EAI
EXETERANALYTICALINC

CE440 CHNS/O Elemental Analyzer
Uniquely Featuring Horizontal Injection and Sample Retrieval
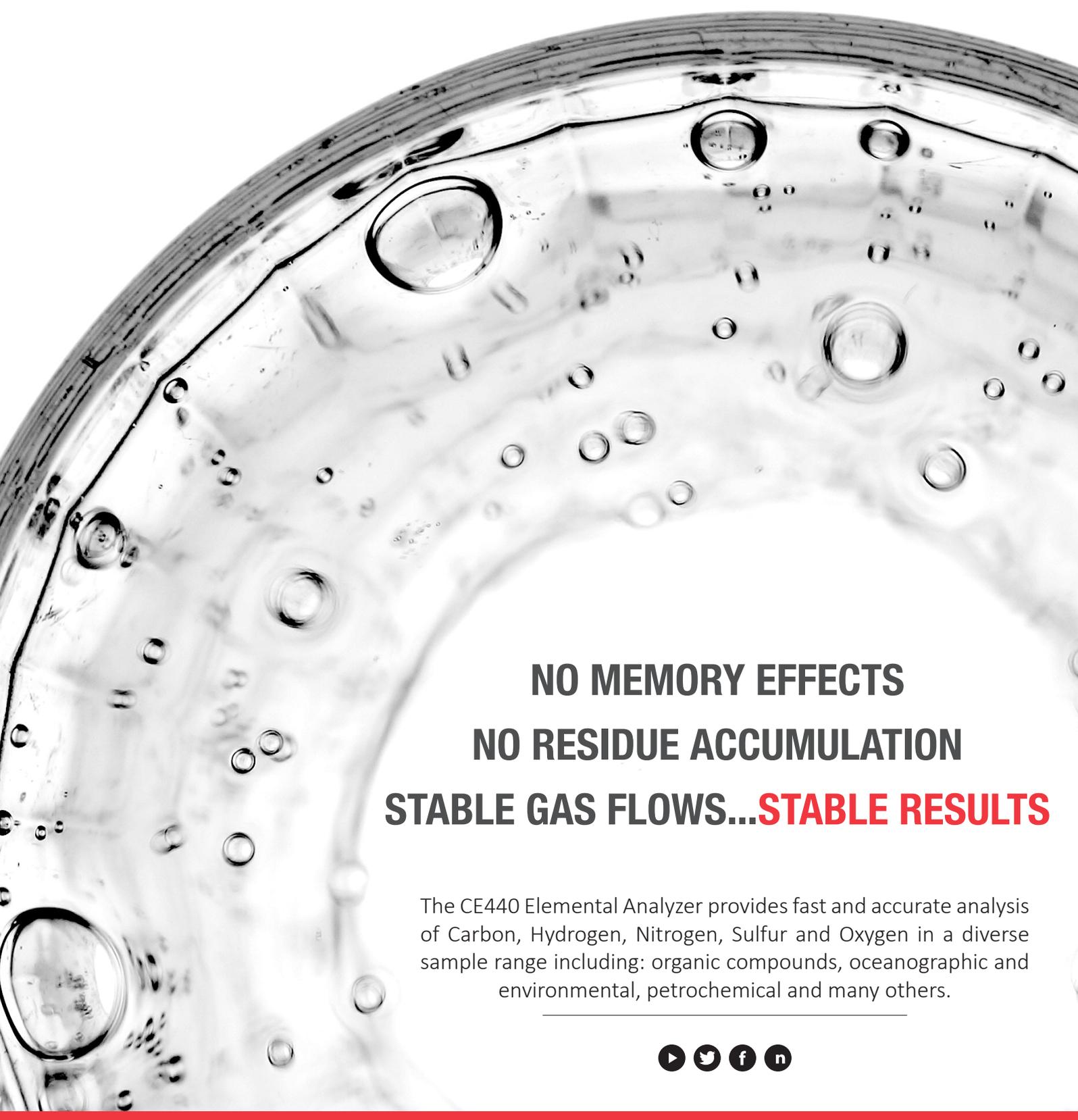
NO MEMORY EFFECTS
NO RESIDUE ACCUMULATION
STABLE GAS FLOWS...STABLE RESULTS

The CE440 Elemental Analyzer provides fast and accurate analysis of Carbon, Hydrogen, Nitrogen, Sulfur and Oxygen in a diverse sample range including: organic compounds, oceanographic and environmental, petrochemical and many others.

