

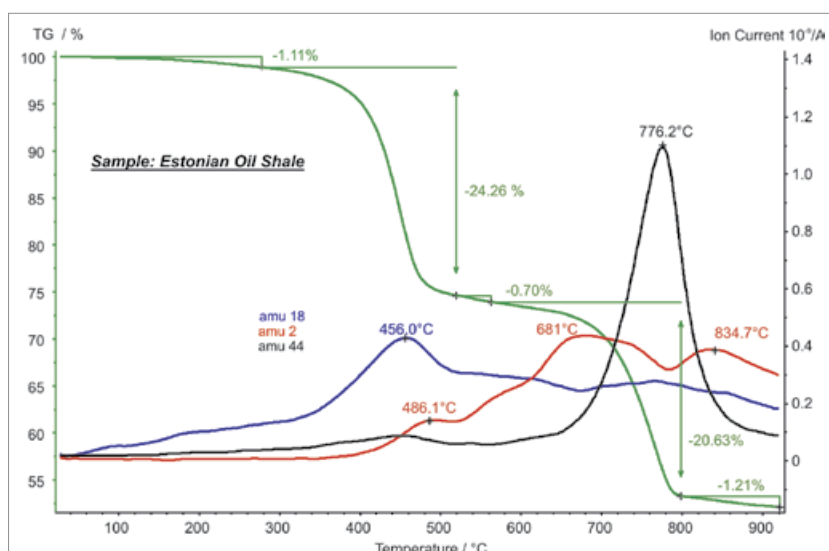
APPLICATION SHEET

ORGANICS – CHEMISTRY

OIL SHALE

Oil shale is a fine grained sedimentary rock which contains kerogen (a solid mixture of organics). From the kerogen, liquid hydrocarbons can be produced. The global deposits of oil shale are estimated as equivalent to ~3x10¹² barrels of recoverable oil. From the kerogen in oil shale, a synthetic

crude oil can be made through pyrolysis which refers to thermal treatment under the absence of oxygen. Oil shale can be used as a raw material in the chemical and materials industries but can also be fired directly as a low-grade fuel for heating and generation of electrical power.



Instrument

STA 409 CD *Skimmer*[®]

Test Conditions

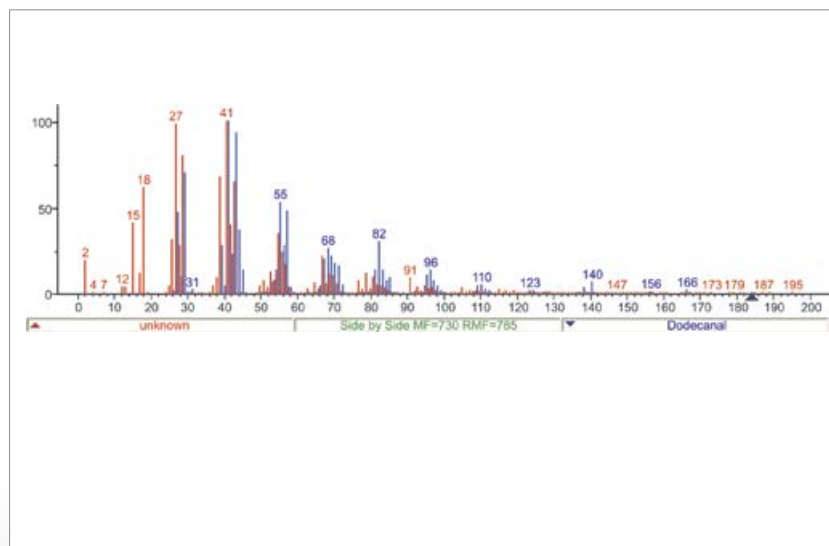
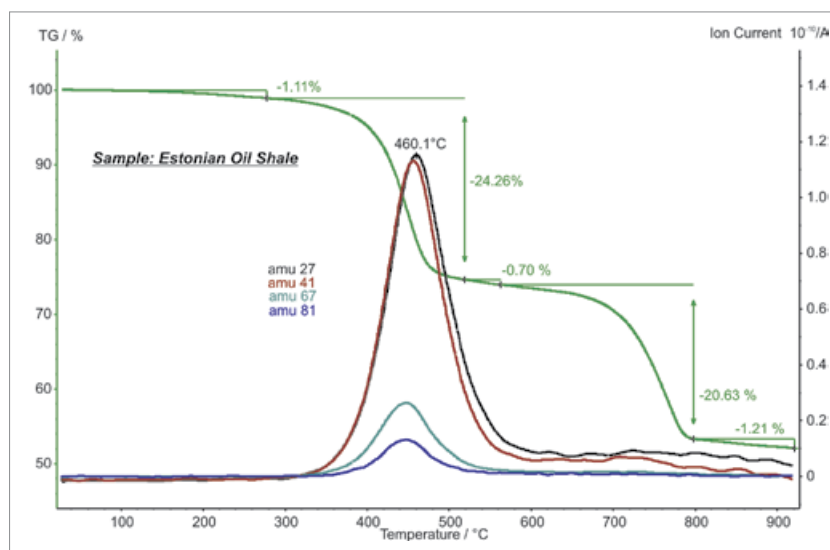
Temperature range	RT ... 900°C
Heating/cooling rates	10 K/min
Atmosphere	N ₂ at 75 ml/min
Sample mass	25 mg
Crucible	Pt
Sensor	TG-DSC type S

Results

The first figure shows the temperature-dependent mass changes together with the strongest mass spectrometer signals. During this pyrolysis experiment, five mass loss steps of 1.1%, 24.3%, 0.7%, 20.6% and 1.2% were observed. The signals for mass numbers 2, 18 and 44 are most probably due to the evolution of H₂, H₂O and CO₂. However, a lot more mass numbers were detected as can be seen from figure 2. An exemplary mass spectrum measured at 459°C is compared with the literature spectrum of the long chain hydrocarbon dodecanal C₁₂H₂₄O. Mass numbers 33, 34, 48 and 64 shown in the last figure are most probably due to the fragment HS, H₂S, SO and SO₂.

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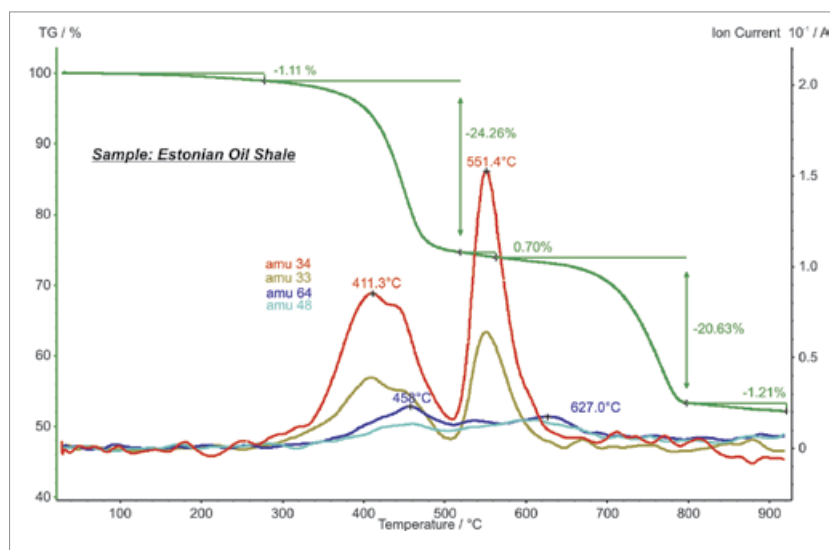
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