

## HAWK Programmed Pyrolysis and TOC

### Overview

Source rock pyrolysis has become essential to unconventional reservoir evaluation and development. Programmed Pyrolysis provides key insight into the organic matter quantity, quality and production potential of source rock bearing intervals.

The quantity of organic matter (TOC) is a valuable insight, but not enough for proper geological, geochemical or financial assessment. The **QUALITY** of the organic matter present provides the additional characterization critical to complete organic geochemical investigation. Accurate measurement and interpretation of thermal maturity as a function of the specific organic matter type(s) aid and confirm the most attractive geochemical target for production AND expected production for each organic interval.



### Why HAWK

- The HAWK is the latest, most robust, precise and accurate pyrolysis instrument on the market.
- The Accuracy of the HAWK instrument is illustrated in the Trueness and Precision (reproducibility) of our personal instrument investigation (Fig 1-3).
- Performing source rock characterization has traditionally been done in the lab. Recent advances in technology have paved the way for analysis to be done on location OR in a Rapid Answer Lab setting for Turnaround in hours or days meeting any critical deadlines.
- Precision and reproducibility of older pyrolysis instruments further complicates an already imperfect model for mapping source rock character and mapping.

### Features

- Building on the fundamentals of Rock Eval and Source Rock Analyzer, the HAWK produces the traditional source rock pyrolysis/oxidation values with much more reproducibility and reliability.
  - Organic richness (TOC)
  - Available hydrocarbon content (S1)
  - Remaining hydrocarbon generative potential (S2)
  - Thermal maturity (Tmax)
  - Organic carbon dioxide from Pyrolysis (S3)
- Accurate and Reliable Inputs for calculating
  - Hydrogen index - Present day kerogen typing
  - Oxygen index - Present day kerogen typing
  - Production index - conversion of kerogen to bitumen
  - Normalized oil content - hydrocarbon accumulations with lower organic content indicative of hybrid reservoirs or migration
  - Organic carbon dioxide from Pyrolysis (S3)
- Less than 100 mg of sample is needed to perform the analysis and results are available in less than one hour after the sample has been collected from the shale shaker.

### Benefits

- Analyzing cuttings samples on location or in the Rapid Answer Lab provides a tool for monitoring the high levels of organic heterogeneity both vertically and laterally. Understanding these trends for a given well reduces risk of missing the most attractive target in a given well.
- More accurate mapping of key organic parameters such as organic content, quality and maturity within a given well or within a given formation from well to well.
- Screening of much larger sample sets at lower cost and with faster turnaround time. Provides a much better understanding of the reservoir across a large area. Which in turn equates to more effective drilling plans for a given area.