

Trace level sulfur determinations below 10 ppm

FlashSmart Elemental Analyzer coupled with Flame Photometric Detector (FPD)

Keywords

Elemental Analysis, FPD Detector,
FlashSmart EA, Sulfur trace

Organic Elemental Analysis (OEA) using the dynamic flash combustion technique typically measures carbon, nitrogen, hydrogen, sulfur and oxygen (CHNS/O) at <100ppm to 100% levels. However, with the addition of a Flame Photometric Detector (FPD) the Thermo Scientific™ FlashSmart™ Elemental Analyzer (Figure 1) offers the unique capability for detecting lower sulfur levels at 5–10ppm.

Principle of operation

The instrument operation remains the same according to the standard FlashSmart EA with the exception of the detection by optional Flame Photometric Detector (Fig. 2). Samples are weighed in tin containers and introduced into the combustion reactor via the Thermo Scientific™ MASPlus Autosampler, with pure oxygen.

After combustion – 1800 °C for few seconds – the gases are carried by a helium flow to a layer filled with copper, then to a trap filled with Anhydron (magnesium perchlorate) and swept through a GC column before detection by the Flame Photometric Detector (FPD). Total time for this lower level sulfur determination is 5-6 minutes.

Advantages:

- Low sulfur determination (5 - 10 ppm) in solid, viscous, liquid and gas samples
- High (<100 ppm - 100 %) and low (5 - 5000 ppm) sulfur detectable by the same instrument using TCD Detector and FPD Detector respectively
- Both TCD Detector and FPD Detector available for use at all times
- For solid, liquid, viscous and gas samples
- No sample pre-treatment required
- Inert tubing and connectors prevent any sulfur adsorption
- Dedicated Standard and Reference Materials (solid and liquid) kit for calibrating the analyzer according to the users samples is included in the package included in the OEA/FPD Detector option
- No additional software or upgrade required: the Thermo Scientific™ EagerSmart™ Data Handling Software automates the operations of the EA with the FPD Detector
- Easy installation – the FPD Detector can be easily installed on any Thermo Scientific™ Flash Series Elemental Analyzer
- Lower owner costs compared to other alternative techniques



Figure 1. FlashSmart Elemental Analyzer with FPD Detector.

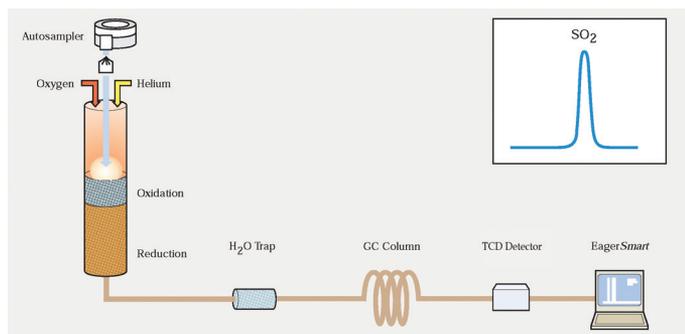


Figure 2. FPD Detector sulfur configuration.

Performance data

Sample	Sulfur ppm	RSD %
Diesel	25	9.03
	22	
	21	
	22	
Biofuel	29	2.01
	218	
Catalyst	29	2.94
	35	
	34	
Cellulose	33	4.68
	12	
	13	
Polymer	12	1.29
	45	
	45	
	44	

Sample	Sulfur ppm	RSD %
Sand	8	10.21
	9	
	8	
	7	
Clay	59	4.10
	61	
	64	
Soil	272	1.51
	269	
	264	
Graphite	49	1.10
	49	
	50	
Lubricant in Iso-Octane Solution	4.9	2.08
	4.8	
	4.7	

Essential for a wide range of applications

Petrochemical products	Lubricants, gasoline, diesel, pitches, rock oils, coke, coal, gasoil, activated carbon, biofuels, biodiesel
Geological material	Soils, sediments, rocks, shale, kerogene, sand, clay
Environmental	Compost, bio-mass, waste water
Inorganic compounds	Ceramics, glass fibres, graphite cathodes, refractory materials
Organic compounds	Organo-metallic compounds, pigments, solvents, urea, formaldehyde
Materials	Catalysts, cements, metals (steel and alloy), polymers, polyethylene films, rubbers, tires, graphene, graphite, carbon fibers, pulp, paper and cellulose
Vegetation	Cereals, leaves, pine needles, plants, tobaccos, algae, lichens, wood and soil amendments
Food	Pasta, chocolate, beer, juice
Animal feed	Alfalfa
Human samples	Nails, hair, urine, blood

FPD Detector specifications

Gas requirements	Helium GC grade Air 99.995% Hydrogen 99.995% Oxygen 99.995% (for sample combustion)
Power requirements	120/230 V AC, 50/60 Hz
Host PC requirements	Pentium processor Windows® 10 and previous operating systems EagerSmart Data Handling Software
Dimensions	Gas control box: 177 x 235 x 287 mm (l x h x d) FPD control module: 180 x 85 x 485 mm (l x h x d)
Weight	Gas control box: 5 kg FPD Detector control module: 6 kg
FPD Detector package includes	Operating manual – includes suggestions on standards, standard weight, sample weight, separation column, FPD Detector analytical range and more to obtain the best results FPD Detector FPD Detector control module Gas control device Standard outfit Sulfur Reference Material (solid/liquid samples): – Pasta Reference Material (S%: 0.131) – Soil Reference Material (S%: 0.032) – Ref. Solutions Kit (4 flasks of 10, 50, 100 and 500 ppm of sulfur conc. solutions)
Part number	432 10145 FPD Detector Option for OEA

Find out more at thermofisher.com/OEA

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