
Product Information

Desktop X-ray Fluorescence Spectrometer ZSXmini

-High-precision analysis with a wavelength dispersive type analyzer-



1. Introduction

X-ray fluorescence analysis today has become an indispensable analysis method in numerous fields as its application has extended from the conventional use for process control and R & D to new fields such as environmental samples and industrial waste.

The ZSXmini analytical system has been developed to meet the demands for a smaller-sized and lower-priced X-ray fluorescence analyzer. It is a desktop wavelength-dispersive spectrometer perfected by Rigaku with its expertise and long experience in instrumentation. Significantly, the ZSXmini has resolved the problems that have plagued the energy dispersive systems, such as poor

resolution and sensitivity as well as high maintenance costs due to the use of liquid nitrogen. The ZSXmini has eliminated the drawbacks related to the nondispersive type analyzer dedicated to a single element, which are, low precision and lack of flexibility.

The ZSXmini employs user-friendly software, so even a novice can carry out high-degree analysis.

2. Features

(1) An energy saving design by use of a compact X-ray tube not requiring cooling water, coupled with an 110V low-power supply.

(2) A desktop, wavelength dispersive designed for precise analysis and resolution covering the elements ranging from ${}_{9}\text{F}$ to ${}_{92}\text{U}$. A

scanning goniometer provides the ability to do complete qualitative analysis.

(3) No need of liquid nitrogen like the energy dispersive systems .

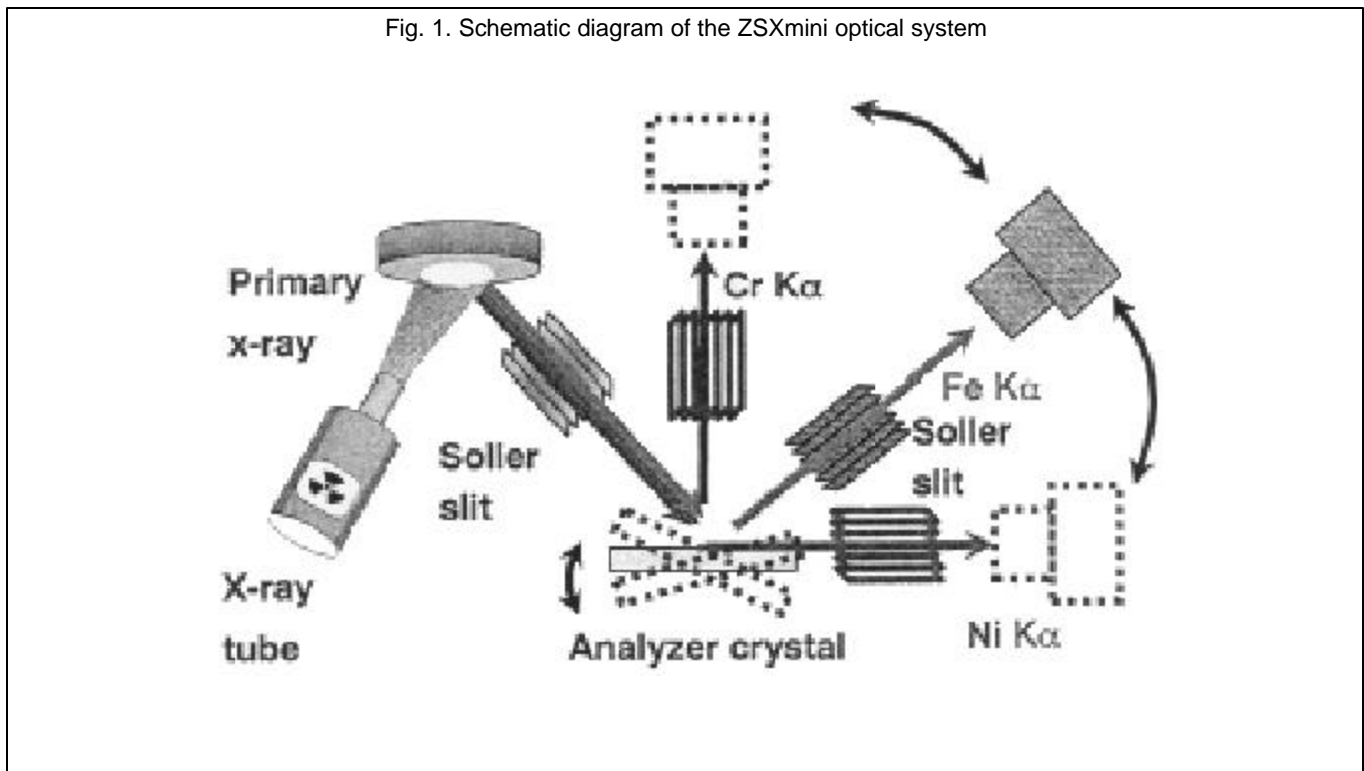
(4) The ZSXmini comes in various configuration from a single position to a 12 position sample changer. In addition a large chamber model is available for a large and irregular type samples including archaeological ones.

