3.1.P04

Imprint of primary migration of hydrocarbon on the nano-scaled pore structure of source rocks and surface properties of organo-clay complexes

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In order to investigate the primary migration of hydrocarbon in clayey source rocks comprehensively and attempt to evaluate the degree of hydrocarbon expelling approximately, the Tertiary clayey source rocks sampled from Dongying Basin, Bohai Depression were studied systematically. As the method of low-tempreture nitrogen adsorption isotherms is proved to be a valid tool to probe nanostructure and surface properties of material, the isotherms of both source rocks and organo-clay complexes fractions were obtained and analyzed whereafter.

There are mainly three types nano-scaled pores (0.5~200nm) in source rocks, including interparticles pore, intra-mineral crystalline pore and ultra-microfracture. During the diagenesis, the volume of micropores in clay minerals decreases gradually until it is too small to be detected, whereas the interparticles generally remain fixed size below the buried depth of 1500m. But the microfracture pores only engender in some special diagenesis stages. It is recognized that a group of mesopores with the width of 20~100nm origated primitively at the depth that is a little deeper than the thresthold depth of hydrocarbon generation. These micropores maybe assigned as ultra-microfracture, which act as the pathes for primary migration of hydrocarbon. It is discovered that the evolution of surface properties of organo-clay complexes is controlled by the illitization and the adsorption of hydrocarbon. Both factors cause the decrease in BET surface area, surface fractal dimension, pore volume and the surface energy. During the primary migration of hydrocarbon, the surface properties of organo-clay complexes, mentioned above, increase slightly. It is of significance to find that the relative high energy sites on clay minerals take precedence over low ones disappear as the generation of hydrocarbon, and reappeare lattermost as the primary migration of hydrocarbon.

In conclusion, the ultra-microfractures provide the pathes for the primary migration of hydrocarbon, and the variation in surface properties of organo-clay complexes could be used as an index to evaluate the degree of hydrocarbon expelling.

3.1.P05

Waxy bitumen in basalts – Skye and Faroe Islands, North Atlantic

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The source of waxy bitumens associated with secondary minerals in the Tertiary basalts of the Faroe Islands (North Atlantic) can only be speculated on as it is most likely located below a 5 km thick pile of volcanics[1]. In order to better understand any relation between the waxy bitumen and its source, other Tertiary basalts where a source could more easily be identified (Skye, Scotland) [2] were examined with respect to occurrences of bitumen.

Tiny (~1 mm) brownish, UV-fluorescent, occurrences of wax were locally found all over the Skye basalt area, mostly in places rich in secondary minerals (zeolites). The waxes in basalts of both the Faroe Islands and Skye all consist almost entirely of higher alkanes (Fig. 1). However, the biomarkers (triterpanes and steranes) which were present in the waxes, do not appear to have been very much altered relative to its most likely source(s) [2].

Thus, it may be concluded (a) that the waxes associated with secondary minerals was deposited from (hydrothermal?) fluids percolating in the basalts, and (b) that these fluids at some point were in contact with oils or mature source rocks.

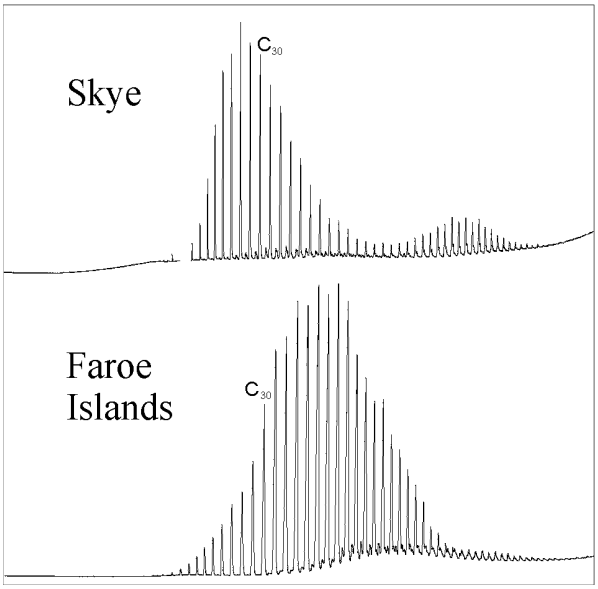

Fig.1. High temperature gas chromatograms of waxes.

References

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