

APPLICATION NOTE



Total Sulfur Compliance in Biodiesel Using Excimer UV Fluorescence (EUVF) Technology

With today's stringent low sulfur requirements of biodiesel, refiners can trust in the ATOM SLA-1000 to continuously, and accurately measure sulfur to achieve a compliant biodiesel.

With an increasing demand for renewable energy in today's world, biodiesels have become increasingly popular as a direct alternative to petroleum diesel fuel, or a blend. Unlike traditional petroleum diesel fuel which is derived from fossil fuels, biodiesels are made from renewable resources such as vegetable oils, and recycled greases which results in a much safer fuel alternative that reduces almost all forms of air pollution, and green house gases.

Per the regulatory requirement, 40 CFR Part 80, Subpart I, the Environmental Protection Agency (EPA) began challenging biodiesel refiners to comply with a strict, low sulfur content of less than 15 ppm in their biodiesels.

There is also a possibility of further sulfur contamination between the refinery and the pumps, which has led refiners to enforce a stricter criterion of lower sulfur levels to as low as 4 ppm.

By meeting the 15 ppm criterion, we minimize any harm to the environment by pollution caused by sulfur. Additionally, refiners are eligible for tax credits by complying with ASTM standard D 5354.

The full turnkey solution of the ATOM SLA-1000 instrument gives refiners the confidence they need in to achieve a compliant biodiesel by providing fast and versatile innovative measurement solution of total sulfur in biodiesels as low as 1 ppm.



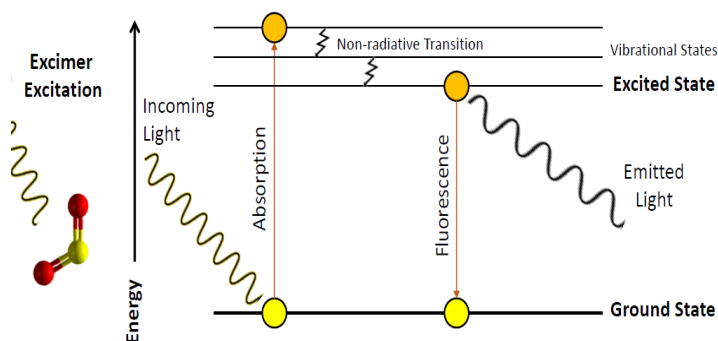
**ATOM SLA-1000
Real-Time Process
Sulfur Analyzer**



The Technology

Total sulfur detection is accomplished utilizing patented **Excimer UV Fluorescence (EUVF)** that has been field proven to be a reliable detection method that meets performance requirements of **ASTM D5453**. The Excimer detection technology allows standard bottled air to be used as the combustion gas, reducing utility costs and increasing operational safety compared to other analyzers that may require pure oxygen.

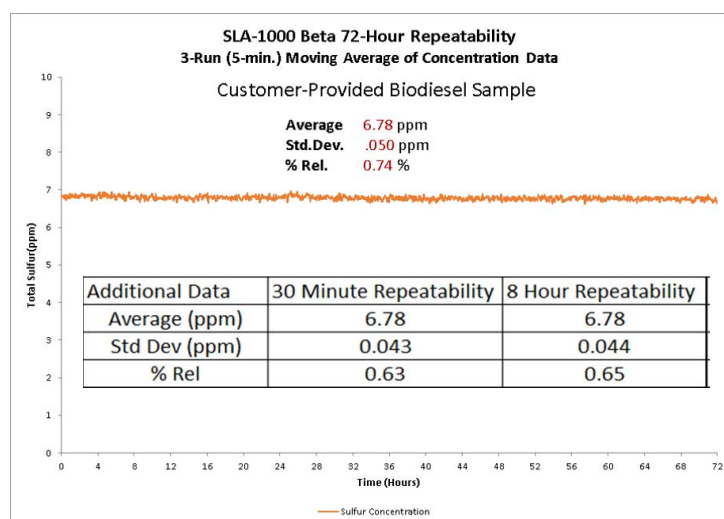
Having passed CSA certification, the ATOM SLA-1000 has demonstrated **exceptional analytical performance** enabling EPA mandated 10 ppm **Tier-3 objectives** to be easily met. Instrument operation is simplified with intuitive and user-friendly software, with an added feature that allows averaging of high-speed analyzer data for enhanced analytical precision.



The above image illustrates our patented Excimer UV Fluorescence (EUVF) Technology working to detect total sulfur. UV photons from the Excimer lamp transfer energy to the SO₂ molecules and raises its energy to an excited state.

Performance Data

The graph below demonstrates stable, and autonomous precision measurement of total sulfur under the 15 ppm requirement from 40 CFR Part 80, Subpart I. A relative standard deviation(**RSD**) of **0.63%** at a **concentration 6.78 ppm/wt.** sulfur was obtained and an outstanding 0.74% RSD. Additional data is shown for the first 30 minutes, and 8 hours of the 72 hours test run.



The Advantages

- Measurement of total sulfur as low as 1 ppm
- High speed analysis and response time
- Low utility consumption
- Convenient compact footprint
- Does not require installation in shelter
- Utilizes air for combustion

Conclusion

With the high demand of biodiesels, and challenging regulations on total sulfur content in, refiners can trust the ATOM SLA-1000 to achieve compliance goals. With its UV Fluorescence method, the ATOM SLA-1000 provides fast, accurate, and reliable measurements as low as 1ppm of total sulfur content that meets performance requirements of ASTM D6751, and D5453.

SPECIFICATIONS

Analytical Performance

Measurement Method: Total Sulfur – Excimer UV Fluorescence (EUVF)

Measurement Range: 1 ppm – 10% (application dependent)

Repeatability: 200 ppb SD or $\pm 2\%$ of measured value, whichever is greater. 100 ppb SD with 5-min. averaging or $\pm 2\%$ of measured value, whichever is greater.

Linearity: $\pm 2\%$ of full scale (dynamic range dependent)

Response Time: 99% (+) in one cycle (180 secs typical)

Calibration: Automatic or manual

Analog/Discrete Data Communications

Analog Outputs: 20 mA DC (optional)

Alarm Outputs: One global dry contact triggered by one or more of the following: Power failure, loss of purge, low oxidizer pressure, low furnace temperature. Other alarm options available.

Digital Data Communications: RS-485 or RS-422 Modbus (RS-232 or TCP/IP ethernet optional)

Local MMI (GUI): 12" Touchscreen computer with embedded Windows 7 allows complete operation and control of all analyzer functions

Remote Interface: ATOM ACCESS allows complete control including monitoring of analysis parameters and digital data values.

Utility Requirements

Ambient Temperature: -20°C to +40°C
(-4°F to +104°F)

Instrument Air: 70 psig (4.8 bar), 5 SCFM, Oil Free, -40°C (-40°F) dew point

Power: 120 VAC, 50/60 Hz
at 2200 watts

Zero Grade Air: 70 psig (4.8 bar), 200 SCCM

Physical Parameters

Dimensions: 965.2 mm (38.0 in) high x 660.4 mm (26.0 in) wide x 304.8 mm (12.0 in) deep

Mounting: Wall or Unistrut Stand

Certifications: Built to NEC Class 1, Div 2, Group B,C,D. CSA (optional)

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