Evaluating Organic Reaction Products Generated during Interaction between Marellus Shale and Hydraulic Fracturing Fluids

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Understanding effects of fracturing fluid-shale interactions both on unconventional reservoir porosity and permeability, and on the composition of produced water, requires an understanding of changes in the organic composition of fracturing fluids and solids during the fracturing process. Building on prior laboratory and field observations of changes in organic composition of fluids and solids associated with hydraulic fracturing operations in the Marcellus Shale, this study focuses on evaluating the influence of iron-bearing minerals and dissolved iron species on reactions involving organic compounds during the fracturing shut-in period. Fluids and solids from experiments performed under reservoir-relevant conditions with Marcellus Shale are characterized for primary organic components using electrochemical, and GC-MS and LC-MS, techniques. Results will show whether Fe-mediated organic reactions affect organic compositions in produced waters, such as changes in surfactant composition observed in prior characterization of field samples from hydraulically fractured Marcellus Shale.