GENERAL MODEL FOR THE MATURATION AND RELEASE OF LIGHT AND HEAVY HYDROCARBONS

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Abstract

The morphology and composition of minerals are well known to be of great importance in determining the suitability of rocks as hydrocarbon reservoirs. However, their role in the generation and release of hydrocarbons from kerogen is still poorly understood. Recent studies suggest that the interaction of some clay minerals with the organic matter in source rocks result in a series of processes which can be characterised as follows:

1 Catalytic increase in the rate of organic carbon decomposition;
2 Control of the chemical nature of the hydrocarbon products;
3 Retention of bitumens and asphaltenes which may be carried to depths where the geothermal gradient causes them to be cracked to light hydrocarbons;
4 Transforming non-porous carbonate rocks to porous reservoir rocks as a result of early catagenic CO_2 and organic acids' release;
5 Recrystallisation of minerals involving release of water, mineral dissolution and release of trapped bitumen;
6 Influence on the formation of mature sweet light oil or immature sour heavy oil.

The consequence of the above evaluation is to suggest that the character of hydrocarbons produced, which is generally thought to be facies controlled, is a result of both mineral as well as kerogen type within the source rock. Recognition of the above could have important implications in the strategy of geochemical exploration for oil and gas.

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