# WDXRF-3020

## X-ray Fluorescence Analyzer

# ▸▸ WDXRF-3020 Wavelength Dispersive Spectrometer

## Application Fields:

Building Materials
  (cement, glass, ceramics)
Metallurgy
  (steel, non-ferrous metals)
Petroleum
  (trace elements S, Pb and so on)
Chemical Engineering
Geography and Mining
Commodity Inspection
Quality Inspection
Human Body Trace Elements Inspection
......

WDXRF-3020 Compact Multi-channel X-ray Fluorescence Spectrometer, with configuration of 10 fixed channels. and capability to analyze 10 elements simultaneously, is able to conduct elemental analysis of arbitrary ten elements from Na to U based on the users' requirements. This instrument is widely used in cement, steel, powder metallurgy, coal, petroleum, kaolin, glass, refractory materials and environment protection, and accordingly an ideal choice for quality control in large and middle-scaled enterprises.

# ▸▸ SPECIFICATION

Model: WDXRF-3020
Temperature control accuracy of constant temperature chamber: setting value±0.1  .
Measurable elements: 10 arbitrary elements from Na to U.
Analysis algorithms: empirical coefficient algorithm and theoretical -coefficient algorithm.
AC220V power supply: 1KVA AC purified stabilized voltage power supply.
High voltage supply: 200W (50KV4mA).
12-hour stability of tube voltage & tube current: less than 0.05%.
Vacuum pump: biphase~220V,2 liters.
Industrial computer: industrial 104 computer.
Analysis accuracy: n-1(24 hours, percent content) ≤0.05%.
Measurement time of single sample: (including time for changing samples and vacuum pumping) ≤3-5 minutes.
X-ray tube: 400W thin Be end window X-ray tube made by Varian company, Rh anode (Pd anode optional).
Detector: gas proportional detector + sealed proportional detector; 10 path 1024 channel independent pulse height analyzer.
Vacuum system: independent vacuum pump station, easy maintenance.
The highest vacuum degree: lower than 5 Pa.
Gas flow system: High Sophisticated Gas Density Stabilizer with pressure stability up to ±0.003 Kpa.
Analysis software: equipped with software for two quantitative analysis algorithms: empirical coefficient algorithm and

theoretical a-coefficient algorithm. With innovative technology of full spectrum analysis, every spectrum line can be timely traced and corrected, which greatly improves the repeatability and stability of quantitative analysis and also serves as intuitive evidence of instrument status diagnosis. Complete measures for self- diagnosis are supplied. In-built RS-232 serial communication protocol, TCP/IP protocol (S/C based on Socket) and OPC protocol (OPC server) all offer ways to share data with DCS or QCS system.

## ▶▶ excellent qualities

- Rapid and non-destructive analysis of powder and bulk samples.

- Multi-channel high speed MCA offers timely measurement of every element peak, benefiting not only instrument debugging and failure diagnosis but also the enhancement of stability of the instrument.

- Compared with sequential scan large power spectrometers, WDS-200 gains adequate analysis precision even when lower power and equal measurement time are adopted, which not only endows the instrument with high cost performance, but also prevents wearing of the goniometer, prolongs the service life of X-ray tube minimizes failures of the high voltage power supply and reduces the maintenance cost of the whole instrument.