CE-440

Fast, Reliable, Accurate analysis of CHNO/S

The CE-440 Elemental Analyzer provides fast and accurate analysis of Carbon, Hydrogen, Nitrogen, Oxygen and Sulphur in a diverse sample range including: organic compounds, oceanographic and environmental, petrochemicals and many others. Whether you are a high throughput laboratory or research based industry, this easy to operate and highly precise instrument suits analysts with any level of experience.

Following a process of sample combustion and reduction, the CE440 employs trap separation and thermal conductivity detection to measure CHN/O/S levels. Samples are analyzed quickly and highly accurately no matter the composition. Combine this with the CE440s 64-sample carousel and you will achieve maximum throughput. The CE440's advanced Windows based software; with data storage, statistical analysis, flexible report generation and continuous diagnostic and automatic maintenance alerts, controls and monitors all instrument functions. Not only this, the instruments minimal gas usage and reagent consumption offers the lowest cost per sample in the industry.

OUR UNIQUE HORIZONTAL FURNACE allows for automatic removal of the residue from each sample alter analysis, avoiding residue accumulation, memory effects and gas flow problems, which can occur with vertical furnace systems.

CE-440 Benefits

Rapid analysis for high productivity- analysis time of less than 5 minutes.

Horizontal sample injection removes interfering residue between each sample run.

Stable thermal conductivity detectors provide linear response with superior accuracy.

Unique combustion technique makes possible the analysis of any sample type, from volatiles to refractories.

Windows based software which is user friendly and offers data storage for statistical analysis with flexible report generation.

Continuous diagnostics and automatic maintenance alerts.

Low reagent consumption- Industry's lowest cost per sample.

Exeter Analytical is a company exclusively focused on Elemental Analysis. We manufacture and sell the CE440. We believe our instrument to be the industry standard for accuracy and precision.

Accuracy, Precision, Versatility and Reliability

The CE440 provides analytical data of unsurpassed accuracy and precision. The complete control of combustion parameters combined with continuous measurement of a steady state combustion process ensures a level of accuracy and precision that cannot be matched. The CE-440 can combust the widest range of sample types due to a combination of programmable temperature, combustion time, oxygen injection and dynamic sample positioning within the furnace

The CE440's fully automated CHN/O/S system provides an easy to use elemental analyzer for any level of experience. The windows-based software has been designed to reduce operator error through extensive automation, customer help, and diagnostic facilities. Using a technique of continuous measurement of the steady state combustion programs, the CE440 continuously measures and integrates the combusted sample's effluent gas flow over a 20 second period. This makes the CE-440 inherently more reliable than chromatography based systems which are dependent on peak determination, flow rates, column temperature and dead volume management.

Continuous diagnostics and automatic maintenance alerts make operation almost fool-proof. By monitoring signals, voltages, and sample throughput, the instrument provides continuous status reports on consumable reagents as well as diagnostic alerts should a problem occur. Most parts are user-replaceable, further reducing service costs and downtime.

Sample Run	%C	%H	%N
1	65.43	6.72	8.45
2	65.47	6.73	8.45
3	65.47	6.72	8.48
4	65.45	6.70	8.44
5	65.44	6.72	8.47
6	65.50	6.72	8.52
7	65.52	6.70	8.52
8	65.48	6.70	8.49
9	65.45	6.70	8.48
10	65.49	6.71	8.48
Mean	65.47	6.71	8.48
Theoretical	65.44	6.71	8.45
Standard Deviation	0.03	0.01	0.03

Operating details: Combustion temperature 975°C; Reduction Temperature 600°C; Oven temperature 81°C; Combustion time 60 seconds; Weighing capsules high purity tin; calibration standard OAS Acetanilide

Sample Handling

For most samples, the CE440 requires no special preparation for most sample types. The sample is placed into a tared capsule, which is then weighed. If you only run a few samples at a time, our Single Sample Automation will let you manually introduce a sample for analysis. Once completed you have the ability to re-weigh for ash if needed.

