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Instrument Business Group

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INGENIERIA ANALITICA

# 355 Sulfur Chemiluminescence Detector

## 355 Sulfur Chemiluminescence Detector

Sievers® 355 Sulfur Chemiluminescence Detector (SCD) is the most sensitive and selective chromatographic detector available for the analysis of sulfur compounds. The SCD utilizes a stainless steel burner to achieve high temperature combustion of sulfur containing compounds to form sulfur monoxide (SO). A photomultiplier tube detects the light produced by the subsequent chemiluminescent reaction of SO with ozone. This results in a linear and equimolar response to the sulfur compounds without interference from most sample matrices. Since measuring trace levels of sulfur compounds are of great importance to a number of industries, the SCD has become an important analytical tool for problem solving and monitoring product quality. The complete SCD system inclu-



des the stainless steel burner, interface controller, vacuum pump and detector. In addition, an option is available to allow for the acquisition of both Flame Ionization Detector (FID) and SCD data in series. Because of the outstanding capabilities and performance of the SCD, there is widespread use and acceptance in the petroleum, chemical and petrochemical, food and beverage, flavor, fragrance, and environmental industries.

### CO<sub>2</sub> Analyzers

Arnel Model 4025 through Model 4438 Trace Impurities in Beverage CO<sub>2</sub> Analyzers are designed to test CO<sub>2</sub> purity at each stage of manufacture, during product delivery and in final use at the beverage producer.

These analyzers offer complete solutions from sample handling/introduction and instrument calibration to analyzing compounds and data handling in the standard product.

The analyzers utilize the Sievers SCD for trace speciated sulfur compound determinations, an FID for trace speciated hydrocarbon (acetaldehyde, alcohols, ketones etc.) compound determinations, and a PID for benzene and other aromatic hydrocarbon compound determinations, meeting or exceeding International Society of Beverage Technologists (ISBT) specifications.

#### **Puntos de interés especial:**

- Features & Specs
- Technical Literature
- Standards, Consumables & Accessories
- Related Sites

# 355 Sulfur Chemiluminescence Detector

## Features and Specifications

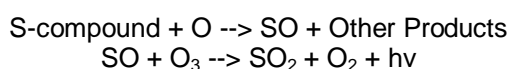
### Features

- Sulfur specific detection for Gas Chromatography (GC) or Supercritical Fluid Chromatography (SFC)
- Picogram detection limits
- No hydrocarbon quenching
- Linear, equimolar response to organic sulfur compounds
- ASTM Method approval
- Adapters for simultaneous SCD and FID operation

### Principle of Operation

Sievers<sup>®</sup> 355 Sulfur Chemiluminescence Detector (SCD) utilizes the combustion of sulfur compounds to form sulfur monoxide (SO) and the subsequent chemiluminescence reaction of SO with ozone (O<sub>3</sub>). The unique combustion process achieves high temperatures (>1,800°C) which are unattainable by standard pyrolysis methods. The patented technology allows the 355 SCD to make ultra-sensitive measurements of any sulfur-containing compound that can be analyzed by gas chromatography (GC) or supercritical fluid chromatography (SFC).

The reaction mechanism is:



The light (hν) passes through an optical filter and is detected by a photomultiplier tube. This mechanism provides selective sulfur detection which is described in the following U.S. and foreign patents: 5,330,714; 5,227,135; 5,310,683; 5,501,981 and patents pending.

### Stainless Steel Burner

The stainless steel burner provides for direct connection of the column to the burner, eliminating peak-tailing and the possibility of unswept dead volumes. The compact stainless steel burner advances the established technology by improving chromatography, reducing maintenance, and enhancing ease-of-use. Combustion tubes may be easily accessed from the top of the burner (~6 inches, 15.24 cm) and facilitate direct mounting into a detector port on most gas chromatographs.

### FID Adapter

For simultaneous determination of sulfur and hydrocarbon compounds, the SCD may be equipped with a flame ionization detector (FID) adapter. Eluting compounds pass from the chromatographic column into the FID and then directly into the SCD. This eliminates the need to split the column effluent between two detectors operating at different pressures and the associated problems with that approach. FID adapters are available for many GCs made by major manufacturers.

