

KEROGEN KINETICS IN PETROLEUM SYSTEMS ANALYSIS: A CASE STUDY USING COALY SOURCE ROCKS FROM MALAYSIAN ONSHORE BASINS

Peter Abolins¹ & Wan Hasiah Abdullah²

¹PETRONAS Carigali Sdn Bhd, Level 16, Tower 2, PETRONAS Twin Tower, KLCC, Kuala Lumpur, Malaysia

²Department of Geology, University of Malaya, 50603 Kuala Lumpur, Malaysia

Kerogen kinetics, when incorporated into a petroleum systems model, play a key role in defined the timing of hydrocarbon generation, the composition of hydrocarbons generated, and hence the phase of hydrocarbons in the subsurface. Such roles and applications are discussed in various papers such as Pepper and Corvi (1995), di Primio and Horsfield (2006), and Stainforth (2009).

In this study, bulk kerogen kinetics were derived for a selection of coal samples from the Malaysian onshore Tertiary basins of Batu Arang, Bintulu, Merit-Pila and Mukah-Balingian. These coals possess % vitrinite reflectance (%Ro) in the range of 0.42-0.60% thus are thermally immature to early mature for hydrocarbon generation. These coals are expected to have fair to good petroleum generating potential based on the HI values that ranges from about 100 to 500 mgHc/gTOC. Petrographically, these coals are observed to be dominated by vitrinite macerals with common occurrence of liptinitic kerogen (10-40% by volume).

The aim of this study is twofold. Firstly to compare the personalised bulk kinetics acquired here with those currently

available from published literature. Secondly is to illustrate the impact of different kerogen kinetics and geochemical parameters in the context of petroleum system analysis that is commonly used in oil and gas exploration, specifically on the timing, quantity and type of hydrocarbon generated. This is achieved by incorporating the personalised kinetics and other geochemical parameters acquired here into simple generic 1D and 2D basin models constructed using the PetroMod software suite.

REFERENCES

- DI PRIMIO, R. AND HORSFIELD, B. (2006) From petroleum-type organofacies to hydrocarbon phase prediction. AAPG Bull. vol. 90, no. 7, 1031-1058.
- PEPPER, A.S. AND CORVI, P.J. (1995). Simple kinetic models of petroleum formation. Part 1: oil and gas generation from kerogen. Marine and petroleum geology, vol12 (3), 291-319
- STAINFORTH, J.G. (2009), Practical kinetic modeling of petroleum generation and expulsion. Marine and Petroleum Geology, vol. 26, 552-572.