[Principle of X-ray Fluorescence Analysis】

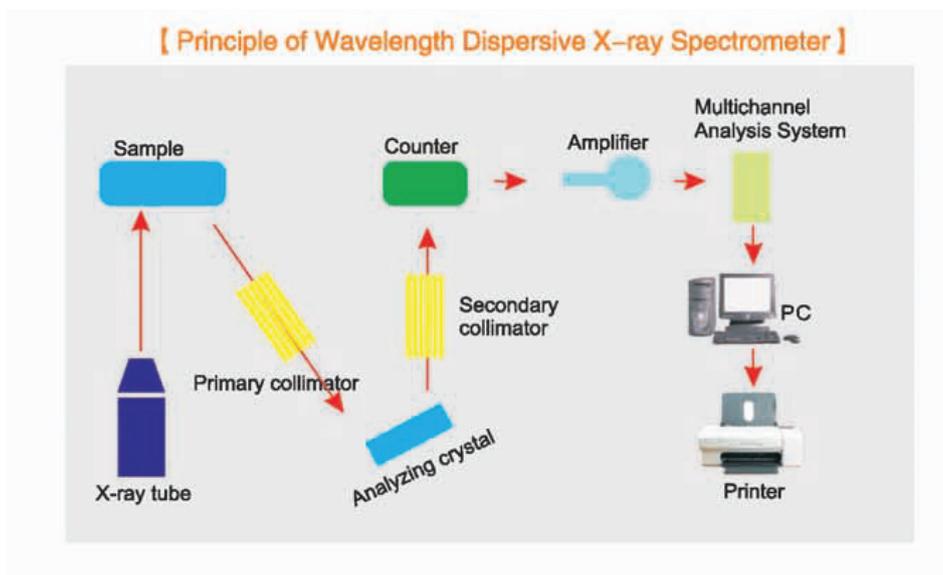## ▶▶ Element characteristic X-ray radiation

Different elements have extra-nuclear electronic orbitals of different binding energies, as a result, they give off X-ray photons carrying energies different from each other when excited, that is, each element emits X-ray at its own special energy, representing the characteristic of this element and accordingly called characteristic X-ray. Characteristic X-ray of each element has its specific wavelength; so when we detect X-ray of specific wavelength, we can identify the presence of the interested element in a sample.
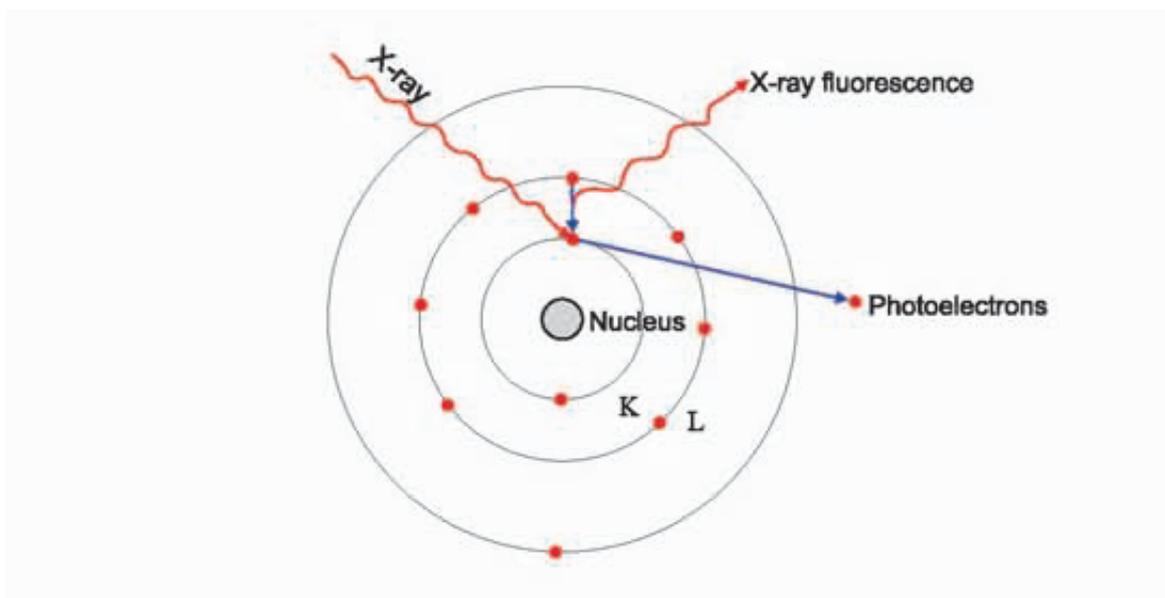
# ▶▶ Principle of Wavelength Dispersive Spectroscopy

When many elements coexist in a sample and get irradiated by primary X-ray emitted from the X-ray tube, they will emit their corresponding characteristic X-rays, which in general are termed as X-RAY FLUORESCENCE. To separate and measure characteristic X-rays of these elements is called X-ray Fluorescence Spectroscopy. As characteristic X-rays of different elements have specific wavelengths, they can be separated by using Crystal Diffraction based on Bragg Equation. This kind of spectroscopy is called Wavelength Dispersive Spectroscopy.