(5) Tube below optics allows easy sample loading in the case of liquid sample analysis,.

(6) A Pd tube is standard, for improved analysis of Cl.

(7) Easy-to-run software so that even a novice can be assured of simple operation.

Fig. 1. Schematic diagram of the ZSXmini optical system



3. Scope of Application

The ZSXmini covers a broad range of applications in different fields.

Type of business	Oil industry	Ceramic industry	Machine and metal industries	Paper and film industries	Art and excavation
Object of analysis	<ul style="list-style-type: none"> •Light oil •Gasoline •Lubricant •Fuel oil 	<ul style="list-style-type: none"> •Cement 	<ul style="list-style-type: none"> •Cast iron, stainless steel •Copper, aluminum •Large metallic parts •Plated sheets and other parts 	<ul style="list-style-type: none"> •Silicon coated film 	<ul style="list-style-type: none"> •Stoneware, earthenware •Curious •Mural
Features	The tube below optics provides high performance in liquid sample measurement.	Can handle light element analysis and more complex matrices.	Excellent resolution permits highly accurate analysis.	Light element analysis can be made with high precision.	Can handle analysis of irregular shape samples and large samples as well.

4. Analysis Example

- (1) Table 1 shows a comparison of calibration curve accuracy with other analyzers for low alloy steel. The data generated by the ZSXmini is more accurate than that produced from the energy dispersive systems and is even comparable to data from a full power X-ray dispersive spectrometer.
- (2) Fig. 2 shows a calibration curve for Portland cement. A good calibration curve can be obtained over the element range extending to light elements even for a sample with a complex matrix.
- (3) Fig. 3 shows a calibration curve for heavy oil. A good calibration curve can be obtained for a liquid sample. Tube below optics allow easy sample handling with the use of a liquid cell.
- (4) Fig. 4 shows a qualitative analysis chart of cement. Since the ZSXmini is a scanning analyzer, elements contained in an unknown sample can be detected by conducting a total qualitative analysis.

Table 1. Comparison of calibration curve accuracy between different types of analyzers. (Unit: mass%)

	ZSXmini	ZSX100s	EDXRF
Si(0.098-0.60)	0.005	0.005	0.015
Mn(0.12~1.59)	0.014	0.010	0.013
P(0.0042~0.038)	0.0009	0.0004	0.0023
Cu(0.056~0.48)	0.0080	0.0012	0.0080
Ni(0.12~4.10)	0.012	0.011	0.037
Cr(0.12~3.08)	0.023	0.022	0.084
Mo(0.047~1.25)	0.006	0.006	0.033
V(0.016~0.40)	0.030	0.003	0.018

The ZSX mini is provided in the following configurations:

1. Measurement under vacuum. For measurement of solid samples and pressed powder sample. A sample spinner is provided as standard.
2. He gas atmosphere type. For measurement of liquid samples. The x-ray chamber is kept under Helium during measurement, while sample chamber remains in the air.

