Multi-channel X-ray fluorescence spectrometer

Simultix 14

1. Introduction

Rigaku's multi-channel X-ray fluorescence spectrometer, Simultix, has been widely used for production control in fields such as the steel and cement industries, where rapid and precise analyses are required. We have developed a new model, the Simultix 14, in which performance, functionality and software user interface are greatly improved compared to the former model.

The Simultix 14 can be connected to automated sample preparation apparatus for on-line operation. The Simultix 14 has been developed with a focus on fast, accurate analysis and reliability. Fully utilizing Rigaku's accumulated X-ray technologies, the features of the Simultix12 have been improved and extended in the Simultix 14.

2. Features

The Simultix 14 has the following features.

2.1. Compact and efficient

The Simultix 14's high-frequency X-ray generator is compact and energy-efficient. The built-in heat exchanger provides a smaller footprint, saving on installation space, and the casters make installation easier in locations where space is limited. With the improved cooling efficiency, the amount of cooling water needed has been drastically reduced.

2.2. Fast and stable

Improvements to the sample transfer and vacuum systems have yielded significantly increased analysis speed and precision.

• Fast sample transfer system

With the instrument's improved sample transportation system, sample lift-down, carry, and placement have been turned into a single smooth motion, reducing sample load time.

• X–Y sample auto-changer

In addition to the standard 8 sample turret, the 48 sample changer (ASC48) is available. The X–Y sample changer increases sample throughput and makes sample handling easier.

• Vacuum system

Evacuation and leaking speed of the sample inlet port can be preprogrammed to operate in two modes so that scattering of powder samples and filters in vacuum can be reduced and long-term stability is increased. Additionally, the optional powder trap minimizes small particles being sucked into the vacuum pump and electric valves. The three degrees of vacuum selectable during measurement setup further shorten the time needed to analyze certain samples and elements.

• Auto pressure control (APC)

Due to long wavelengths of the element lines for ultra-light elements, the X-ray intensities are sensitive to the degree of vacuum in the spectroscopic chamber. The

APC keeps the vacuum inside the spectroscopic chamber constant and drastically improves stability in ultra-light element analysis.

2.3. Abundant additional functions

The Simultix 14 can supply optimum configuration according to samples to be analyzed, as seen in the following examples:

- Scanning goniometer for heavy and light elements

All elements from $_{9}$F to $_{92}$U can be analyzed using a single, flexible goniometer, which can be used in the non-routine analyses. The instrument can be used to perform qualitative and quantitative analysis. Semi-quantitative analysis using qualitative result is also supported.

- Background measurement function

The fixed channels can be used for background measurement. Background intensities can vary with metallic structure and thermal history. These influences cannot be corrected through matrix correction. The Simultix 14 can correct for background variation as seen in Fig. 1. Hazardous heavy trace elements in slag can be analyzed accurately down to the ppm level using the background measurement function.

- Special optics for galvaneal Zn–Fe alloy coating steel sheet analysis

Accurate analysis of coating weight and iron content for galvaneal coating has been achieved using newly developed optics and FP software (Fig. 2). Additionally, it is possible to perform simultaneous analysis of pre-treatment phosphate coating weight. The new optics have broadened applications in coating weight analysis for steel sheet coating lines.

2.4. Outstanding software functionality and UI

The software of the Simultix 14 was designed with an emphasis on production control analysis, with steps taken to make analysis parameter setup significantly easier than past instruments. Data processing capabilities have been improved utilizing Rigaku's peerless Fundamental Parameter Method technologies.

- Expansion of Fundamental Parameter method (FP method)

The number of applications that can utilize the FP method has increased, and the Simultix 14 is an excellent match for applications such as the high precision analysis of high alloy steel and other materials. New FP software enables line overlapping correction using theoretical intensities and can achieve more accurate correction.

- Accurate ore analysis—Compton scattering correction

Accurate analysis of target elements is essential in the analyses of ores and concentrates such as iron ore and copper concentrates. Newly developed Compton scattering correction software computes theoretical alphas with the Compton scattering correction method, providing accurate inter-element correction (Fig. 3).

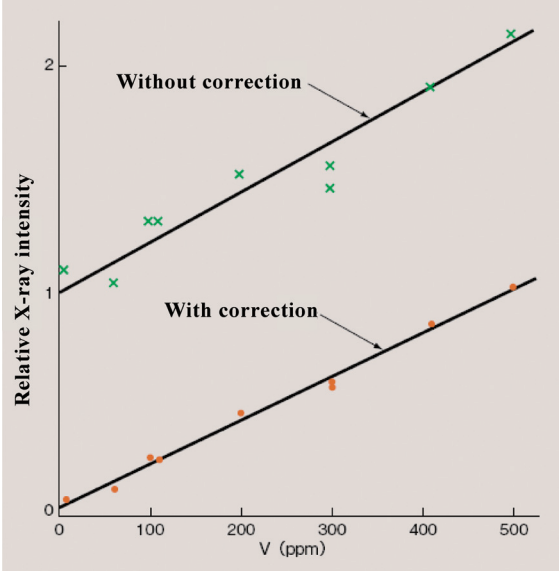

Fig. 1. Vanadium analysis in stainless steel.

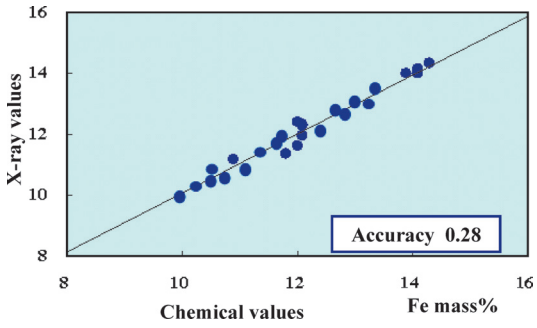

Fig. 2. Fe content analysis in galvaneal steel sheet.

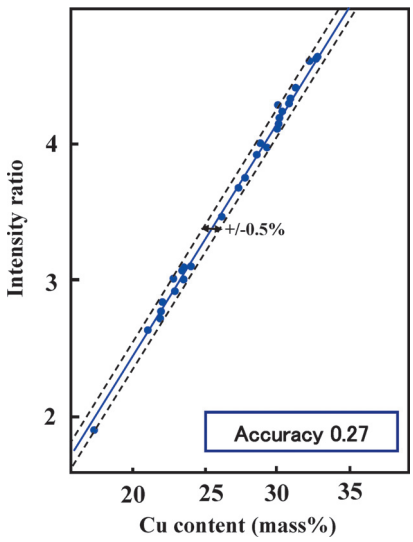

Fig. 3. Copper analysis in copper concentrates.