Bragg Equation: $2d\sin\theta = \eta\lambda$ Where d is the interplanar spacing of the lattice planes of the crystals, is the angle of incidence and diffraction, A is the wavelength of the incident radiation, n is the order of diffraction and is an integer.



【 Principle of Wavelength Dispersive X–ray Spectrometer 】

# ▶▶ Software Review

## Functions:

| setting- up and monitoring | Performance Test | Sample Test | Resul Retrieval | Preparation of Working Curve |
|---|---|---|---|---|

## Advantages of the Software:

1、 Self-developed software system for X-ray Fluorescence Analyzers, applicable to windows operating system.
2、 Easy manipulation realized by operating interface in all Chinese language.
3、 With innovative technology of full spectrum analysis, every spectrum line can be timely traced and corrected, which greatly improves the repeatability and stability of quantitative analysis and also serves as intuitive evidence of instrument status diagnosis.
4、 Equipped with software for two quantitative analysis algorithms: empirical coefficient algorithm and theoretical a-coefficient algorithm, among which the latter algorithm reduces the number of standard samples greatly and retains adequate accuracy at the same time.
5、 Analysis data treatment including linear fitting and all kinds of matrices correction.
6、 Calculation of characteristic value based on analysis value.
7、 Man-machine interaction, allowing you to set and modify parameters.
8、 Timely output of analysis data and report.
9、 Complete self-diagnosis measures.

# ▶▶ Spectrum of Wavelength Dispersive Spectrometer
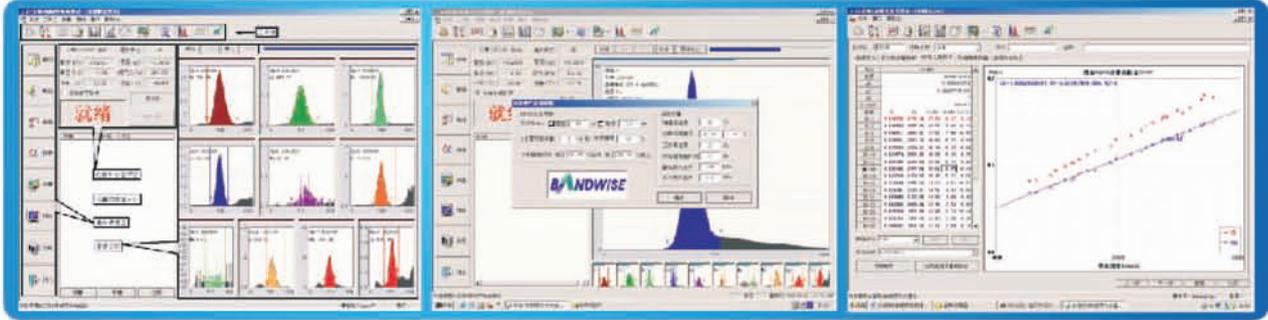


# ▶▶ Results of Cement Measurement

### Cement Standard XS04-2

| XS04-2 | Si | Al | FE | CA | Mg |
|---|---|---|---|---|---|
| Standard Value | 12.71 | 2.86 | 3.09 | 43.29 | 1.6 |
| Average Value | 12.724 | 2.862 | 3.074 | 43.318 | 1.584 |

### Continued

| XS04-2 | Si | Al | FE | CA | Mg |
|---|---|---|---|---|---|
| Max Value | 12.71 | 2.84 | 3.07 | 43.3 | 1.57 |
| Range | 0.03 | 0.04 | 0.01 | 0.05 | 0.04 |
| SDV | 0.011136 | 0.01077 | 0.004899 | 0.017776 | 0.013565 |
| RDV | 0.087516 | 0.376322 | 0.159368 | 0.041037 | 0.856355 |

