



Sample preparation for XRF analysis of metallic materials

Contact us for more information

Linishing (grinding) or milling are the two most commonly used sample preparation methods for X-ray analysis of metallic materials. After the sample preparation procedure, the sample surface should be as homogeneous as possible (clean and that almost all imperfections have been removed). Chips and drillings of hard metals can also be measured if remelted to form a solid sample. For soft metals, you can press the loose material into a stable pellet.

Remelting

You can remelt bulk or loose metal particulates to form a solid piece. You can then directly measure such metal samples or prepare them further according to one of the techniques below before analyzing them. Remelting may be combined with diluting. It is not always possible to remelt ferroalloys as fine granules without getting segregation. In this case diluting with metallic iron may result in a homogeneous melt. However, there is a risk of losing volatile elements in this process.

Linishing

The sample top layer of hard metallic samples (like steel) is removed by using a linishing belt or disk grinder (comparable to sandpaper) to ensure that measurements are carried out on a flat and non-oxidized surface. Be careful to avoid cross-contamination when using the same area of the sandpaper. It is a very fast and cheap method. Soft alloys (Al- and Cu-based) are usually not suited for linishing as parts of the sample may be smeared out or ripped away from the sample.

Grinding

This is very similar to linishing, but instead of sandpaper, it is a solid abrasive (like a rotating stone or circular sander) that is used. The same restriction with regard to soft metals apply.

Milling and turning

Milling and turning are techniques usually based on hard-metal tooltip(s) that cut metal away from the sample surface. In a milling machine, the fixed sample is driven towards the usually rotating cutter head that may involve many tool tips. In a lathe, the sample is spun and driven towards a single-bladed cutter head. Mills and lathes will grind laboratory samples at low cost and with a high degree of reproducibility. The rapid machining of laboratory samples is suitable for both XRF and XRD sample preparation. Tool tips are used and for both hard and soft grinding materials when appropriate (hard metal).

This technique produces a clean and flat surface, eliminates cross-contamination and fine-tunes the roughness of the analytical surface.

Pressing

Chips and drilling residues from sufficiently malleable alloys can be pressed using a hydraulic press to form a pellet. You can use either a manual or an automated press for this purpose.

Fusion

You can prepare powdered metal alloys (e.g. FeSi, FeCr, etc.) as fused borate beads if they are properly oxidized. This offers improved accuracy and reproducibility in comparison to loose powder or pressed pellet analysis. [Malvern Panalytical fusion instruments](#) can be very helpful in this situation.





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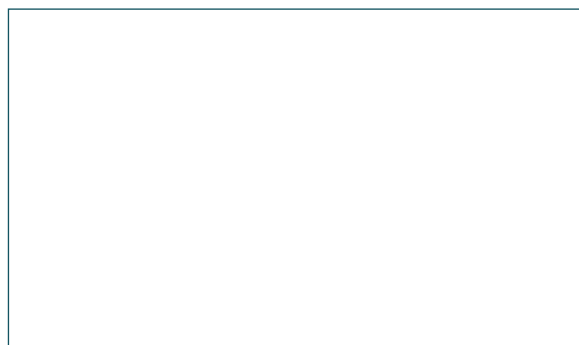
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Malvern Panalytical

Groveswood Road, Malvern,
Worcestershire, WR14 1XZ,
United Kingdom

Tel. +44 1684 892456
Fax. +44 1684 892789

Lelyweg 1,
7602 EA Almelo,
The Netherlands

Tel. +31 546 534 444
Fax. +31 546 534 598

www.malvernpanalytical.com