

## Simultaneous Carbon and Sulfur Analysis

**By Acidification and Coulometric Detection**

*Applications include: Dissolved CO<sub>2</sub>, SO<sub>2</sub> and H<sub>2</sub>S in amines, Carbonates and Sulfites in geological materials.*



The **CM540 Simultaneous Carbon/Sulfur Analyzer** is a complete analytical system allowing the direct, simultaneous measurement of TIC and sulfites in a wide variety of sample matrices and concentrations. Combining a self-contained unit for the acidification of a sample (to evolve CO<sub>2</sub>, SO<sub>2</sub> and H<sub>2</sub>S), with a highly sensitive CO<sub>2</sub> detector and SO<sub>2</sub>/H<sub>2</sub>S detector, the CM540 easily handles solid or liquid samples with concentrations from ppm levels to 100% without user calibration. UIC's analyzers are rugged, accurate and adaptable to most applications. They are used extensively in industrial, research and educational laboratories worldwide. The CM540 system includes the following components pictured above:

### **CM5014 CO<sub>2</sub> Analyzer and CM5014S SO<sub>2</sub>/H<sub>2</sub>S Analyzer**

- No user calibration
- Wide, linear dynamic range
- User selectable display units
- Floppy disk drive for archiving data

### **CM5130 Acidification Module**

- 10, 25, 50 or 100 ml reaction vessels
- Selectable volume acid dispenser
- Internal air pump with flow controller
- Controlled sample heating and stirring

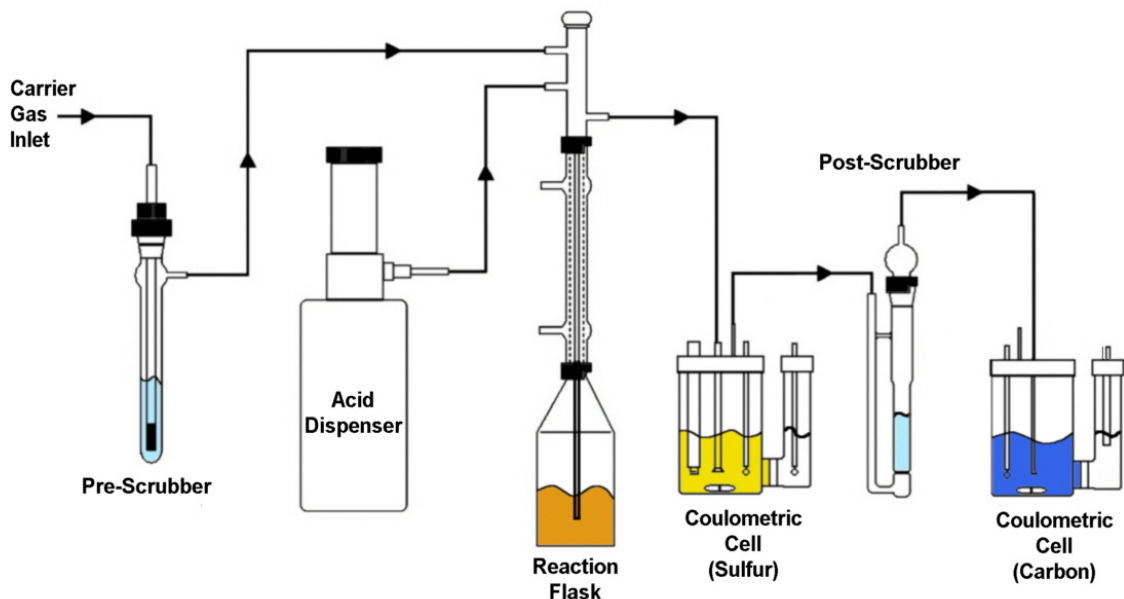
### **Instrument Capabilities**

A major advantage of the CM540 Simultaneous Carbon/Sulfur Analyzer is the use of coulometric detection. Employing the principles of Faraday's Law, the CM5014 CO<sub>2</sub> and CM5014S analyzers automatically measures the absolute mass amount of carbon dioxide, sulfur dioxide and hydrogen sulfide resulting from sample acidification. No user-calibration is required and linear detection is available from less than 1 ug C/S to over 10,000 ug C/S. Using this 100% efficient coulometric process, relative standard deviations of 0.2% or better are common for standard material. For smaller concentrations, an absolute deviation of approximately 1 ug C/S is typical.

Additionally, it is possible to analyze either solid or liquid samples. Sample flasks are available in 10, 25, 50 and 100 ml sizes. Solids or liquids may be weighed directly into the sample flasks. Alternatively, liquid samples may be syringe injected through a septum.

Oxidation times vary with sample type and temperature although 5 to 7 minute analyses are typical. To quicken CO<sub>2</sub> and SO<sub>2</sub>/H<sub>2</sub>S evolution, sample heating and stirring capabilities are included within the CM5130 Acidification Module. Other features include the ability to: select different acids; add wetting/emulsifying agents; and, modify the flow path and scrubbers to optimize a particular application.

## Principles of Operation



### Simultaneous Carbon and Sulfur

Upon introducing a sample into the sample flask, the system is purged with a CO<sub>2</sub>-free carrier gas to eliminate atmospheric carbon dioxide. At that point, the analysis is initiated by adding an aliquot of acid through the acid dispenser into the sample flask, causing inorganic carbon to be evolved as CO<sub>2</sub> and sulfur compounds to be evolved as SO<sub>2</sub> or H<sub>2</sub>S. The gases evolved from the acidification of the sample then pass into the special cell of the SO<sub>2</sub> coulometer where SO<sub>2</sub> and H<sub>2</sub>S are absorbed into the solution and titrated. CO<sub>2</sub> is not absorbed into the sulfur detector solution and provides no interference. The CO<sub>2</sub>-enriched carrier gas is then routed to the CO<sub>2</sub> analyzer where it is absorbed and automatically titrated.

### Data Handling

Names, weights, volumes or areas of up to 50 samples can be entered to be used by the CM5014 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

### CM540 - Simultaneous Carbon and Sulfur Analyzer

**Includes:** CM5014 CO<sub>2</sub> Coulometer, CM5014S SO<sub>2</sub> Coulometer, CM5130 Acidification Module and a special Simultaneous C/S cell 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 CM540-01 110V, 50/60Hz) (P/N CM540-02 220V, 50/60Hz)



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