Minerals From Elements: A Reality Check

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ABSTRACT

Just as many people have used Uranium as a proxy for TOC in the past, there is an increasing application whereby elemental data are used to model mineralogy. Here we look at the pitfalls and also the advantages of this approach. Acquiring elemental data from cuttings samples in unconventional plays has become almost routine analyses. The advantages of collecting elemental data are numerous: data collection is quick and cost effective; instrumentation allows good quality data to be gathered at well-site; data acquired are absolute values and require little interpretative processing; the data provides information on litholofacies, paleoredox, TOC and aids with sweet spot identification. Clearly it is also possible to comment on clay, quartz and carbonate content based on Al2O3, SiO2 and CaO concentrations, further enhancing the usefulness of elemental data. However, increasingly elemental data are being used to calculate mineralogy using a stoichiometric approach. This approach can and does provide meaningful mineralogical data, but without some knowledge of the system you are working with can also provide highly erroneous results. We will demonstrate how using two different stoichiometric models will produce different results from the same elemental data and how those results would impact on looking at rock brittleness. We will look at what you need to decide which model is nearest the truth and demonstrate a possible alternative method using unsupervised machine learning.