Micro-Z ULS

Wavelength dispersive X-ray fluorescence

WDXRF ultra-low sulfur analyzer

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Rigaku

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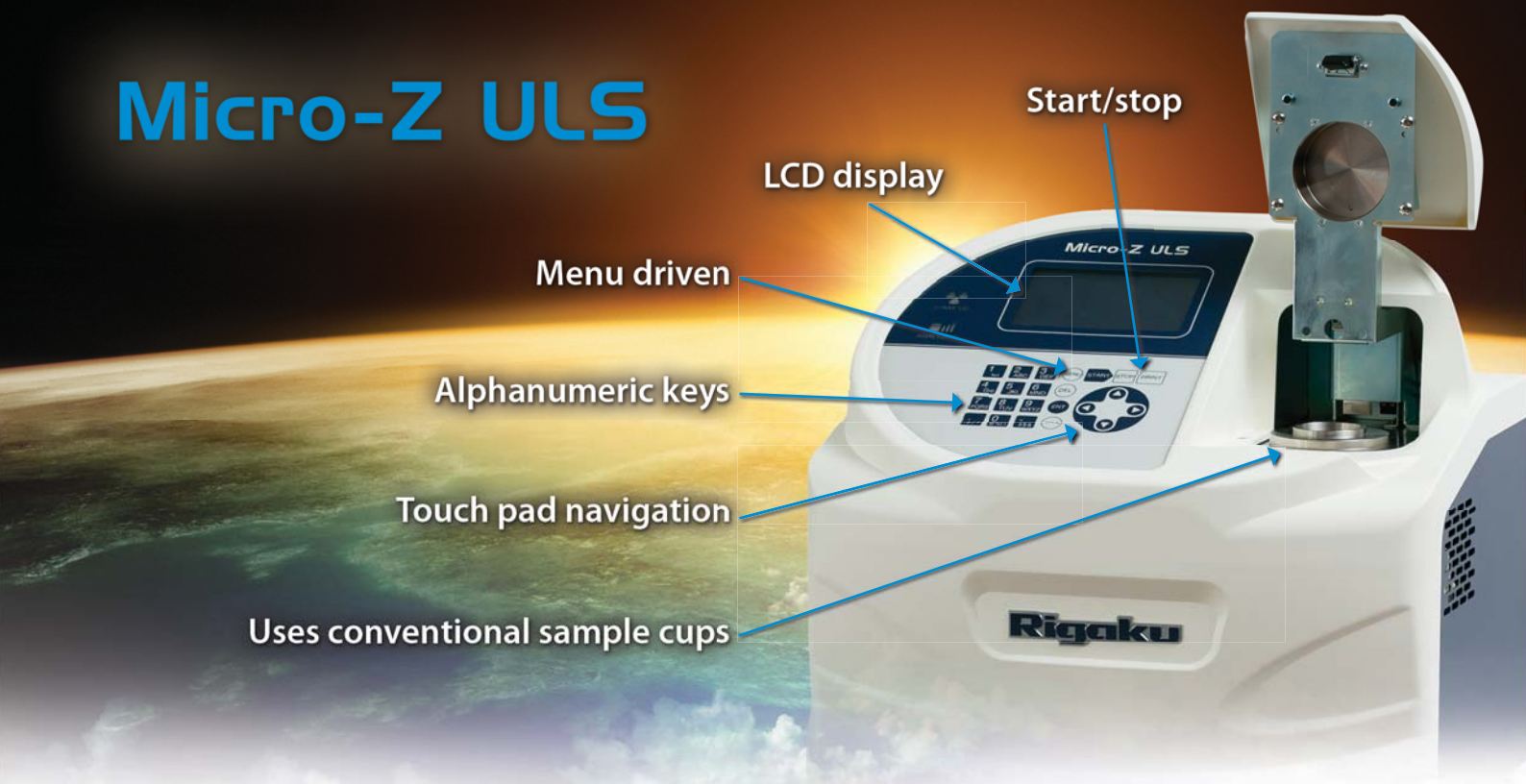
Micro-Z ULS



Ultra-low sulfur analyzer delivers performance with Rigaku durability

Proven design and analytical functionality

Designed for ultra-low level sulfur analysis of diesel, petrol (gasoline) and other fuels, the Rigaku Micro-Z ULS wavelength dispersive X-ray fluorescence (WDXRF) instrument features a novel design that measures both the sulfur peak and the background intensity. The ability to measure and correct for changes in background intensity delivers a better net peak intensity measurement, resulting in superior calibrations and enhanced real world precision. Rigaku Micro-Z ULS complies with ASTM 2622-10, ISO 20884 and JIS K2541-7 methods.