### Cement Standard XS05-2

| XS04-2 | Si | Al | FE | CA | Mg |
|---|---|---|---|---|---|
| Average Value | 8724.72 | 1060.937 | 2657.513 | 23576.84 | 302.405 |
| Max Value | 8733.5 | 1065.37 | 2661.84 | 23596.69 | 304.96 |
| Min Value | 8715.27 | 1054.96 | 2652.05 | 23562.46 | 300.76 |
| SDV | 6.626293 | 2.963579 | 3.476547 | 11.31869 | 1.419699 |
| RDV | 0.075948 | 0.279336 | 0.13082 | 0.048008 | 0.469469 |

# ▸▸ Results of Agglomerate Measurement

**Below are the results of repeated tests of the unknown sample:**

| No | Sample No | Measurement Time | Fe(%) | CaO(%) | MgO(%) | SiO. (%) | So.(%) |
|----|-----------|------------------|-------|--------|--------|----------|--------|
| 1 | 17# | 2007-11-09 13:35 | 53.87 | 12.10 | 3.44 | 5.73 | 0.040 |
| 2 | 17# | 2007-11-09 13:39 | 53.89 | 12.08 | 3.43 | 5.74 | 0.040 |
| 3 | 17# | 2007-11-09 13:42 | 53.91 | 12.08 | 3.44 | 5.75 | 0.039 |
| 4 | 17# | 2007-11-09 13:46 | 53.91 | 12.10 | 3.44 | 5.76 | 0.040 |
| 5 | 17# | 2007-11-09 13:50 | 53.90 | 12.07 | 3.45 | 5.76 | 0.039 |
| 6 | 17# | 2007-11-09 13:53 | 53.89 | 12.09 | 3.43 | 5.75 | 0.041 |
| 7 | 17# | 2007-11-09 13:57 | 53.90 | 12.09 | 3.45 | 5.75 | 0.042 |
| 8 | 17# | 2007-11-09 14:01 | 53.89 | 12.09 | 3.46 | 5.76 | 0.040 |
| 9 | 17# | 2007-11-09 14:05 | 53.89 | 12.09 | 3.44 | 5.75 | 0.039 |
| 10 | 17# | 2007-11-09 14:08 | 53.88 | 12.08 | 3.44 | 5.75 | 0.040 |

**Test of 18-hour stability taken by unknown sample 17#; the results after total 306 times are:**

| Components | Average | Min | Max | SD |
|------------|---------|-----|-----|-----|
| Fe (%) | 53.891 | 53.850 | 53.920 | 0.012 |
| CaO(%) | 12.086 | 12.040 | 12.120 | 0.014 |
| MgO(%) | 3.446 | 3.420 | 3,470 | 0.010 |
| SiO,(%) | 5.752 | 5.710 | 5.780 | 0.010 |
| So,(%) | 0.040 | 0.038 | 0.042 | 0.001 |

# ▸▸ Results of Converter Slag Measurement

**Below are the results of repeated tests of the unknown sample:**

| No | Sample No | Measurement Time | Fe(%) | SiO$_2$(%) | CaO(%) | MgO(%) |
|----|-----------|------------------|-------|-----------|--------|--------|
| 1 | D1-2702A | 2007-11-12 16:52 | 12.75 | 7.74 | 50.41 | 9.11 |
| 2 | D1-2702A | 2007-11-12 16:56 | 12.73 | 7.77 | 50.39 | 9.12 |
| 3 | D1-2702A | 2007-11-12 17:00 | 12.71 | 7.78 | 50.38 | 9.14 |
| 4 | D1-2702A | 2007-11-12 17:04 | 12.73 | 7.78 | 50.35 | 9.14 |
| 5 | D1-2702A | 2007-11-12 17:08 | 12.74 | 7.80 | 50.33 | 9.15 |
| 6 | D1-2702A | 2007-11-12 17:11 | 12.76 | 7.80 | 50.27 | 9.18 |
| 7 | D1-2702A | 2007-11-12 17:15 | 12.76 | 7.80 | 50.27 | 9.18 |
| 8 | D1-2702A | 2007-11-12 17:19 | 12.76 | 7.80 | 50.25 | 9.18 |
| 9 | D1-2702A | 2007-11-12 17:22 | 12.77 | 7.81 | 50.24 | 9.19 |
| 10 | D1-2702A | 2007-11-12 17:26 | 12.76 | 7.82 | 50.24 | 9.23 |

