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Effect of oil shale particle size on oil yield, sulfur and distillation fractions

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The effect of particle size on total weight loss, gas loss, and oil yield of oil shale samples has been investigated at constant heating rate. Particle size of the samples varied from 4.0mm to 37.5mm for the pyrolysis experiments on Ellajjun (Jordan) oil shale specimens. The total weight loss at 550°C final pyrolysis temperature decreased from 28% to 21% as particle diameter increased from 4.0mm to 37.5mm. Gas loss percent also decreased from 9% to 6% in the investigated range. Oil yield measured by Fischer Assay was found to decrease from 90% to 67% with increasing particle size. Atmospheric distillation of the produced shale oil has shown a decrease in the naphtha and gasoline fraction by 4 volume %, whereas the percentage of diesel fraction decreased from 50% to 42% as particle diameter increased. On the other hand, the percent kerosene produced from large particle size pyrolysis was found to be 34%, whereas 22% volume distilled was reported for the smaller size. Sulfur and density decreased with increasing particle diameter. The sulfur in liquid hydrocarbon decreased from 10.9% wt. in liquid hydrocarbons to 9.9% wt. as particle size increased.