Confident measurements for demanding standards

The US Environmental Protection Agency (EPA) proposed Tier 3 standards for gasoline sulfur content for light-duty and medium-duty passenger vehicles. With a proposed start in 2017, the Tier 3 program is also harmonized with the California Air Resources Board (CARB) Low Emission Vehicle (LEV III) program, enabling automakers to sell the same vehicles in all 50 US states.

EPA is proposing that federal gasoline contain no more than 10 parts per million (ppm) of sulfur on an annual average basis by January 1, 2017, down from the current 30 ppm standard. In addition, EPA is proposing to either maintain the current 80 ppm refinery gate and 95 ppm downstream caps, or lower them to 50 and 65 ppm respectively.

The proposed Tier 3 gasoline sulfur standards are similar to levels currently in place in California, Europe, Japan, South Korea, and several other countries. A 15 ppm sulfur specification, known as Ultra Low Sulfur Diesel (ULSD), was phased in for highway diesel fuel in the US beginning in 2006.

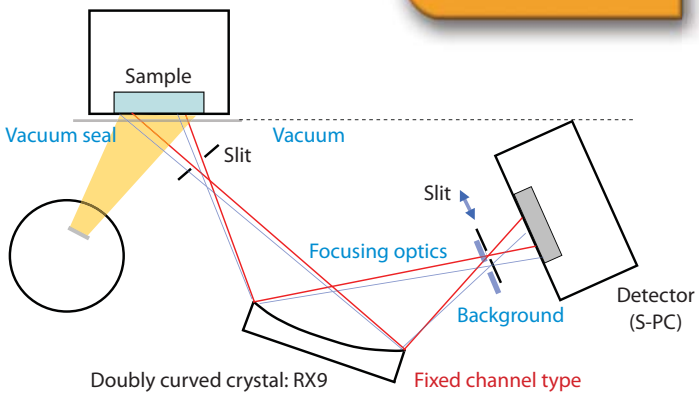
ASTM D2622-10, ISO 20884 and JIS KI2541-7 compliant

Sulfur
16
S
Atomic Weight = 32.07

Superior optics for reliable performance

The Rigaku Micro-Z ULS is the ideal solution for sulfur analysis of petroleum-based fuels, with a lower limit of detection (LLD) of 0.3 ppm sulfur. Employing robust fixed optics in a vacuum environment, and featuring a specially designed doubly curved RX-9 analyzing crystal, the Micro Z ULS delivers consistent high sensitivity measurements.

Specifically designed for non-technical users, all operations – from calibration through routine analysis – can be performed via the easy-to-use interface. The analyzer can be powered by any standard "wall" AC outlet.



Schematic of the close-coupled optical design. Note that the moveable receiving slit allows for measurement of both peak and background intensity.

Calibration results using Micro-Z ULS (units: ppm)

Material	Diesel fuel	Isooctane (for gasoline)
Calibration range	0 – 100	0 – 100
Accuracy	0.49	0.37
LLD	0.3	0.3

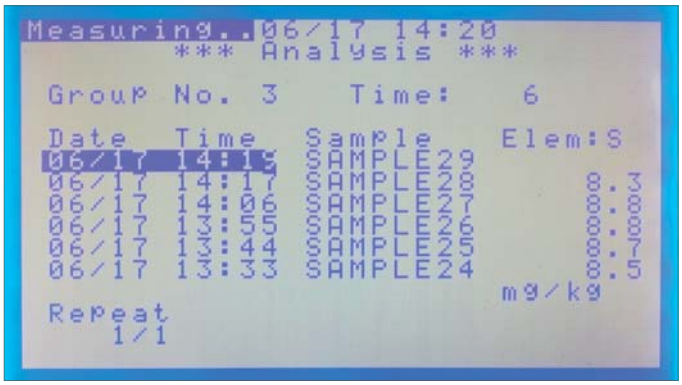
(a) Diesel fuel

Run #	Average ((mg/kg)	Difference (mg/kg)
1	8.0	0.3
2	8.2	0.1
3	8.1	0.3
4	8.0	0.3
5	8.2	0.1
6	8.1	0.3
7	8.1	0.3
8	8.2	0.1
9	8.1	0.0
10	8.1	0.1
11	8.2	0.5
12	8.5	0.0
13	8.6	0.2
14	8.7	0.0
15	8.4	0.7
16	8.3	0.6
17	8.3	0.5
18	8.0	0.2
19	8.2	0.7
20	8.3	0.5
Avg.	8.2	
Maximum		0.7
ASTM limit		0.8

