

## Hydrocarbon Potential of Sasin sediments of the Wealden - A Shale Gas Target in Germany

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Basin facies sediments of the Wealden of NW Germany are a target of gas shale exploration. We present preliminary results of a study that aims at providing basic information of the hydrocarbon potential of Wealden sediments. A complete succession of the central sub-basin facies of the German Wealden has been drilled at site Isterberg 1001. The cored sediment section contains three groups of alternating claystones and intercalated shell-horizons. The sediments have been sampled for geochemical investigations.

Organic geochemical analyses have been performed on a suite of 48 selected samples of Wealden 3 and 4 sediments, which cover all claystone facies types. Methods include carbon and sulphur elemental analyses as well as RockEval pyrolyses and gas chromatography and biomarker investigations to characterize depositional changes as well as thermal maturities of the sediments.

Biomarker derived maturities are compatible to Tmax values of RockEval pyrolyses and suggest thermal maturities slightly below peak oil generation. The amounts of extractable hydrocarbons in relation to organic carbon contents indicate that the sediments are an excellent oil source rock. This is supported by RockEval pyrolysis parameters, which indicate that the organic matter of the sediments varies between Type I and II kerogens. Low hydrogen indices related to more terrestrial organic matter have only been observed in very few samples. Carbon isotope ratios show an enrichment of <sup>12</sup>C in the organic matter, and are characteristic of a carbon contribution from the methane cycle in oxygen deficient environments. Alkane distributions of extracted hydrocarbons as well as of biomarkers of the aliphatic fraction confirm the initial interpretation of the organo-facies.

Production indices as well as the hydrocarbon yields of solvent extraction show an unexpected inverse relationship with the thermal maturity, with lowest carbon-normalized hydrocarbon concentrations at highest maturities. We explain this observation by a matrix effect through which already generated hydrocarbons have been absorbed on the organic matter, as we observe that samples with high organic carbon concentrations yield low carbon-normalized amounts of extracts. These observations indicate that the expulsion of hydrocarbons is hampered in the organic rich (> 6 % TOC) basin sediments of the German Wealden. Sediments with similar geochemical characteristics likely have a gas shale potential at higher maturities.