We're Going Global

CHNS/O

Carbon, hydrogen, nitrogen, sulfur and oxygen and are the basic elements of living nature and all are found in crude oil and petroleum products. In 1833, Jean-Baptiste Dumas, a French chemist, developed a combustion method for determining nitrogen in organic compounds. In 1923, Fritz Pregl, a Slovenian and Austrian chemist won the Nobel Prize in Chemistry for contributions to quantitative organic microanalysis. Their work helped build the foundation for today's very sophisticated and complex modern elemental analysis methods.

Individual element pictures are from https://en.wikipedia.org/wiki

Why Carbon, Hydrogen, Nitrogen, Sulfur and Oxygen Require Testing

It is important to quantify their amounts in crude oil and finished fuels to understand how they will refine or combust and what by-products may be formed.

- Characterization of crude oil and petroleum feedstock is important for optimizing the production of fuels and finished petroleum products.

The following can come from petroleum products combustion sources, such as motor vehicle exhausts, gas turbines, jet engines, power plants and factories.

- **GHG** - Burning fossil fuels releases large amounts of carbon dioxide and other greenhouse gases into the earth's atmosphere. Greenhouse gases act like a blanket, trapping energy in the atmosphere and causing it to warm.
- **ACID RAIN** - Nitrogen oxides and sulfur dioxide produced by the combustion of fossil fuels react with oxygen and water to form nitric acid and sulfuric acid also known as acid rain.
- **SMOG** - Pollutants (primarily made up of ground-level ozone) are produced through a complex set of photochemical reactions involving volatile organic compounds (VOCs) and nitrogen oxides in the presence of sunlight that result in the production of ozone.

CHNS/O Elemental Analyzer at AmSpec New Orleans

The PerkinElmer 2400 Series II CHNS/O Elemental Analyzer in the AmSpec New Orleans laboratory is a state of the art instrument, offering consistent and precise analytical measurement of carbon, hydrogen, nitrogen, sulfur and oxygen. It has the capability of handling a wide variety of sample types in the field of pharmaceuticals, polymers, chemicals, environmental and energy, including solids, liquids, volatile and viscous samples.

For more information on ELEMENTAL ANALYSIS, please contact:

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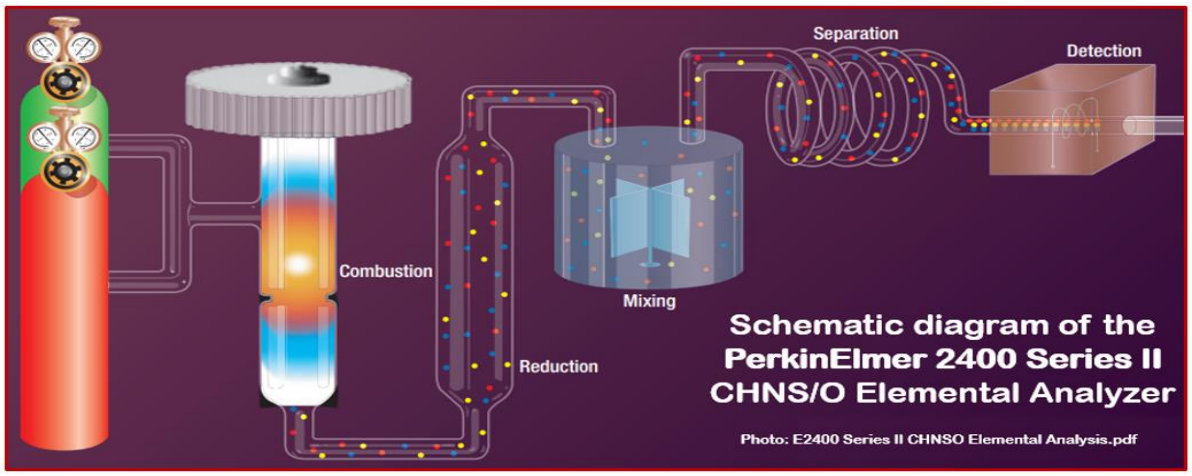

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Please visit us on our website…www.amspecgroup.com or contact us at (800) 286-2208

Testing on the PerkinElmer 2400 Series II CHNS/O Elemental Analyzer

Carbon, Hydrogen, Nitrogen, Sulfur Testing

The CHN and CHNS testing is based on the Pregl (C,H) and Dumas (N) methods where samples are combusted in a pure oxygen environment and resultant combustion gases measured.

Combustion Zone

In the presence of excess oxygen and combustion reagents, the sample is combusted completely and reduced to the elemental gases. Carbon is converted to carbon dioxide (CO2), hydrogen to water (H2O), nitrogen to nitrogen gas (N2) and sulphur to sulphur dioxide (SO2).

Gas Control Zone

The gases are captured in the mixing chamber of the Gas Control Zone. The gases are rapidly mixed and precisely maintained at controlled conditions of pressure, temperature and volume. By controlling the product gases from combustion/pyrolysis (heating to decomposition to produce smaller molecules that are easily separated by gas chromatography) to the same exact conditions for every run, outside influences of barometric pressure changes and altitude are eliminated.

Separation and Detection Zone

After homogenization of product gases, the mixing chamber is depressurized through a column in the Separation Zone of the instrument. As the gases elute, they are measured by a thermal conductivity detector (TCD) in the Detection Zone of the analyzer.

Frontal Chromatography for Highest Reliability

Selective retention of the gases to produce a stepwise signal rather than a peak signal. This technique allows for a more accurate determination of the combustion. The powerful data management software system with high-speed microprocessor control provides confidence in performance and a robust system for accurate, reliable material characterization.

Oxygen Testing

The sample is pyrolyzed in a helium/ hydrogen (95%:5%) atmosphere at 1,000°C. The resulting products of reaction containing oxygen are converted to carbon monoxide over the platinized carbon reagent. The carbon monoxide and other gases pass through a scrubber where interferences are removed. The carbon monoxide is then controlled, separated and determined in the same fashion as above.