Electrical Fusion Machine

New electrical fusion system for x-ray fluorescence analysis

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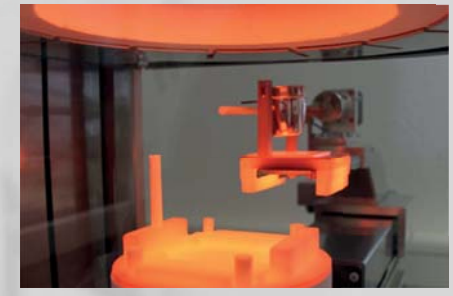
In x-ray fluorescence analysis (XRF), sample preparation is an important step in the analytical procedure. A borate fusion is frequently used for the determination of main components. At the present, there are several gas and electrical fusion systems on the market.

We have now developed a new automatic electrical furnace which overcomes the well-known problems and disadvantages of systems based on muffle furnaces.

ill. 1)

A lift-bottom furnace (ill. 1) is the basis. Compared to a normal muffle furnace, which has a forward opening door, opening this oven results in a significantly lower heat loss.

An autosampler (ill. 2) places the sample into the furnace. In this way, the operator no longer comes into contact with the actual oven heat. The autosampler also ensures fault-free operation.

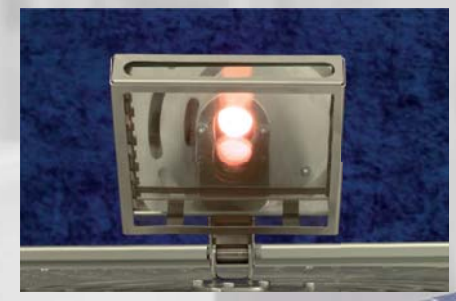


ill. 2)

A special ceramic holder (ill. 3) was developed to fasten the crucible and casting dish. This ceramic material must permanently withstand a temperature difference of 1200 °C. The material must also be resistant to lithium tetraborate and lithium metaborate fluxes.

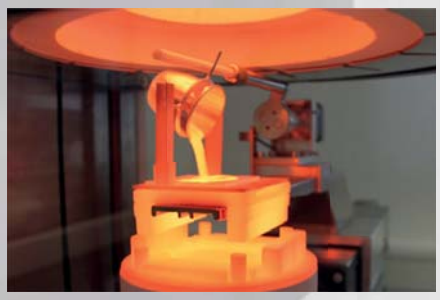
ill. 3)

Fusion process: Melting is complete within 3 minutes after the autosampler has placed the sample into the oven. This procedure can be observed in a mirror (ill. 4). After this, the sample is stirred for 7 minutes. This process is made possible by the fact that the oven bottom can be rotated with a speed of up to 250 rpm. Stirring takes place alternately in both directions. Then in the next step, the sample is poured off (ill. 5).



ill. 4)

The autosampler pours off the sample (ill. 5) after the bottom of the oven is lowered together with the sample. This concept ensures that all mechanical parts are found on the exterior of the oven. Fusion instruments for which the pouring mechanics are located within the oven exhibit a higher failure rate. This is avoided here.

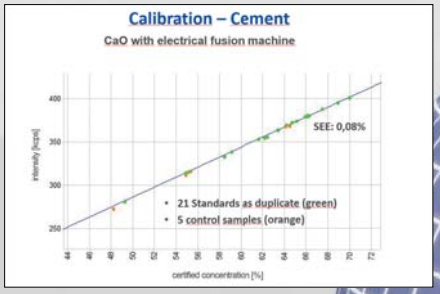


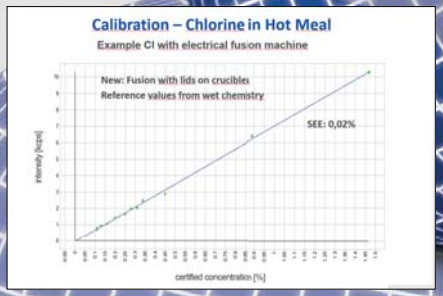
ill. 5)

A special platinum cover (ill. 6) that is fastened to the crucible with a hook and an eye was designed to reduce the losses of volatile elements such as chlorine, fluorine or sulfur. The cover remains on the crucible for the entire fusion procedure; including pouring off of the sample.

ill. 6)

Electrical Fusion Machine with 4 Stations and Continuous Operation Option





The new system shows excellent precision and accuracy for all elements typically analyzed in oxidic materials like cements, gypsum, sands, iron ores, clays, geological samples, etc.

The closed design also helps to avoid the loss of volatile elements like sulfur, fluorine and chlorine.

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