

## MultiTek® Sulfur in Biodiesel by UV Fluorescence

- **Rapid and Accurate Sulfur Determination**
- **Excellent sensitivity and stability**
- **Exceeds regulatory limits of compliance**

### Keywords:

**MultiTek, UV Fluorescence, Sulfur, Biodiesel**



### INTRODUCTION

The analysis of total sulfur can be utilized in the biodiesel industry to comply with government mandated regulations for emission. This includes all blends with conventional diesel. The principle of operation for sulfur analysis begins with the complete, high temperature oxidation of the entire sample matrix. The sample is combusted with oxygen at a temperature of 1050°C.

The combustion gases are routed through a membrane drying system to remove all water and then to the sulfur detector module for quantitation.



SO<sub>2</sub> is contacted with UV light to form SO<sub>2</sub>\*. As the excited SO<sub>2</sub> relaxes, photons are emitted at a specific wavelength range and detected by a photomultiplier tube (PMT).



### EXPERIMENTAL CONDITIONS

#### Instrumentation

Antek MultiTek Horizontal Sulfur with Model 735 Syringe Drive, Model 740 MultiMatrix, and Model 748 or 758 Autosampler.

### Instrument Parameters

Sample Volume (µl)	20
GFC 1- Ar/He (ml/min)	130
GFC 2- Pyro O <sub>2</sub> (ml/min)	450
GFC 4- Carrier O <sub>2</sub> (ml/min)	25
Furnace (°C)	1050
Sulfur PMT voltage (V)	600
Model 735 Speed	1300

### Calibration

The calibration was performed using sulfur as dibutyl sulfide in biodiesel standards in the range of 0-25 mg/kg

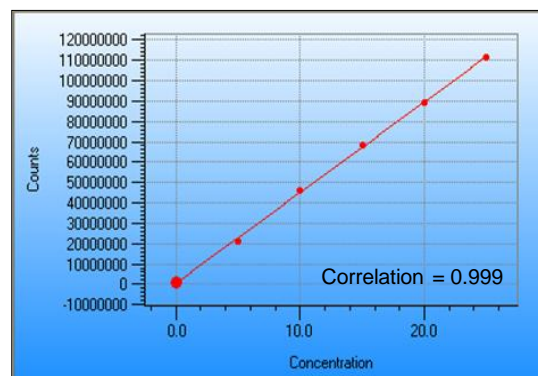


Figure 1. Calibration Results for Sulfur

Calibration data was used to determine the limit of detection (LOD) defined as 3σ. The LOD is calculated to be 376 ppb sulfur for this calibration range.

## REPEATABILITY and STABILITY

### Sample Results

Concentration (mg/kg)	Counts	% RSD
7.2	32822983	1.42
7.3	33302002	
7.2	32789329	
7.3	33470375	
7.2	32930269	
7.1	32575033	
7.2	32891082	
7.0	31762221	
7.2	32935378	
7.2	32999575	
7.1	32574562	

The MultiTek shows excellent repeatability and stability as demonstrated below. These injections of the B100 sample demonstrate both accuracy and precision.

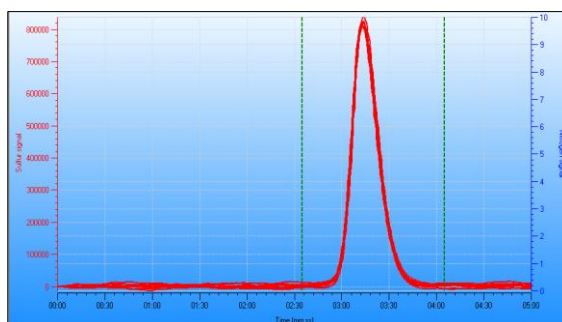


Table 1. B 100 Sample table

Figure 2: B 100 Sample (10 injections)

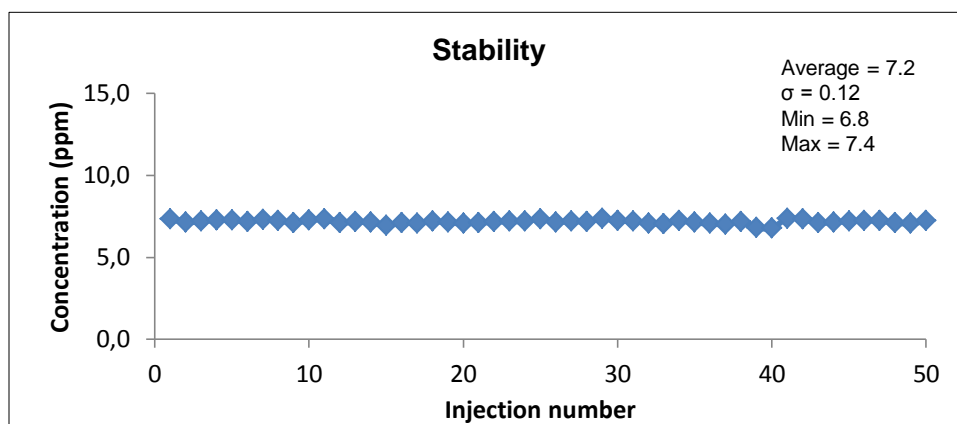


Figure 3: Long term repeatability test of B100 sample

### CONCLUSION

The Antek MultiTek® Elemental Analyzer demonstrates the ability to accurately determine total sulfur in biodiesel. The analysis allows monitoring the production process of intermediate, final products as well as biodiesel blends.

*The Antek MultiTek® is the only instrument on the market that combines sulfur, nitrogen, and halides analysis all in one. Compact, powerful, automated, and able to analyze gas, liquid, or solid samples, it's the perfect solution to today's increasing demand worldwide for fast, accurate detection and analysis of contaminants, and corrosive elements. Because MultiTek® delivers precise results with high sensitivity and unmatched versatility, it's a valuable process optimization tool that will deliver faster ROI and a better bottom line.*