For higher sample loads, our automatic sample changer allows you to run up to 64 samples without operator intervention. Our unique double drop feature allows for the analysis of samples up to 500 mg in size.

The CE-440 can easily analyze volatile or air sensitive samples. Our Capsule Sealer ensures sample integrity by sealing sample capsules with a cold weld. Analysis of volatiles such as gasoline, alcohols etc. become routine.

Our refractory materials kit contains fluxes and special sleeves for the combustion of difficult samples requiring extreme conditions for extracting carbon and nitrogen.
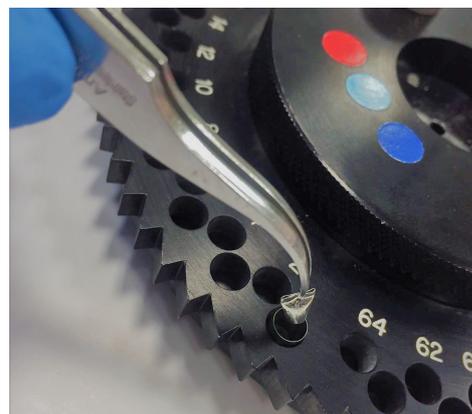
Applications of use

POLYMERS

Polymers, co-polymers, and blends. Even samples with high levels of halogens, like PVC or Teflon, can be analyzed rapidly and accurately.

REFRACTORIES

Nitrides, graphite fibres, and ceramics can be analysed even carbides with melting points over 2000°C.

ENVIRONMENTAL

Soil, waste analysis, agricultural, fertiliser, animal waste, lake and river bed sediment.

PETROCHEMICALS

Crude oil, sludge, gasoline, jet fuel and refined products.

OCEANOGRAPHY

Glass fiber filters (25mm and 50mm) to analyze ocean, lake and river waters. Filtered smoke stack effluent can also be analysed.

ORGANICS & PHARMACEUTICALS

Analysis of virtually any class of organics, including: organometallics, heterocyclic nitrogen derivatives, steroids, polynuclear aromatics and organo-phosphorous.

VOLATILE/AIR SENSITIVE SAMPLES

Volatile and air sensitive materials are easily analyzed with the aid of our capsule sealing device.

COAL INDUSTRY

Coal, coke, coal tar, carbon fibers.

Other Application Areas food, cosmetics.
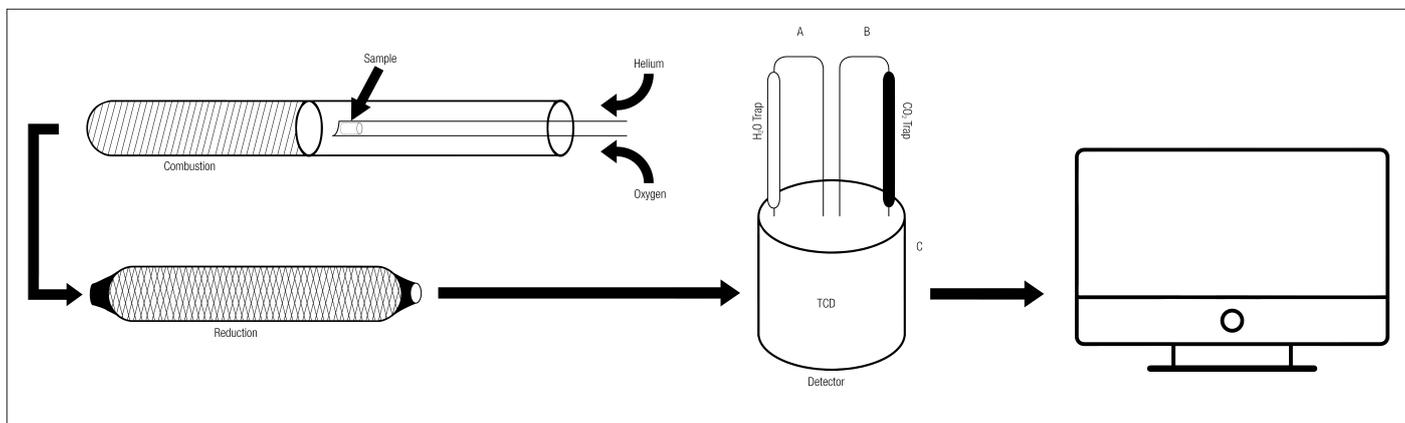
CE-440

