THE RIGAKU JOURNAL
VOL. 12 / NO. 2 / 1996

RIGAKU / MiniFlex+

X-RAY DIFFRACTOMETER SYSTEM

1. Introduction

Rigaku general-purpose X-ray diffractometer systems are broadly classified into "D/max" series and this "MiniFlex+" series.

The D/max series offers a research tool to meet a wide range of X-ray analysis, and is used with a variety of diffraction attachments and cameras. According to diversified purposes of measurement, it permits 3-axis rotation of the crystal plane or sample plane, mapping, stress loading, heating and cooling, and so on.

The MiniFlex+ series, on the other hand, is designed mainly to serve as an experimental tool for high school, college and university students. As such, it is available at a reasonably low price and is rather simple in terms of function. Nevertheless it features high-precision measurement comparable to the D/max series.

The MiniFlex+ is suitable also for quality control and inspection in the production field, where the sample material and the measuring condition remain virtually the same. For instance, the MiniFlex+ may be used for control of the composition ratios or mixture ratios as well as for environmental measurement of the quantity of asbestos particle dust for labor safety. In such areas the operational procedures are routine and the result can be easily obtained.

Further, as an X-ray diffractometer, the Miniflex is the world's smallest in size and lightest in weight. It is a desktop type that allows simple transfer and installation in any place where 90 to 127 V AC earth-grounded power supply is available. It may even be taken on a passenger car to a quarry or batcher plant for use as a sorting machine of concrete skeleton materials, etc.

2. Features

(1) Radiation Enclosure & Safety

When the radiation enclosure door is opened, the X-ray shutter will automatically close. This function completely protects the user from exposure.

(2) Display of Instrument Status

Instrument status is available on demand to monitor the functions of the components.

(3) Continuously Variable Slit

The continuously variable slit (patent pending) is linked to the θ-axis, widening to maintain a constant irradiated area as θ becomes larger. This will improve the peak-to-background ratio at low 2θ angles as well as increase the X-ray intensity at high θ angles. These improvements are important

for the measurement of clay minerals, concretes, skeleton materials, etc.

(4) Automatic Sample Changer with 6 positions

Up to 6 samples can be mounted and measured with the automatic sample changer. Each sample can be made to spin to enhance data precision for qualitative and quantitative analysis. The changer option is helpful for routine sample analysis of geological samples, asbestos dust, raw material consistency, etc.

(5) Sample Holders

Two (2) types of holders, for powder and bulk samples, are available for use with the MiniFlex+'s vertical goniometer.

(6) Standard Measurement Software

The MiniFlex+ software with multiple functions is easy to use. The measurement condition set-up includes the following

Sample name — Sample width (stepwise)
Scanning range — Scan speed

Measurement mode (continuous, stepscan, integral measurement, skip scan)

Standard data processing software includes the following.

Profile smoothing — Background subtraction
$K\alpha_2$ removal — Peak search

(7) Qualitative Analysis Software

Identification of phases is achieved through accessing the ICDD databases. This is accomplished through the primary search/match to ICDD card information, a secondary search/match which compares the d-spacings and intensities with the measured data, and a residual search/match which is performed after excluding the major components.

Standard Configuration

X-ray generator	Output	30 kV, 15 mA (fixed)
	High voltage generation	High frequency method
	Stability	Within ±0.05% (for within ±10% input power variations)
	X-ray tube	Standard: Cu-target tube with 1 x $10mm^2$ focus
Detector	Scintillation counter	Scintillator: NaI(Tl)
Goniometer	Type	Vertical type
	Goniometer radius	150 mm
	Slit	DS: θ-axis interlocked variable slit RS: 0.3mm (fixed)
	Scanning range	-3° ~ +150° (2θ)
	Scanning speed	0.01° ~ 100° /min (2θ)
	Slewing speed	1000° /min
Computer (recommended by Rigaku)*	CPU	486DX2 / 66 MHz
	OS	Windows Ver. 3.1
	Main memory	8MB
	Hard disk	540 MB (170MB for notebook)
	Floppy disk drive	3.5", 1 drive
	Display	15" color (640 x 480)
	Printer	Color ink jet (A4)
Software	Standard software	System condition setting
		Manual measurement
		Standard measurement
		Integrated intensity measurement
		Peak search

* If you already own a computer that can meet the above specifications, it may be utilized. For details, contact the nearest Rigaku representative.

Option

Application software	Multiple recording
	Qualitative Analysis
	Simplified qualitative analysis (concrete skeleton material analysis
	ICDD database management
	ICDD database (PDF-1, PDF-2)
	Environmental particle dust quantitation (asbestos quantitation)
Components and attachments	Air cooled heat exchanger
	Specimen rotation attachment
	Auto sample changer with 6 positions
	Auto-transformer

4. Installation Requirements

Power supply	Basic unit	Single-phase 90V ~ 127V AC, 10A...1 unit
	Computer	Single-phase 100V AC, 5A ... 3 units
	Air cooled heat exchanger	Single-phase 100V AC, 8A ... 1 unit
Grounding		Grounding resistance: 100 Ω or less
Cooling water	Feed water (30°C or less)	2 lit/min or more (1 ~ 3 kg/cm^2)...1 unit (hose I.D.: 10 mm dia.)
	Drain	Drain port: 200 mm high or less from the floor level (must allow natural discharge)

(Note) The power cable, grounding cable and feed water & drain hoses provided as standard are 5 meters long, respectively)

Dimensions and Weight of Equipment

Basic unit: 560(W) x 315(D) x 582(H) mm, 59kg