

Oil shale pyrolysis laboratory and technique

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While standard laboratory tests such as Fischer Assay and Rock Eval provide information about the relative richness of oil shale intervals, they neither guide the design of production processes nor predict product quality and quantity that result from those processes. Our objective is to formulate a kinetic model to interpret oil shale production tests in a specific interval of the Green River formation. A program of thirty experiments has been devised to maximize the efficiency of kinetic parameter determination. Heating rate, final temperature, final temperature duration, pressure, and water content are varied. For the purpose of supporting production tests, the samples consist of drill cuttings from the production interval of a research, development, and demonstration lease in the Piceance Basin, Colorado. A pyrolysis laboratory apparatus has been upgraded for kinetic studies of oil and gas generation. Samples are small enough that the effects of heat and mass transport are negligible, but large enough to generate product volumes adequate for complete analysis. The semi-open system, designed to mimic downhole conditions, has the following capabilities: (1) flexible, programmable temperature profiles, with maximum temperature of 425°C, (2) controlled atmosphere, (3) programmable gas pressure from 0 to 20 MPa, (4) sample mass up to 100 g, and (4) measurement of volumes and compositions of oil produced via vaporization, bitumen retained in the shale, organic and inorganic gases, water, coke and ash. An extensive analytical program is used to characterize the pyrolysis products.