Specifications

Accuracy
With standard organic compounds, +/- 0.15% absolute plus +/- 0.15% relative

Sample Size
Typically 1-5mg; up to 500 mg for samples with low carbon content.

Analysis Time
Less than 5 minutes for CHN

Controller
Windows Base PC

Automation
64 sample carousel or single sample with ability to re-weigh for ash.

Range
100 ppm to 100%

Detector
Thermal conductivity

System Sensitivity
+/- 1 microvolt

Analytical Sensitivity
Less than 1 microvolt

Power
110/220 V,60/50 Hz, 10 amp, single phase

Weight and Dimensions
120 lbs (55 Kg)
32" wide x 28" deep x 13" high (81 x 71 x 33 cm)

Bottled Gases Required
UHP Helium 99.99%, UHP Oxygen 99.99%.

CE-440

Theory Of Operation

The samples to be analyzed are weighted in consumable tin or aluminium capsules. The capsule is injected into a high temperature furnace and combusted in pure oxygen under static conditions. An additional burst of oxygen is injected at the end of the combustion period to ensure total combustion of all inorganic and organic substances. If tin capsules are used for the sample container an initial exothermic reaction occurs raising the temperature of combustion to over 1800 °C.

The resulting combustion products pass through specialized reagents to produce carbon dioxide (CO_2), water (H_2O) and nitrogen (N_2) and oxides of nitrogen. These reagents also remove other interferences including halogens. sulfur, and phosphorous. They are then passed over copper to scrub excess oxygen and reduce oxides of nitrogen to elemental nitrogen. After scrubbing, the gases enter a mixing volume chamber to ensure a homogeneous mixture at constant temperature and pressure.

The mixture then passes through a series of high-precision thermal conductivity detectors, each containing a pair of thermal conductivity cells. Between the first two cells is a water trap. The differential signal between the cells is proportional to the water concentration, which is a function of the amount of hydrogen in the original sample. Between the next two cells is a carbon dioxide trap for measuring carbon. Finally, nitrogen is measured against a helium reference.

Sulfur is measured separately, as sulfur dioxide, by replacing the combustion and reduction reagents. Oxygen is also measured separately by pyrolysis in the presence of platinized carbon. The oxygen is finally measured as carbon dioxide. Both analyses are easily carried out and require a single change of reagent tubes. In this way the analysis of either sulfur or oxygen is not compromised by trying to determine several elements at the same time. Parameters and reagents are optimized for the element undergoing analysis.

