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BENCHTOP UV FLUORESCENCE SULFUR ANALYZER

Benchtop UV Fluorescence Sulfur Analyzer – ToronFSA™ 5453

ToronFSA™ 5453 is a fully automatic ultraviolet fluorescence sulfur analyzer for the precise determination of total sulfur content in petroleum products, crude oil, hydrocarbons, engine fuels, liquefied petroleum gas (LPG), and petrochemicals. Combining high-temperature combustion with UV fluorescence detection, this sulfur analyzer delivers high sensitivity, low noise, a wide linear measurement range (0.05 mg/L – 10000 mg/L), strong anti-interference capability, and stable results that meet or surpass the performance of comparable instruments.

The ToronFSA™ 5453 features a 136-position fully automatic vertical injector, a membrane dryer system that replaces traditional magnesium perchlorate desiccants, an intelligent auto-switching cooling fan, precision gas flow control, and flexible single-point and multi-point calibration with auto-generated curves. It complies with ASTM D5453, ASTM D4239, SH/T 0689, and equivalent international standards, making it a fully compliant sulfur analyzer for both regulatory testing and quality control.

APPLICATIONS

Benchtop UV Fluorescence Sulfur Analyzer – ToronFSA™ 5453 Applications

- Total sulfur determination in refined petroleum products including gasoline, diesel, jet fuel, and heating oil
- Sulfur analysis in crude oil, crude oil fractions, and vacuum residues
- Sulfur content measurement in hydrocarbons, engine fuels, and liquefied petroleum gas (LPG)
- Ultra-low sulfur fuel (ULSF) compliance testing for regulatory and specification requirements
- Sulfur monitoring in petrochemical process streams and intermediate products
- Research and development of sulfur removal processes, hydrodesulfurization (HDS) optimization, and fuel formulation

- Environmental monitoring and emissions compliance testing for sulfur in fuels
- Quality control in refinery laboratories, fuel distribution, and blending operations

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Standards & Compliance

- ASTM D5453: Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence
- ASTM D4239: Standard Test Method for Sulfur in the Analysis Sample of Coal and Coke Using High-Temperature Tube Furnace Combustion Methods

FEATURES

Benchtop UV Fluorescence Sulfur Analyzer – ToronFSA™ 5453 Key Features

- Versatile application: suitable for sulfur analysis in refined oils, crude oil, hydrocarbons, engine fuels, LPG, and petrochemicals
- Advanced combustion system with blind-end quartz cracking tube ensuring thorough sample combustion and high detection accuracy
- Precision gas flow control with stabilized gas path pressure fluctuation prevention and automatic shutdown protection if gas pressure exceeds safe limits
- Intelligent cooling: auto-switching cooling fan for low-noise, hassle-free thermal management during continuous operation
- High-performance UV fluorescence components: UV fluorescence detector, photomultiplier tube (PMT), and UV lamp for superior stability and long-term accuracy
- Innovative membrane dryer system replacing traditional magnesium perchlorate desiccant, significantly reducing maintenance requirements and consumable costs
- 136-position fully automatic vertical injector with auto-sampler functions including automatic cleaning, bubble elimination, standard curve plotting, and adjustable sampling speed to minimize human error
- Flexible calibration: supports single-point and multi-point calibration with automatically generated calibration curves

- Wide linear measurement range: 0.05 mg/L to 10000 mg/L total sulfur with 0.01 mg/L minimum detection limit
- High repeatability: ≤0.5% for 0.05–1.0 mg/L; ≤4% for 1.0–10 mg/L; ≤5% (× sample concentration) for ≥10 mg/L
- Fast analysis: approximately 3 minutes per sample for high-throughput petroleum sulfur testing
- Baseline drift ≤ 5 mV/min for stable, long-duration test sessions
- Data interface: RS232 or USB for direct PC connection and LIMS data transfer

THEORY & METHOD

Theory and Method

The ToronFSA™ 5453 employs the ultraviolet fluorescence (UVF) detection method per ASTM D5453. A liquid sample (5–50 µL, fully combustible) is injected by the 136-position automatic vertical injector into a blind-end quartz cracking tube within the advanced combustion system, where it is combusted at temperatures up to ambient + 1150°C under oxygen-rich conditions (O_2 purity ≥99.999%, ≤0.2 MPa; Ar purity ≥99.999%, ≤0.2 MPa).

Sulfur-containing compounds in the sample are converted to sulfur dioxide (SO_2) and trace sulfur trioxide (SO_3). The combustion gases pass through a precision gas flow controller and a membrane dryer — which removes water vapor without the maintenance burden of magnesium perchlorate — before entering the UV fluorescence detector.

In the detector, SO_2 molecules absorb UV radiation and are excited to a higher energy state; upon returning to the ground state, they emit characteristic fluorescence photons detected by a high-sensitivity photomultiplier tube (PMT). The PMT signal is proportional to the SO_2 concentration, which is directly related to the total sulfur content of the original sample. The instrument generates a calibration curve automatically from single-point or multi-point standards, with adjustable sampling speed for optimized peak resolution and throughput.

TECHNICAL SPECIFICATIONS

Benchtop UV Fluorescence Sulfur Analyzer – ToronFSA™ 5453 Technical Specifications

Parameter	Specification
Standards	ASTM D5453, ASTM D4239
Measurement Range	0.05 mg/L – 10000 mg/L
Minimum Detection Limit	0.01 mg/L
Precision	± 1 °C (temperature control range: ambient to 1150 °C)
Repeatability	0.05–1.0 mg/L: ≤ 10%; 1.0–10 mg/L: ≤ 4%; ≥10 mg/L: ≤ 5% (× sample concentration)
Temperature Control Range	Ambient to 1150 °C
Sample State	Liquid
Sample Volume	5 – 50 µL (must be fully combustible)
Analysis Time	Approx. 3 minutes per sample
Baseline Drift	≤ 5 mV/min
Injector	136-position fully automatic vertical injector
Gas Requirements	O_2: ≥99.999% purity, ≤0.2 MPa; Ar: ≥99.999% purity, ≤0.2 MPa
Data Interface	RS232 or USB
Power Consumption	≤ 3000 W
Main Unit Size (W × D × H)	600 × 500 × 500 mm
Auto-Sampler Size (W × D × H)	300 × 240 × 460 mm
Voltage	AC 220 V ± 10%, 50 Hz ± 10% (110V is also available)

Parameter	Specification
Relative Humidity	< 80% RH
Ambient Temperature	10 – 28 °C
Other Notes	No strong vibration, airflow, strong electromagnetic interference, or corrosive gases near instrument

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