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Effect of demineralization of El-lajjun Jordanian oil shale on oil yield

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Abstract: The effect of demineralization on oil yield and mineral composition of Jordanian oil shale was investigated. A standard digestion procedure using a range of inorganic and organic acids including HCl, HNO₃, HF, and CH₃COOH was used to enhance the oil recovery of oil shale samples collected from the El-lajjun area. The total yield of the digested samples, as determined by Fischer Assay, has shown a maximum value (two folds the untreated sample) obtained when using CH₃COOH. The kaolin in the treated oil shale with a high concentration of CH₃COOH is believed to have transformed to illite as found in the XRD analysis. The treatment of oil shale using HCl has shown an increased ratio of oil to gas as a result of the digestion of calcite in the oil shale. At higher concentrations of HNO₃, the acid is believed to react with the kerogen in the oil shale resulting in high levels of low molecular weight compounds. Therefore, the amount of noncondensable gases produced by Fischer assay after treatment with a high concentration of HNO₃ is relatively high. HF is believed to drive off water from the oil shale by dissolving the clay minerals leading to increased oil to gas ratio.