



Speakers

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The following list is a selection of questions asked prior to and during the online seminar. If your question is not covered or has not been answered here, please do not hesitate to contact us.

Q: Regarding the PV value measured with NIR, how do you manage the sampling? Because it is a "moving" criteria (PV is increasing).

A: The Peroxide Value is indeed a tricky one. Here we must make sure that for the calibration the reference analysis and the NIR analysis are more or less happening at the same time. Also, the PV lowers again with higher degradation, so very badly degraded samples will disturb the calibration. A well set-up calibration method is the key.

Q: If I have structurally similar samples, am I able to differentiate them only by absorption intensity, using FT-IR? Can the absorption intensity indicate the concentration of functional groups?

A: The intensity of a band is a measure of the concentration of the respective functional group. However, other effects might need to be considered. This is why with FT-NIR spectroscopy we do not look at the often broad bands themselves but use chemometric algorithms for evaluation.

Q: Let's say you are producing milk on different systems. You want to monitor the carbohydrate content per system. However, the particle size of the milk is different per system. Does each NIR spectrometer require a new calibration?

A: The particle size or better the fat globule size is affecting the spectra, but they can be combined in one set of methods for the required parameters. By this you maintain one set of methods for all instruments.

Q: How does NIR accuracy compare to the reference values?

A: As a rule of thumb, the NIR can be as accurate as the reference method in average. The calibration of the NIR as a secondary method may cost precision but the easy and operator-independent handling of samples and measurement give a benefit which brings precision.

Q: Let's say you want to monitor your dairy production process. I can imagine that the particle size is different from batch-to-batch, depending on the cow's where the milk was obtained from. What effect would such a change in particle size have on the NIR spectra?

A: With a well laid out calibration, matrix effects like particle size should be levelled out. The aim is to set up a calibration model that caters for most of these variabilities while keeping the model still specific to the product. Same is valid e.g. for different seasons, which might lead to slightly different fat content etc...

Q: How do you deal with the heat generated during grinding?

A: Heat is always a by-product during grinding. With correct settings and sample handling heating can be controlled quite easily. Sometimes the use of cooling agents (dry ice, liquid nitrogen) is advised.

Q: What will be the best preparation for soybean samples?

A: The answer depends on what you would like to achieve. Due to the sample's fat content, soybeans normally are prepared using the Ultra Centrifugal Mill ZM 300 with distance sieves. Eventually grinding at



slightly reduced speed (10.000-14.000 instead of 18.000 rpm) is recommended. With this set-up a fineness of about 300 µm to 2 mm (depending on the used sieve size) may be possible. The ZM 300 allows you to grind continuously. A sample amount of a few grams to several hundred grams are possible. For a rough particle size reduction also the Knife Mill Grindomix GM 200 is suitable. With preliminary interval grinding and subsequent continuous grinding a fineness of 1-2 mm may be achievable. The GM 200 grinds batchwise allowing to grind about 100-200 g in one batch.

Q: Ball Mills: How can I remove sticking material from the jar and balls?

A: The easiest approach is grinding an abrasive material. Just recover the sample and add some quartz sand or broken glass. Grind the material for some minutes at moderate speed. The sample abrades sticking material from the jars and balls and simply can be separated by sieving. Balls and jar can be cleaned with a brush and/or water.

Q: How to clean the grinder between different samples?

A: Mills with separate grinding containers can be used directly by swapping the equipment. The dirty units can be cleaned in a household dish washer or under tap water. Cleaning in place can be performed by grinding a sample (e.g. sand in ball milling jars, pasta in rotor mills).

Q: What is the best practice to clean the cup/jar?

A: Grinding jars (ball mills) can be cleaned by grinding a sample like sand. The grinding container for the knife mills is simply washed with tap water or in a household dishwasher.

Q: Is it possible to determine the bone content with XRF in meat? How do I prepare meat samples for XRF?

A: Yes, the bone content in mechanically separated meat (MSM) can be determined indirectly by measuring the calcium content. The relationship between calcium to bone content is used in regulation set by Food Safety and Inspection Service Agency of the US Department of Agriculture (USDA) and others. For XRF analysis, meat samples should be ground to obtain a slurry which can be filled into a liquid cup.

Q: How to determine the correct particle size (powder) for different materials for XRF analysis?

A: For feed samples it is typically sufficient to use a 500 µm sieve in the Retsch ZM300. Such samples with a grain size of < 500 µm can subsequently be measured as powder by XRF and FT-NIR. For XRF you can also add some wax and press the material into pellets. This is beneficial for light element analysis (e.g. Na, Mg).

Q: Do the fluorescence spectra provide the molecule specific information?

A: XRF uses X-ray fluorescence generated during near-atom-core electron transitions (see also [What is XRF](#)). This makes us rather independent of the next neighbor or binding element. It means we analyze always elemental concentrations and not species.

Q: Does the S2 PUMA have a German type approval ("Vollschutzgerät")? Are there any special room conditions to consider?

A: Yes, the S2 PUMA Series 2 has a German Type Approval and "Vollschutz" according to BfS RöV. It is a fully radiation-protected system. Special room conditions are not required, also no cooling water. The system has a rugged design and is frequently used in dusty production environments. For light element analysis (e.g., F, Na, Mg) you typically need a vacuum pump and/or Helium gas. Helium is required e.g. for volatile liquid analysis. More details can be provided on request.