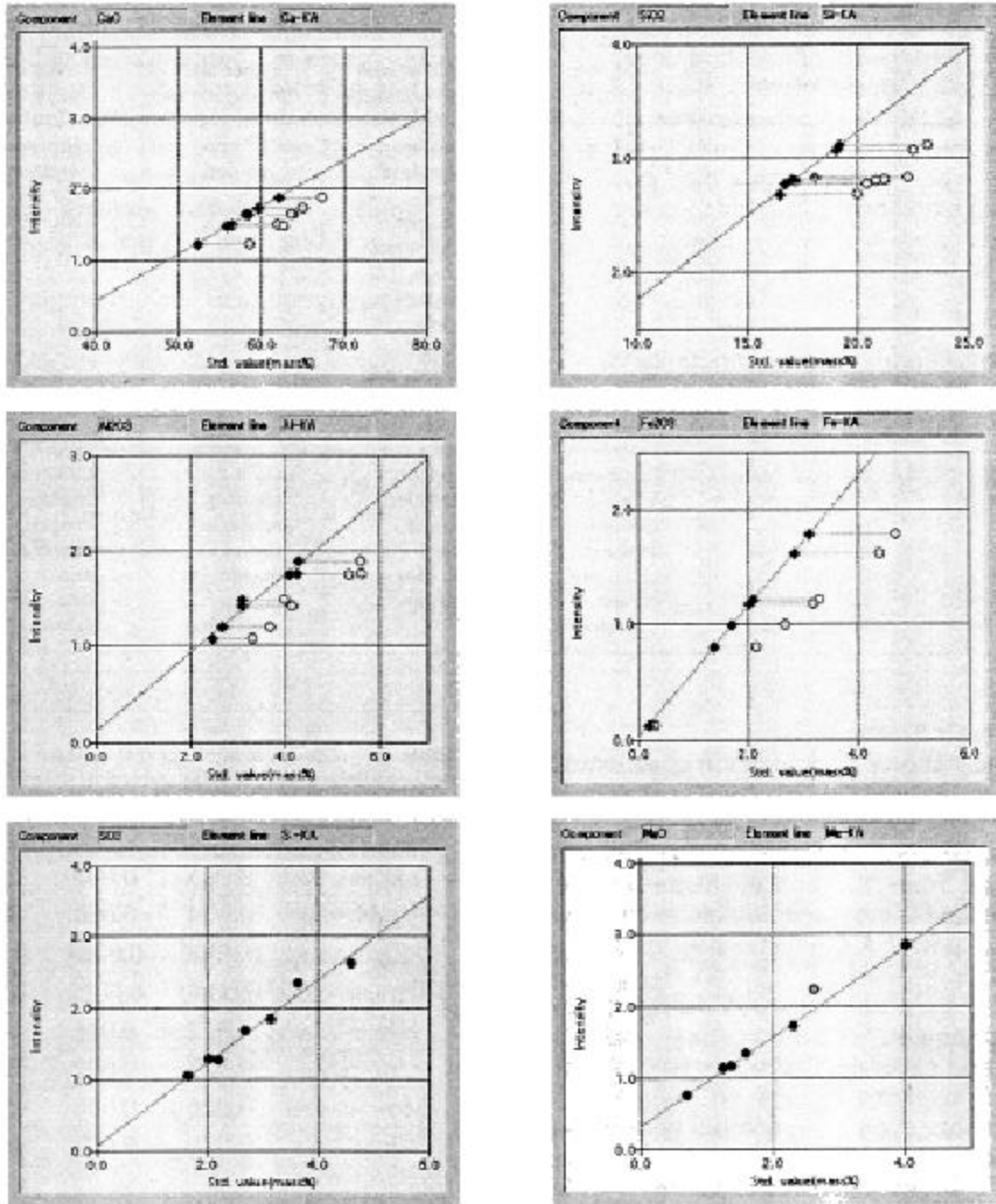


Fig. 2. Calibration curve for Portland Cement.

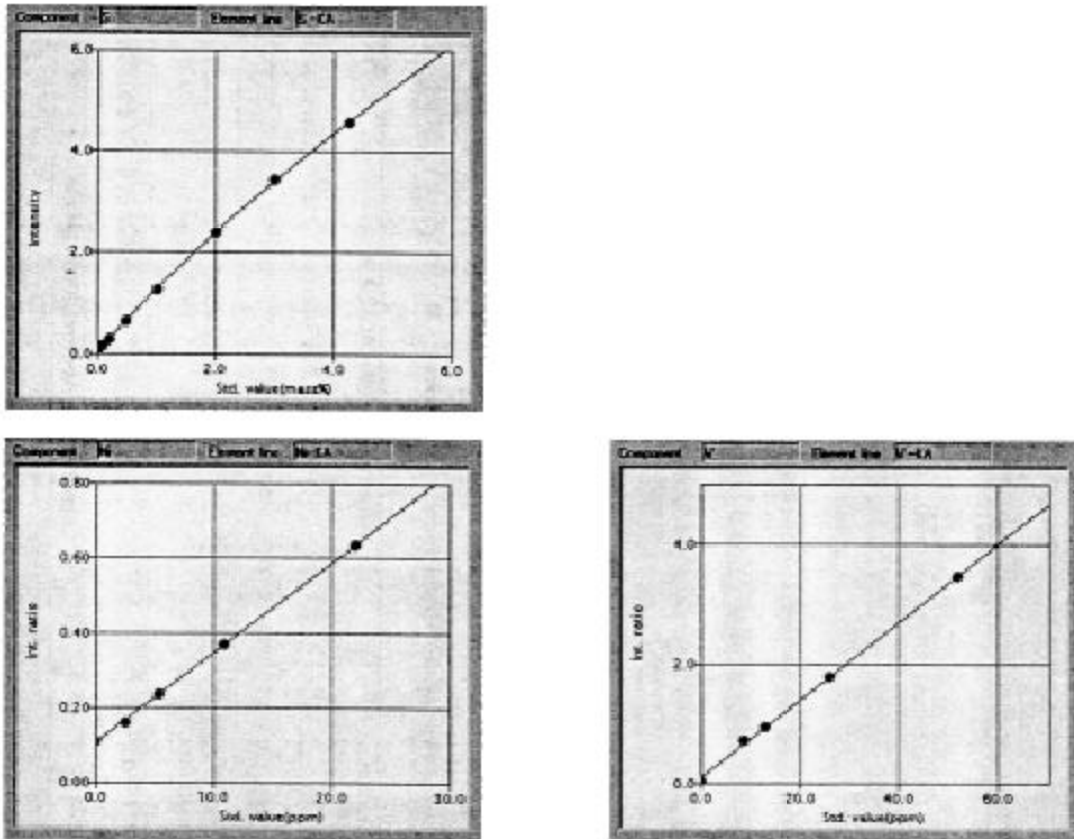


Fig. 3. Calibration curve for heavy oil. (Ni and V were analyzed by the background ratio method.)