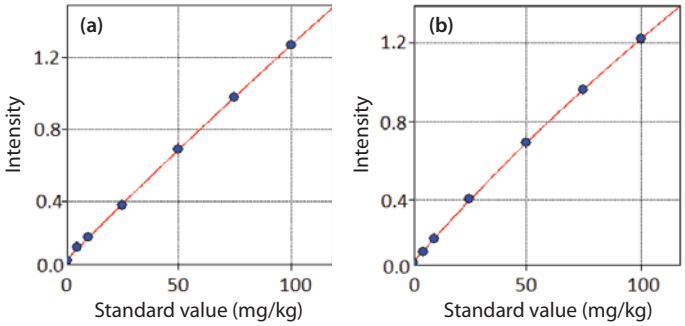
(b) Gasoline

Run #	Average ((mg/kg)	Difference (mg/kg)
1	11.8	0.8
2	11.7	0.7
3	12.1	0.1
4	11.8	0.8
5	11.5	0.1
6	11.5	0.1
7	11.8	0.4
8	12.1	0.4
9	12.1	0.4
10	11.7	0.4
11	11.7	0.4
12	11.9	0.2
13	11.7	0.1
14	12.0	0.6
15	12.1	0.4
16	11.6	0.6
17	11.5	0.3
18	11.6	0.0
19	11.6	0.1
20	11.8	0.4
Avg.	11.8	
Maximum		0.8
ASTM limit		1.1

Repeatability results for Micro-Z ULS (ASTM D2622-10)



Instrument status, through to analytical results, are selectable with the touch of a finger.



Calibration curve for each material of Micro-Z ULS

(a) Diesel fuel
(b) Isooctane (for gasoline)

Micro-Z ULS

Wavelength dispersive X-ray fluorescence

Specifications

Instrument:
- Wavelength dispersive X-ray fluorescence analyzer
  - Includes vacuum pump
- Element range: sulfur (S), LLD = 0.3 ppm
- Application: analysis of fuels for sulfur content
- Single measurement position (std. 35 mm cup)

Supported methods:
- ASTM D2622-10
- ISO 20884 and JIS KI2541-7

Excitation:
- 40 kV Cr-anode X-ray tube
- 40 W max power

Detection:
- Doubly curved RX-9 analyzing crystal
- Sealed proportional counter
- Fixed optics with switchable receiving slit
  - To select peak or background
- Pulse height analyzer (PHA)

Atmosphere:
- Sample analysis in air
- Optics are under vacuum

Environmental conditions:
- Ambient temperatures 15 – 28°C
- Relative humidity <75% non condensing
- Vibration undetectable by human
- Free from corrosive gas, dust, and particles

Dimensions / power:
- Analyzer: 450 x 410 x 440 mm, 36 kg
- Pump: 323 x 142 x 189 mm, 10 kg
- 100-120 VAC, 15 A or 200-240 VAC, 10 A

Backed by Rigaku

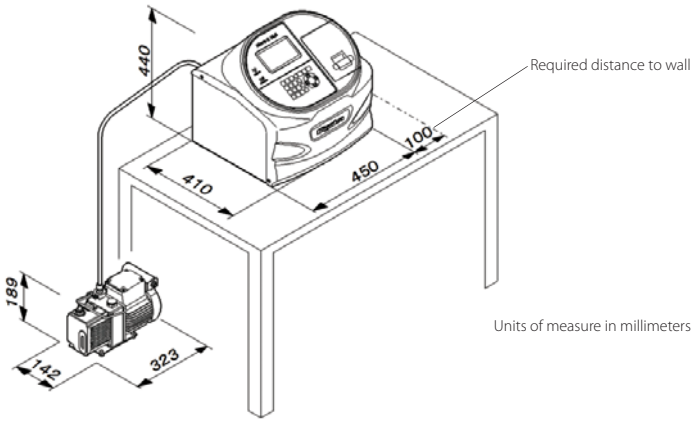
Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. Today, with hundreds of major innovations to our credit, the Rigaku Group of Companies are world leaders in the field of analytical X-ray instrumentation. Rigaku employs over 1,100 people worldwide in operations based in Japan, the U.S., Europe, South America and China.

Computer:
- Embedded dedicated processor
- Proprietary operating system

Software:
- Up to 10 calibrations
- Up to 30 standards per calibration
- Selectable analysis time (up to 900 s)
- Drift correction
- Pulse height analyzer (PHA) adjustment

User interface:
- LCD display
- Embedded computer
- Membrane keypad and navigation

Options:
- Thermal dot printer
- RS-232C data output



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