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# Is your geochemistry real? – geochemical best practices

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## Summary

When considering the geochemical analysis of cores, it is necessary to generate the most accurate geochemical data as possible. Many different factors can impact compositional data, and a number of steps can be taken to reduce variations that are artefacts of sample handling, transport and preparation. Temperature control (or lack of) can result in permanent compositional changes to core bitumen, through evaporative loss. Diamondoids are especially susceptible to this. The time between coring and sample preparation / analysis is also critical. During this time, volatile bitumen components are continuously being lost, even during frozen storage, resulting in core fluids which ultimately do not represent what was originally collected. Analysis as soon after coring is the best approach, wherever feasible.

Selection of a representative sample is another consideration. For geochemical analysis, the best samples are typically taken from the centre of the core, minimising the chance of drilling fluid infiltration.

Determination of fluid properties from bitumen within cores requires that fluids are liberated in such a way as to exert the minimum amount of force upon them. Subjecting samples to centrifugation, for example, can alter fluid chemical compositions through the loss of volatile hydrocarbons, resulting in a less accurate viscosity measurement. Likewise, the measurement of fluid properties after solvent extraction poses a problem relating to removal of excess solvent. Because other factors such as water content or the presence of mineral fines can impact fluid property measurements, processes that minimise both are advisable.

Selection of appropriate methods of analysis is also critical. Many oils are topped prior to analysis, in order to generate a stable weight. However, this process removes light components which may be the intended molecules of interest. Analytical standards are commonly employed in order to quantify this analysis, and it is important that the standards selected are relevant in terms of their chemical behaviour. In addition, standards should be run in each set of analyses, in order to minimise the risk of “batching". Reducing or removing the risk of batching helps to ensure that observed variations across multiple sample sets is actually due to significant variations in geochemical composition. Interference of aromatic compounds in the fingerprints of saturated hydrocarbons (and vice versa) means that good separation prior to analysis is essential. Gas

chromatography mass spectrometry (GCMS) allows analysts to ensure that such separation has been carried out.

The relationship between geochemical composition and fluid properties is well known. To construct a meaningful predictive model, of use when direct viscosity measurement is not possible (in lean zones, or with some cuttings samples), the measurements making up the original model must be as accurate as possible. Failure to capture such baseline data will lead to the creation of a poorer model. Subtle differences in molecular geochemical composition can lead to variation in predicted fluid properties or source interval for produced fluids during production allocation.