### Decoking Valve

While not necessary for most chromatographic applications, a decoking valve is available to prevent the accumulation of carbon in the burner. This is important for applications in which there is a tendency for the sample to polymerize and form carbon deposits in the burner, e.g., dienes, or

large quantities of hydrocarbons are introduced into the chromatograph over a very short time frame. While coking can occur with any high temperature combustion technique, only Sievers detectors provide this simple, but effective solution.

### Method Approval

The SCD is the detector of choice for ASTM Standard Test Method D 5504-94: *Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence*, and ASTM D 5623-95: *Sulfur Compounds in Light Petroleum Liquids by Gas Chromatography and Sulfur Selective Detection*. The SCD is the only detector tested for ASTM D 5623-95 in which data was sufficient for determining method precision. (ASTM Research Report: RR:D02-1335.)

### Optional Features

#### Burner Covers

Ionics Instruments offers Burner Covers for both Hewlett-Packard Model 5890 and 6890 GCs. The burner cover provides an enclosure around hot burner surfaces and gives the system an integrated appearance.

#### Oil Free Pump

An oil-free vacuum pump is available to those of you who are interested in reducing the maintenance requirements on your detector. This pump is available at a fraction of the cost of the oil-sealed pump and only requires a monthly Hopcalite Trap change.

**\*\* The Oil-Free pump will reduce the sensitivity of the SCD by a factor of 2. \*\***

# Specifications Operating

Sensitivity < 0.5 pg S/sec  
Selectivity > 10<sup>7</sup> g S/g C  
Linearity > 10<sup>5</sup>  
Typical Flow Rates Air: 15-40 mL/min or 6-15 mL/min as Oxygen  
Hydrogen: 75-100 mL/min  
Signal Output (Analog) 0-100 mV, 0-1 V, 0-10 V  
Precision and long term stability.\* **12 hours of continuous operation:**  
RSD DMS <5.0%  
RSD Thiophene <5.0%  
**100 hours of continuous operation:**  
RSD DMS <10.0%  
RSD Thiophene <10.0%  
\* Repeated injections of a standard with 16 ppm Dimethyl sulfide (DMS) and 28 ppm Thiophene at 30 minute intervals. RSD = Relative Standard Deviation.

# Instrument

Power Requirements USA: 110/115 V, 60 Hz  
Japan: 90/100 V, 50/60 Hz Europe: 220/240V 50 Hz

Gas Requirements Air, Hydrogen, Oxygen (optional). Sulfur Scrubbers, available from Sievers, are recommended for all gases. All gases should be Ultrahigh-purity (UHP or 99.999%) grade.

Dimensions - Detector 16" H (41 cm) x 9.2" W (24 cm) x 21.8" L (55 cm)  
Weight - Detector 34 lbs. (11 kg)

Dimensions - Oil Sealed Vacuum Pump 9.8" H (25 cm) x 6.3" W (16 cm) x 18.5" L (47 cm)

Weight - Oil Sealed Vacuum Pump 45 lbs. (20 kg)

Dimensions - Oil-free Vacuum Pump (optional) 5.8" H (15 cm) x 7.4" W (19 cm) x 9.6" L (24 cm)

Weight - Oil-free Vacuum Pump 14 lbs. (6.3 kg)

Dimensions - Burner Controller 4" H (10 cm) x 11" W (28 cm) x 7" L (18 cm)

Weight - Burner Controller 8.2 lbs. (3.7 kg)

## Sulfur and Nitrogen Chemiluminescence Detectors Accessories, Standards and Consumables

### Accessories

Item Description	Part Number
Stainless Steel Burner	ABI 00005-01
Model 350B to 355 Upgrade	PRD 23551 F
Flame Ionization Detector Adapter (Available for various GC's) Decoking Valve and Cable (Available for various GC's) Oil Free pump (Available for various voltages) Burner Covers (Available for HP 5890 and 6890)	

