

## Total Sulfur / Total Sulfites

**By Combustion, Acidification and Coulometric Detection**

*Applications include: Total sulfur and sulfites in organics, coal, geological materials, inorganics, natural products, foods and beverages.*



### The CM350 Total Sulfur / Total

**Sulfite Analyzer** is a complete analytical system capable of measuring total sulfur and total sulfites in solid and liquid samples. Combining a dual zone, high-temperature furnace, a self-contained acidification module and a highly sensitive SO<sub>2</sub>/H<sub>2</sub>S detector, the CM350 offers the flexibility to analyze most any sample type and concentration with a precision un-matched by other analytical techniques. The CM350 system includes the following 3 components pictured above:

#### CM5014S SO<sub>2</sub> Analyzer

- No user calibration
- Wide, linear dynamic range
- Readability to 0.01 ug Sulfur
- User selectable display units
- Floppy disk drive for archiving data

#### CM5380 Dual Zone Furnace with CM5382 Sample Introduction Kit

- Programmable up to 1100°C
- Separate catalyst zone
- Automated oxygen dosing
- Split-tube furnace design for easy maintenance

#### CM5130 Acidification Module

- 10, 25, 50 or 100 ml reaction vessels
- Selectable volume acid dispenser
- Internal air pump with flow controller
- Matrix independent
- Results typically obtained in less than 15 minutes via modified Monier-Williams procedure
- Controlled sample heating

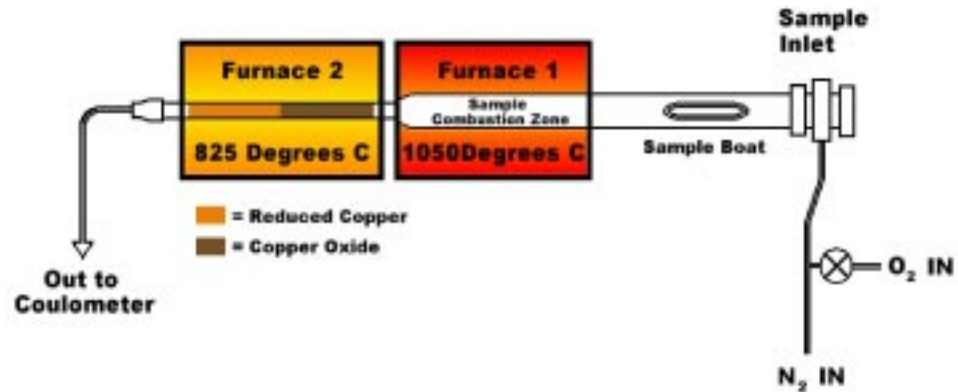
#### Instrument Capabilities

A major advantage of the CM350 Total Sulfur / Total Sulfites Analyzer is the use of coulometric detection. Employing the principles of Faraday's Law, the CM5014S SO<sub>2</sub>/H<sub>2</sub>S Analyzer automatically measures the absolute mass amount of sulfur dioxide and/or hydrogen sulfide evolved from a combusted sample. No user-calibration is required and linear detection is

available from less than 1 ug sulfur to over 10,000 ug sulfur. Using this 100% efficient coulometric process, relative standard deviations of 0.2% or better are common for standard reference materials. For smaller concentrations, an absolute deviation of approximately 1 ug S is typical.

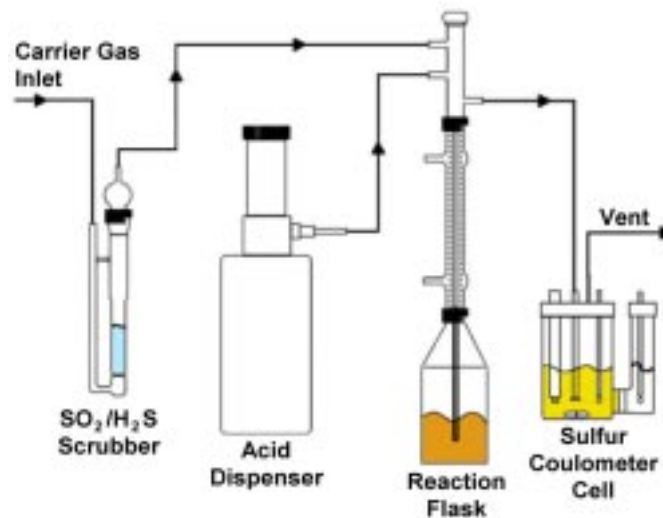
Sample sizes can range from 0.5mg to 10 grams with concentrations from 1 ppm to 100%. Analysis times of 5-7 minutes are typical

## Principles of Operation




## Total Sulfur

Samples are weighed into a ceramic combustion boat, covered with a vanadium pentoxide accelerator, and transferred into the combustion furnace at 1050°C. The sample, in the presence of the accelerator and added oxygen, combusts to form SO<sub>2</sub> in equilibrium with SO<sub>3</sub>. This mixture is then conveyed by the nitrogen carrier gas into a second furnace at 825°C and passed over reduced copper, quantitatively converting all SO<sub>3</sub> to SO<sub>2</sub>, which is subsequently conveyed to the coulometric cell of the detector. There, the resulting sulfur dioxide and/or hydrogen sulfide is automatically measured using absolute coulometric titration.



## Total Sulfite, SO<sub>2</sub>/H<sub>2</sub>S

Upon introducing a sample into the sample flask, the system is purged with a SO<sub>2</sub>/H<sub>2</sub>S-free carrier gas to eliminate atmospheric sulfur dioxide and hydrogen sulfide. At that point, the analysis is initiated by



adding an aliquot of acid through the acid dispenser into the sample flask, causing sulfites to be evolved as SO<sub>2</sub> or releasing dissolved sulfur dioxide and/or hydrogen sulfide. Using the built-in heater and magnetic stirrer to facilitate the fast evolution of sulfites, the carrier gas transports the reaction products into the reaction cell within the CM5014S Analyzer. There, the resulting sulfur dioxide and/or hydrogen sulfide is automatically measured using absolute coulometric titration.

### Data Handling

Names, weights, volumes or areas of up to 50 samples can be entered, to be used by the CM5014S in calculating the final result. Analytical progress is digitally displayed in user-selectable units. A detailed report is printed while each sample is running that includes the final result. Upon completion of a series of samples, a one page report will print, summarizing the analysis of all 50 samples. The results can also be stored to diskette for further data handling.

## Ordering Information



### CM350 - Total Sulfur / Total Sulfites Analyzer

**Includes:** CM5014S SO<sub>2</sub> Coulometer, CM5380 Dual Zone Furnace, CM5382 Sample Introduction Kit, and CM5130 Acidification Module with tools and accessories for the analysis of solid or liquid samples.

**Must also choose either CM5131, CM5132, CM5133 or CM5134 Sample Introduction Kit. (P/N CM350-01 115V, 50/60Hz) (P/N CM350-02 230V, 50/60Hz)**

Consult with UIC to establish analytical parameters for your particular application.



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