Comparison of Various Mineral Analysis Methods for Green River Oil Shale

Alan K. Burnham[a], Michael Herron[b], Susan Herron[b],Alyssa Charsky[b], Clay Jones[c], Milind Deo[c], Robert Krumm[c], Prashanth Mandalaparty[c], Andre Levchenko[d], Pierre Allix[e]

[a]American Shale Oil, LLC, Rifle, CO; [b]Schlumberger-Doll Research, Cambridge, MA; [c] University of Utah, Salt Lake City, UT; Setaram, Pleasanton, CA; Total SA, Pau, France

FTIR Method

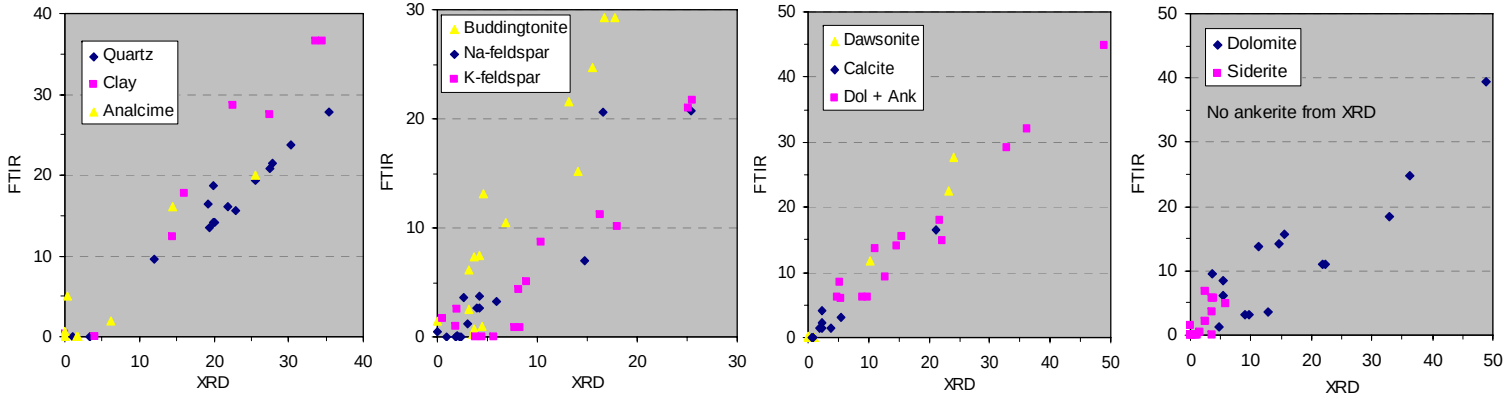
Samples were analyzed by dual range (far- and mid-IR) Fourier Transform Infrared (FT-IR) spectroscopy using the procedure of Herron et al. (1997). The samples are crushed, milled to finer than 2 microns, mixed with KBr, and pressed into spectroscopy pellets for scanning.

Herron, M.M., Matteson, A. and Gustavson, G. (1997) "Dual-Range FT-IR Mineralogy and the Analysis of Sedimentary Formations," Proceedings of the 1997 International Symposium of the Society of Core Analysts, Calgary, Sept. 7-10, paper SCA-9729.

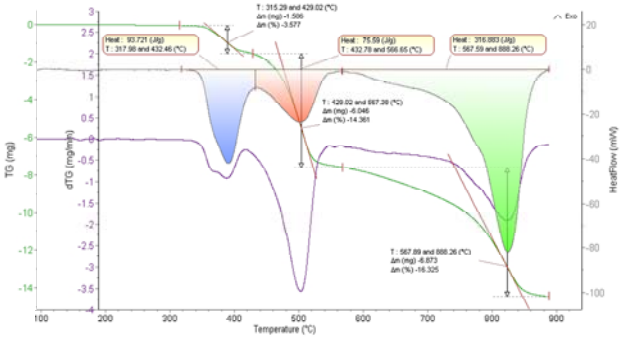
XRD Method

XRD samples were milled to an average grain size to ~10 µm prior to analysis on a Bruker D8 diffractometer. Samples were run with and without ethylene glycol swelling to improve quantification of expandable clays. TOPOS software incorporating the Rietveld profile refinement method was used to determine the abundance of each crystalline phase.

XRD and FTIR analyses agree qualitatively

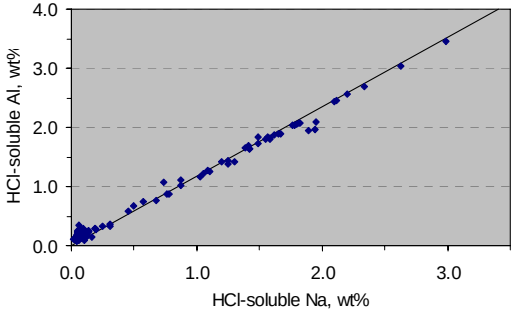


Thermal Analysis Method

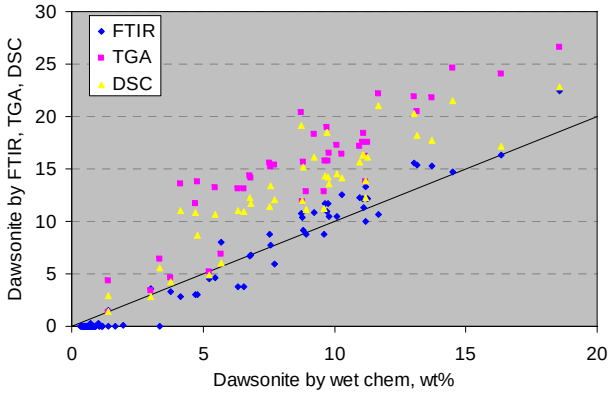


Wet Chemistry Method

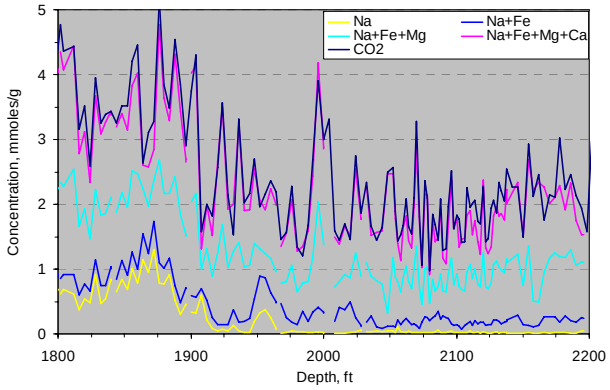
Adapted from method used at Laramie and Livermore in the 1970s and 1980s
Nahcolite determined by water soluble Na
Dawsonite, Calcite, and Dolomite determined by subsequent leach with 1N HCl



FTIR agrees well with wet chemistry for Dawsonite



Wet chemistry cations balance well with mineral CO_2



FTIR carbonate cations agree reasonably well with wet chemistry