**Test of 15-hour stability taken by unknown sample D1-2702; the results after total 253 times are:**

| Components | Average | Min | Max | SD |
|-----------|---------|-----|-----|-----|
| Fe(%) | 12.782 | 12.710 | 12.840 | 0.021 |
| SiO,(%) | 7.818 | 7.740 | 7.840 | 0.011 |
| CaO(%) | 50.215 | 50.160 | 50.410 | 0.030 |
| MgO(%) | 9.217 | 9.110 | 9.290 | 0.027 |

# HPLC Servicing, Validation, Trainings and Preventive Maintenance :

**HPLC Servicing** :HPLC Servicing : We have team of service engineers who can attend to any make of HPLC promptly @the most affordable cost.

**Trainings** :We also take up preventive Maintenace to reduce downtime of HPLC's Trainings.

**AMC's/CMC** :AMC's/CMC :We offer user training both in-House and at customer sites on HPLC principles, operations, trouble-shooting.

**Validations** :Validations :We have protocols for carrying out periodic Validations as per GLP/GMP/USFDA norms.

**Instruments** :Instruments :We offer instruments/Renting Services Modules like pumps,detector etc. on Rent.



## About Analytical Technologies

Analytical Technologies is synonymous for offering technologies for doing analysis and is the Fastest Growing Global Brand having presence in at least 96 countries across the global. Analytical Technologies Limited is an ISO:9001 Certified Company engaged in Designing, Manufaturing, Marketing & providing Services for the Analytical, Chromatography, Spectroscopy, Bio Technology, Bio Medical, Clinical Diagnostics, Material Science & General Laboratory Instrumentation. Analytical Technologies, India has across the Country operations with at least 4 Regional Offices, 6 Branch Offices & Service Centers. Distributors & Channel partners worldwide.
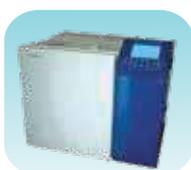
## Our Products & Technologies

| | | | | | | |
|---|---|---|---|---|---|---|
| UV/VIS Spectro 2080+ Double Beam | Infra FTIR | Optima Gas Chromatograph 3007 | Optima Gas Chromatograph 2979 Plus | Flash Chromatograph | Atomic Absorption Spectrophotometer | Liquid Partical Counter |
| Optical Emission Spectrophotometer | DSC/TGA | Semi Auto Bio Chemistry Analyzer | HEMA 2062 Hematology Analyzer | Micro Plate Reader/Washer | URINOVA 2800 Urine Analyzer | Total Organic Carbon 3800 |
| Fully Automated CLIA | NOVA-2100 Chemistry Analyzer | PCR/Gradient PCR/ RTPCR | TOC Analyzer | Laser Particle Size Analyzer | Ion Chromatograph | Water purification system |

# Regulatory compliances



# Corporate Social Responsibility



Analytical Foundation is a nonprofit organization (NGO) found for the purpose of:

1.Research & Innovation Scientist's awards/QC Professional Award : Quality life is possible by innovation only and the innovation is possible by research only, hence ANALYTICAL FOUNDATION is committed to identify such personallities for their contributions across various field of Science and Technology and awarding them yearly. To participate for award, send us your details of research / testing / publication at Info@analyticalfoundation.org

2. Improving quality of life by offering YOGA Training courses, Work shops/Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXIFY human minds,souls and body by means of yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Camps etc.





**HPLC Solutions    MultipleLabs    Analytical Bio-Med    Analytical Distributors    Analytical Foundation (Trust)**

| | | | |
|---|---|---|---|
| **Corporate & Regd. Office:**<br>Analytical House, # E67 & E68,<br>Ravi Park, Vasna Road, Baroda,<br>Gujarat 390 015. INDIA | T: +91 265 2253620<br>+91 265 2252839<br>+91 265 2252370<br>F: +91 265 2254395 | E: info@hplctechnologies.com<br>info@multiplelabs.com<br>info@analyticalgroup.net | W. www.analycalgroup.net<br>www.hplctechnologies.com<br>www.multiplelabs.com | Sales & Support Offices:<br>across the country :<br>Distributors & Channel<br>partners World Wide |