

# MultiXQuant

## Quantification and calorific value determination of lightweight materials with X-ray fluorescence spectroscopy

### Invention

X-ray fluorescence analysis can be used to identify about 80 elements, giving it great popularity in the industrial areas of mining, refineries, and cement. Using it to analyze lightweight materials such as plastics has thus far been a challenge, since elements with low atomic numbers such as carbon,

hydrogen, nitrogen, and oxygen generally do not radiate sufficient fluorescence, making it impossible to establish a sample matrix. So-called standardless methods for quantifying elements with high atomic numbers cannot be applied optimally without matrix composition information. Matrix-adjusted calibration materials are

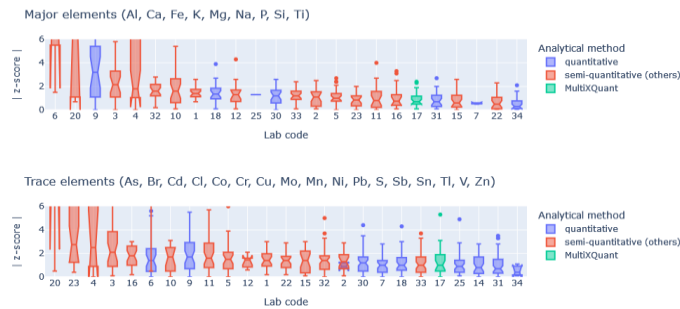


Figure 1

rarely available for quantitative methods.

The new analytical method described here allows quantification of elements with high atomic numbers in plastics, polymers, and substitute fuels. First, a multi-variant calibration is recorded and used to extract the precise matrix composition of samples and thus improve standardless quantification (see figure).

This procedure can also be used to simultaneously determine the energy content of the materials in question. The technology makes determination of calorific value for plastics and substitute fuels very easy, quick, and precise. Unlike established near-infrared methods, this procedure measures not only the surface, but almost the entire volume of samples and determines the energy content.

### Commercial Opportunities

The new technology can be used to conduct elemental analysis of lightweight materials such as plastic and determine their calorific value. It is useful for such applications as production monitoring aimed at ensuring that values for legal limits and toxic heavy metal content are complied with.

It can also be used for calorific value determination wherever more costly calorimetric measurements are being taken. For example, it could be used in process management for recycling waste into substitute fuel.

### Current Status

The university has applied for a patent in Germany. International applications are also possible. On behalf of FH Münster, we are offering interested companies the opportunity to license and refine this technology.

### Relevant Publications

<https://pubs.rsc.org/en/content/articlelanding/2022/JA/D1JA00412C>

An invention of FH Münster.

### Competitive Advantages

- Combines elemental and caloric analysis
- Quickly determines energy content
- Determines elements in lightweight materials such as plastics
- Enhances analytical efficiency
- High analytical precision

### Technology Readiness Level

123456789

Technology validated in relevant environment

### Industries

- X-ray apparatus manufacturers
- Recycling
- Energy producers

### Ref. No.

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