The Use of Hydropyrolysis of Oil Asphaltenes to Characterize Mixed Oils from the Clair Field

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Catalytic hydropyrolysis (hypy), which refers to pyrolysis assisted by high hydrogen gas pressures (15 MPa) in the presence of a dispersed sulphided Mo catalyst, has been developed as a method for liberating covalently bound biomarkers from macromolecular organic fractions in coals, source rocks and crude oils. Bound biomarkers released from asphaltenes adsorbed to petroleum cores reveal the maturity and source characteristics of the oil that first came into contact with the carrier substrate, so allowing for the elucidation of migration pathways and reservoir filling events.

This study describes the use of hypy of oil asphaltenes to understand more about the source and filling history of oils from the Clair field in the West of Shetland area, which is one of the largest oil discoveries on the UK continental shelf. It is known to contain oils formed from the mixture of two distinct pulses, which vary both in terms of their source characteristics, and the degree of biodegradation to which they have been subjected.

To identify the sources of the two components, the aliphatic hydrocarbons isolated from a number of free oil and reservoir core samples, which generally represent the non-biodegraded second charge of oil, have been compared to that recovered from the hypy of the oil asphaltenes which reflect the source of the first charge of oil. Indeed, hypy has enabled lacustrine source rocks for the first charge of the waxy oil to be identified.