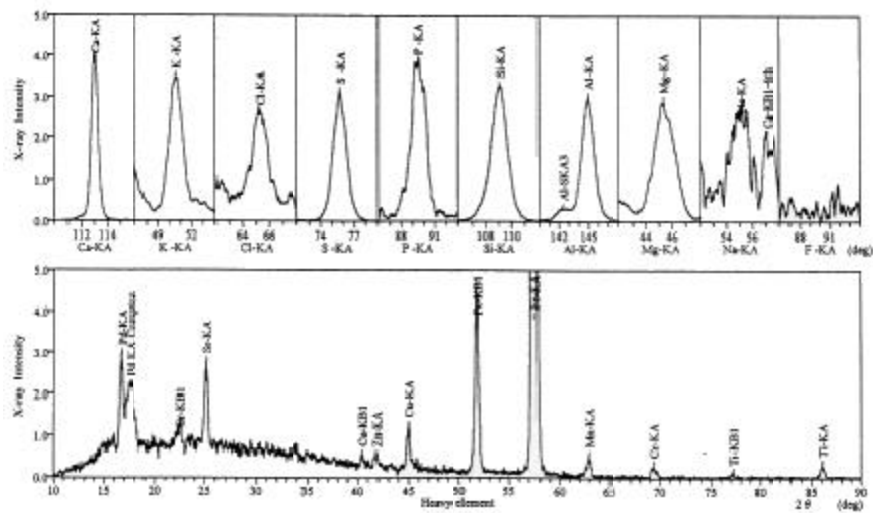


Fig. 4. Qualitative analysis chart of cement. (Sample: Cement NIST 1880)

Specifications							
Atmosphere for measurement		Air/Vacuum			Air/Helium		
X-ray tube	Target material	Pd (standard); choose from Rh, W and Mo (optional)					
X-ray generator	Tube voltage, tube current	40 kV max., 1.2 mA max.					
Crystal changer	Crystal changer	3-crystal auto changer (1 crystal for heavy elements and 2 crystals for light elements installable)					
Analyzing crystal (crystal element)	For heavy element	LiF200 (standard)					
	For light element	PET (standard), TAP (standard), Ge (optional), RX35 (optional)					
Detector	For light element	F-PC with center wire cleaner					
	For heavy element	S-PC					
Area for measurement		Area dia. for measurement: 20 mm dia.					
Sample chamber		One sample chamber	12-sample turret	Large sample	One sample chamber	12-sample turret	Large sample
	Max. sample dimensions	O.D.: 110mm Height: 60 mm	O.D.: 44 mm Height: 33 mm	O.D.: 300 mm Height: 65 mm	O.D. 110 mm Height 60 mm	O.D. 44 mm Height: 33 mm	O.D. 300 mm Height: 65 mm
	Sample holder	One for solid (standard)	12 for solid (standard)	None (standard)	10 for liquid (standard)	20 for liquid (standard)	None (standard)
	Sample spin	30 rpm			None		
	X-ray path atmosphere	Air (standard)/Vacuum (optional)			Air (standard) /He optional		
	Vacuum pump (optional)	Oil rotary pump			None		
	He gas cylinder (optional)	None			One for 40 lit., 15.2 Mpa (150 atom.)		
Data processor	Hardware	IBM AT compatible PC, type 17 CTR (type 15 TFT optional), A4 color ink jet printer					
	OS	Windows 2000					
	Application software	Qualitative analysis, quantitative analysis with FP (fundamental parameters)					
Specifications for installation							
Power requirement	Basic unit	Single phase 110 V AC, 8.5 A (including 6.3 A for turbomolecular pump; 2 A required additionally at time of excitation)			Single phase 100 V AC, 2.2 A		
	PC	Single phase 100 V AC, 1A					
Earth ground		Grounding resistance: Below 30 ohms					
Installation environment		Room temperature: 15 to 28°C, Humidity: Below 75%, Free of corrosive gas					
External dimensions & weight	Basic unit	580 (W) x 750 (D) x 475 (H) mm, approx. 120 kg.					
	Oil rotary pump	183 (W) x 500 (D) x 250 (H) mm, 28 kg					
Detector gas		PR gas (P-10 gas), Consumption: Approx/ 25 m lit/min					
Helium gas	Not required				Consumption: Approx. 300 m lit/min		