

## MultiTek® Sulfur in Liquefied Petroleum Gas by UV Fluorescence

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

**Keywords:**

**MultiTek, UV Fluorescence, Sulfur, LPG  
ASTM D6667**

### INTRODUCTION

The analysis of total sulfur can be utilized in petrochemical industry to comply with government mandated regulations for emission and is poisonous to the valuable catalysts. Sulfur can corrode metal surfaces and it is important to monitor the concentrations. The principle of operation for sulfur analysis begins with the complete, high temperature oxidation of the entire sample matrix 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 exposed to 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).



The amount of light detected is proportional to the amount of sulfur in the LPG.

### EXPERIMENTAL CONDITIONS

#### Instrumentation

Antek MultiTek Vertical Sulfur with Model 734



*Note: Horizontal and Low Level Sulfur Model configuration can also perform this application*

#### Instrument Parameters

734 Sample Loop (µl)	15
GFC 1- Ar/He (ml/min)	110
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)	500
Model 734 Carrier -Ar or He (ml/min)	20

#### Calibration

The calibration was performed using sulfur as dimethyl sulfide in n-butane standards in the range of 0-150 mg/kg.

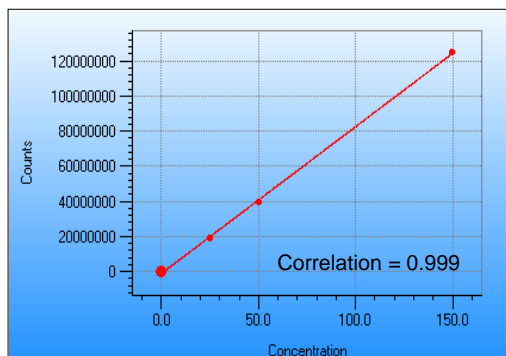


Figure 1. Calibration Results for Sulfur 0-150 mg/kg

## STANDARDS

Concentration (mg/kg)	Counts	% RSD
Blank	20871	
25.1	19400562	0.60
50.1	39866156	2.83
149.9	124740983	0.43

Table 1. Calibration 0- 150 mg/kg S in n-butane

## REPEATABILITY

### Sample Results

Concentration (mg/kg)	Counts	% RSD
50.6	41281185	0.24
50.4	41153794	
50.6	41285118	
50.6	41286123	
50.8	41399707	

Table 2. 50.1 mg/kg S in n-butane

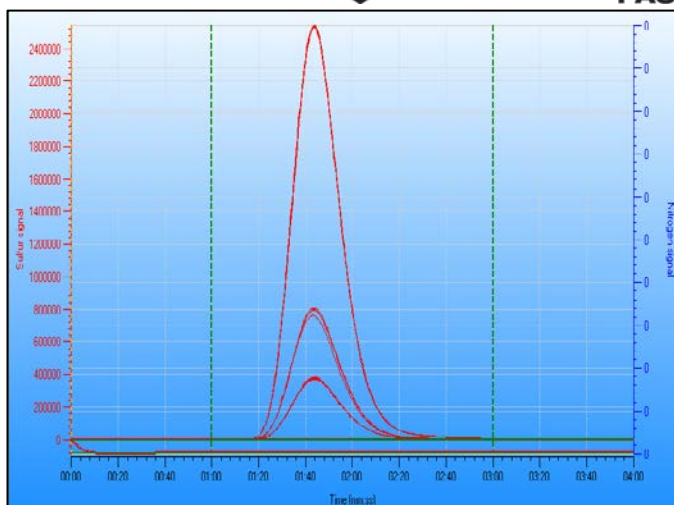


Figure 2. Calibration Overlay

The MultiTek shows excellent repeatability and stability as demonstrated below.

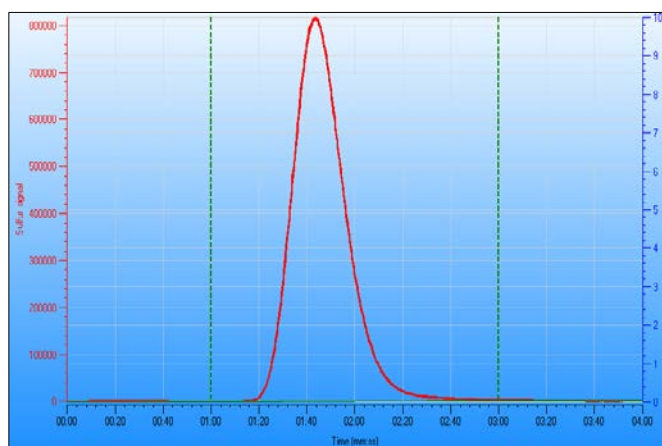


Figure 3. 50 ppm n-butane Sample (4 injections)

## CONCLUSION

The Antek MultiTek Elemental Analyzer along with the Model 734 LPG sampler demonstrates the ability to accurately determine total sulfur in LPG and complies with ASTM D6667. The analysis allows monitoring the production process of intermediate and final products, protecting expensive catalysts and helps to monitor costly corrosion.

*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.*