

Total Organic Carbon / LECO TOC

LECO Carbon

Accurate quantification of total organic carbon (TOC) is key to the exploration and development of hydrocarbon reservoirs in an unconventional play.

Premier utilizes the LECO 744 Series for quantification TOC by Combustion Infrared Detection Techniques in rock samples.

LECO 744 Series Technical Specification:

Detection limits of Carbon: 0.002 to 60 mg;

Precision: 0.001 mg or 0.5% RSD, whichever is greater when converted to absolute units (mg)

Calibration: Standards (single or multipoint); manual

Analysis Time: 40 seconds (nominal)

Cycle Time: 130 seconds (nominal)

Throughput: 27 samples per hour (nominal)

Sample Size: 1 gram (nominal)

Detection Method: Non-Dispersive Infrared Absorption

Chemical Reagents:

- Anhydrous Magnesium Perchlorate ($MgClO_4$)
- Sodium Hydroxide on an Inert Base†
- Platinized Silica Gel
- Rare Earth Copper Oxide‡
- Cellulose

Gas Requirements

Carrier: Oxygen, 99.6% pure, 35-psi (2.41 bar) $\pm 10\%$

Pneumatic: Compressed Air (oil, water free), 40 psi (2.76 bar) $\pm 10\%$

Gas Flow Rates Carrier: 3 L/min

Pneumatic: 1 L/min

Furnace: 2.2 kW Induction



Figure 1: LECO 744 instrument.

Operating Conditions: Operating Temp: 15 to 35°C (59 to 95°F)

Rel. Humidity: 20 to 80% (non-condensing)

Standard Operating Procedures

Sample preparation for core

- Samples are cut/drilled from the butt-half of the core at the desired interval of analysis. It is recommended to analyze the corresponding depth of XRF analysis for best correlation between datasets.
- The sample (core pieces or drilled powder) are then pulverized and homogenized using a centrifugal mill or a mortar and pestle.

Sample preparation for drill-cuttings

- A powerful magnet is run over the drilled cuttings samples in order to remove metal contamination from drill pipes.
- The drilled cuttings samples are first washed in an ultrasonic bath with deionized water for 5 minutes to remove surface contaminants such as drilling mud.
- The washed cuttings are dried in an oven at 70°C for an hour.
- The dried cuttings are pulverized and homogenized using a centrifugal mill or mortar pestle.

LECO TOC Analysis:

- Samples are weighed and placed into filtered crucibles for sample prep.
- Samples are acidified using a ratio of 3:1 H₂O:HCl until samples cease to effervesce.
- Allow samples to dry, load samples into carousel along with conditioners, blanks and standards to ensure accurate quantification.
- Samples are combusted in the furnace and converted to carbon dioxide, which flows into a non-dispersive infrared detection cell that quantifies the sample CO₂ and converts the measurement into a dry sample weight of %TOC.