### Standards and Consumables

Item Description	Part Number
SCD Test Mix	NIP 00010 D
NCD Test Mix	NIP 00100-01
Ceramic Tube Package for Stainless Steel Burner	AAK 35512 C
Ferrule, 1/4" Vespel for Stainless Steel Burner HTF 24041	
Hopcalite Chemical Trap	ACT 00050 E
Sulfur Trap for Supply Gas	ACT 00355
Synthetic Oil, 1 quart	SMI 00075
Oil Filter Element for RV-5 Pump	HFL 00111 A
12-Month Maintenance Kit (for RV-5 pump systems)	PMK 55512 A

## Sulfur and Nitrogen Chemiluminescence Detectors Technical Literature

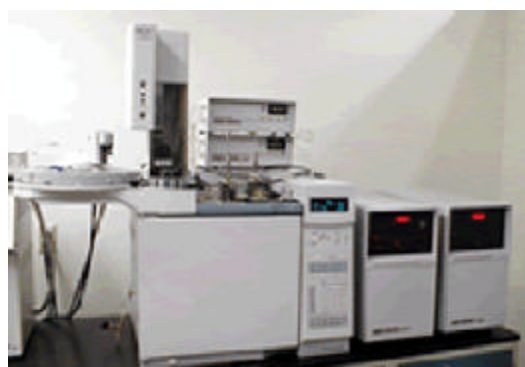
General

Chemical and Petrochemical

Environmental

Food and Beverage

Petroleum and Natural Gas



## Nuestra «Política de Calidad»

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*la ingeniería en analítica  
instrumental. un nuevo concepto*

[www.ingenieria-analitica.com](http://www.ingenieria-analitica.com)

**Nuestra razón de ser como empresa, en el ámbito de las técnicas instrumentales de análisis, y a los sectores altamente tecnificados y cualificados a los que van dirigidos nuestros productos y servicios, es conseguir la total satisfacción de nuestros Clientes, desde un compromiso de La Calidad y que satisfaga sus expectativas.**

En base a ello tenemos que:

1. *Cumplir eficaz y puntualmente con los compromisos adquiridos, justo en la medida y el tiempo en que nos hemos comprometido.*
2. *Buscar la mejor solución técnica y económica a las consultas y problemas planteados, siendo creativos y didactas en nuestras actuaciones.*
3. *Ser conscientes de nuestras propias limitaciones, aceptando únicamente aquello por lo que estamos preparados y podemos realizar de una forma muy profesional.*
4. *Participar, concienciar y motivar a todo el estamento productivo en la consecución de la Calidad. La formación, información y animación de todo el equipo humano es un objetivo prioritario.*
5. *Entender la Política de Calidad como la directriz para la consecución de los objetivos establecidos a corto, medio y largo plazo. Su aceptación y ejecución por parte de todos los estamentos productivos.*
6. *Mantener un Sistema de Calidad en base a un Manual de Calidad adaptado a las normas ISO 9000, con una definición clara y concisa de las funciones y responsabilidades de cada uno de nosotros.*
7. *Medir y saber potenciar nuestra relación con el cliente, con la Calidad y la Calidad Humana, ya que ellos son la clave de nuestro negocio.*
8. *Vivir la inquietud de la comunidad técnica y científica con la que trabajamos, para establecer el flujo de intercambios necesarios que enriquecerán nuestros conocimientos.*
9. *Establecer un entorno de trabajo que fomente:*
  - a. *Nuestro compromiso y respeto por la Ciencia y Tecnología.*
  - b. *La protección del Medio Ambiente y la seguridad en Higiene Industrial.*
  - c. *La entrega, la estima, la motivación, la confianza, la honestidad y el respeto mutuo.*
  - d. *El estudio y formación continuada.*
10. *Asumir nuestra responsabilidad individual, ante este y cualquier otro proyecto, enriqueciendo nuestro ego, al ser partícipes de algo que no es fruto de la casualidad, si no más bien de la voluntad y el esfuerzo de todos los que constituimos nuestra empresa.*



Detector 355 montado en un 6890GC de AGILENT