

INVESTIGATING THE PYROLYSIS OF OIL SHALE USING TGA-MS

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Oil shale (OS) is an important resource for the production of electricity and oil, especially since 90% of electricity in Estonia is produced from OS [1]. Although it has been studied in Estonia since the 1930s, with the use of modern laboratory equipment, there is still much to learn. This study focuses on the pyrolysis of oil shales from the USA, China and Estonia using thermogravimetric analysis (TGA). In order to study the evaporating gases, TGA was coupled with mass spectrometry (MS). The effect of sulphur on the pyrolysis kinetics and evolved gases was investigated. The MS results indicate the intensifying of the evaporation of SO₂ above 500 °C. H₂S is mainly released in the temperature range of 350 to 500 °C. The samples Kentucky, Green River, Estonia and Chinese 2 also have an additional peak at 500 to 570 °C (see Fig. 1). Based on the results of the evaporating sulphur containing substances changing the pyrolysis temperature could potentially decrease the sulphur content of the produced oil. The calculation of kinetic distribution supported the findings of MS – the samples exhibited two distinct kinds of activation energy distributions. Samples with a higher sulphur content exhibited more parallel reactions with a similar and relatively small weight percentage. Additionally, the total conversion dependence of reaction time was calculated at isothermal conditions to show the effect of decreasing the pyrolysis temperature.

References

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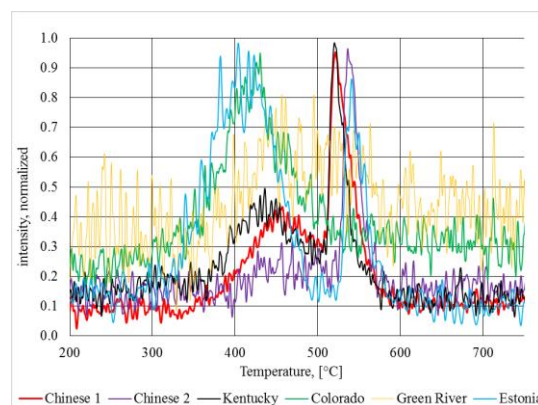


Fig.1 The evolving of m/z 34



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