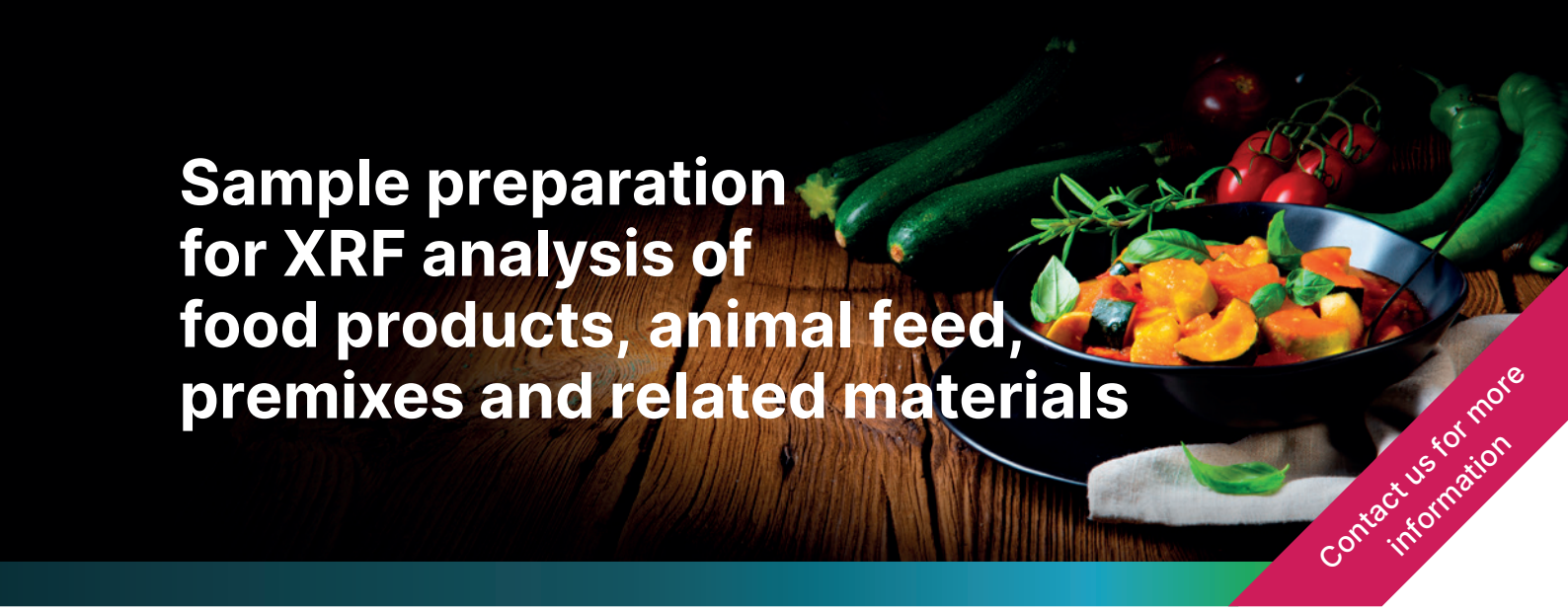
Sample preparation for XRF analysis of food products, animal feed, premixes and related materials



Contact us for more information

Food and animal feed samples are heterogeneous materials with many of the same elements distributed into various constituents like protein, fat and carbohydrate-rich phases. A proper sample preparation technique will help you determine reproducible and representative elemental content.
Grinding and pressing might be difficult or even impossible to perform due to oily or sticky sample characteristics. You might have to follow special procedures. Good news: these procedures are normally easy to implement using available specialized equipment.

Mineral premixes are typically inorganic samples which can easily be prepared as pressed pellets or glass disks.

Loose powder/liquid cups

You can analyze powdered/homogeneous materials directly in loose powder cups (liquid cups) especially when the sample must be recovered or when accuracy/reproducibility are not the main drivers.
Any liquid or semi-solid samples (solutions, emulsions, slurries, etc.) can be analyzed in liquid cups. No further preparation is needed! However, you must ensure that these samples are stable and that they will not segregate during the analysis.
Malvern Panalytical offers dedicated and single-use sample cups in 32 or 40 mm diameter, with corresponding lids. These cups are carefully designed with high standards in production control. They are safe to use and ensure that you will get the best analytical conditions for any liquid (or loose powder) samples.

Grinding

It is necessary to grind dry and brittle samples into a fine powder to minimize undesired particle size effects and allow further processing like pressing or fusion.

Cutting, blending & homogenizing

Moist, fatty or soft samples (including fresh produce or other plant-/ animal-derived substances) may require cutting into fine particles or blending into a homogeneous slurry. Cutting or knife mills or high-power specialized lab blenders are then useful. Samples processed in such a way can be conveniently pressed into pellets or presented to the XRF spectrometer in a liquid cup.

Pressing

As a general rule, pressed samples deliver more accurate and reproducible results than loose powders in cups. Detection limits are also lower, as there are no absorption losses due to the cup's foil.
Pellets can be pressed freely into Al cups or steel rings. Cellulose or protein-rich samples may be pressed as is, but mineral-rich samples may require the use of binders to achieve the necessary mechanical stability and robustness.

Fusion

You can prepare mineral-rich samples or calcined residues as glass disks. When accuracy and reproducibility play a significant role, this is arguably the best way to present a sample. With Malvern Panalytical automated fusion instruments, you dissolve the sample into a molten glass-forming flux at high temperatures, and it ultimately results in a completely homogeneous glass disk. This way, particle size and matrix effects are eliminated.
It is difficult to obtain suitable standards that have the same particle size, mineralogy, surface roughness and segregation characteristics as the production samples. Therefore, the role of glass disks is extremely important in setting up reference calibrations for determining in-house standards for the production of control calibrations.

Handling oily samples

Materials with high fat content require special care during grinding and pressing to avoid the mobilization of the fat as well as clumping and segregation of the sample. This is why you will need an additive for oily samples. It will guarantee that fatty components are not mobilized during normal grinding and pressing, leading to an increased sample preparation repeatability, accuracy and representativeness of results.

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