Locations of CE-440 Elemental Analyzer's.
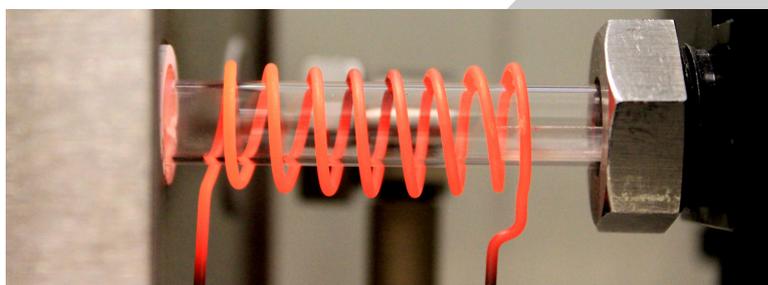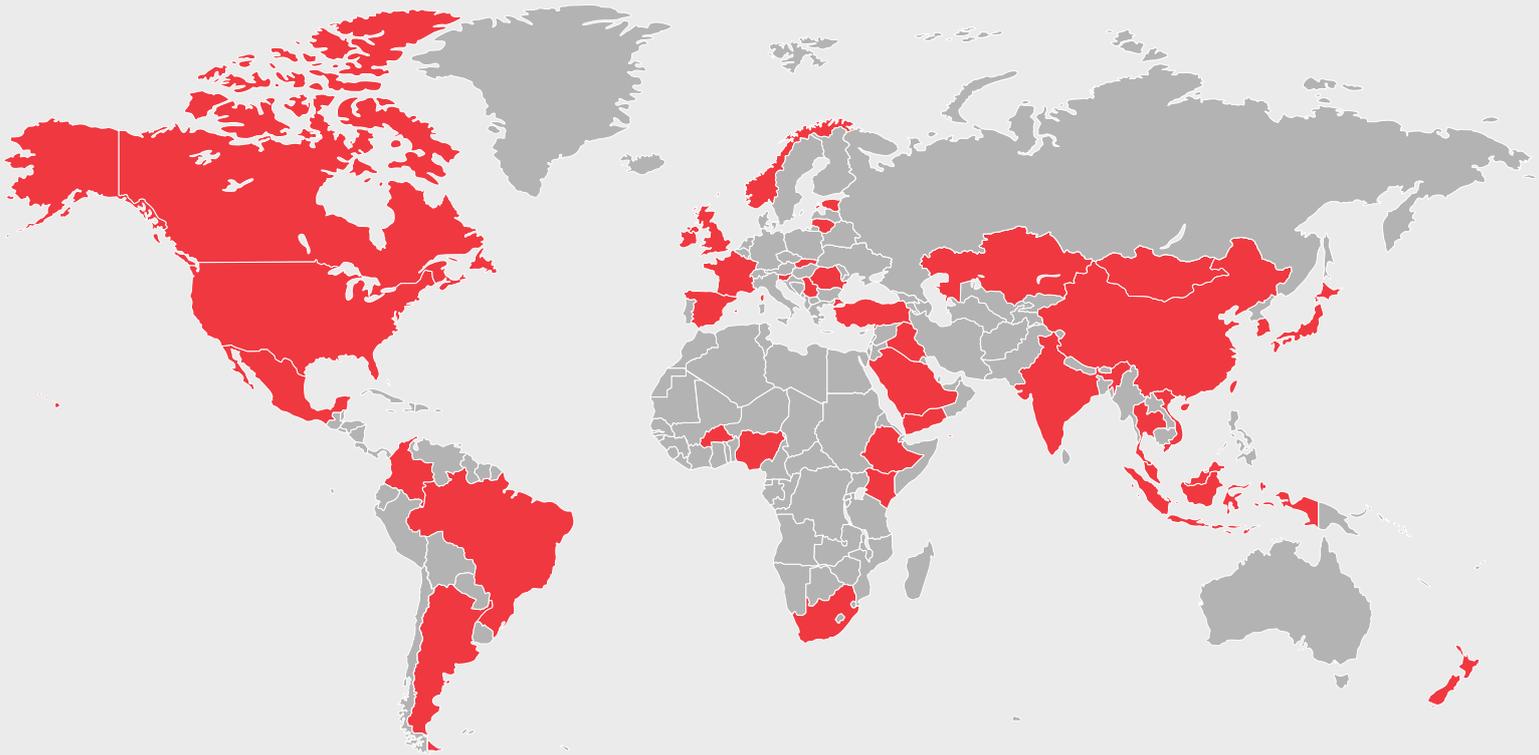
About

Exeter Analytical

Exeter Analytical, Inc. is a company with a rich heritage in the manufacture of elemental analyzers for a wide range of research, industrial and academic applications. Our customers include some of the largest firms in the world as well as some of the most prestigious academic research institutions in over 30 countries.

Our CHN/O/S application laboratory stands ready to assist you in getting the best results on your samples. Our experienced and knowledgeable applications chemists and engineering staff are always available to provide in-depth support and consultation on any CE-440 application.

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