**	0.16	0.45
ground wheat					
average	2.80	9.68	**1.10**	1.17	9.02
standard deviation	0.03	0.09	**0.05**	0.03	0.07



The analysis of the unground sample clearly shows a systematic as well as a considerable statistic error.

FREE TEST GRINDING

As part of RETSCH's professional customer support we offer our customers the individual advice required to find the optimum solution for their sample preparation task. To achieve this our application laboratories process and measure samples free-of-charge and provide a recommendation for the most suitable method and instrument.

For more information please visit our website www.retsch.com/testgrinding

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