

Catalytic and Thermal Processes of Oil and Gas Generation

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Analysis of changes in physics-chemical properties, molecular composition and structure of different oil types, gas condensates and gases depending upon the depth of their occurrence, the degree of maturity and temperature show that catalytic and thermal processes play an important role in hydrocarbon fluids genesis. In nature these phenomena are closely connected with the stages of sedimentary rocks lithogenesis and thermodynamic conditions.

Oil generation is taking place before "oil window". Catalytic cracking of kerogen begins in the presence of a sufficiently active catalyst already at the protocatagenesis stage ($R_o = 0.30\%$) under relatively low pressures and temperatures thus promoting accompanying reactions of isomerization, dehydrocyclization, hydrogen redistribution, etc. Low - paraffinic oils with a great amount of high-cyclic components and highly branched hydrocarbons are formed in these conditions.

Mid-paraffinic oils are formed at the beginning of mesocatagenesis in the main phase of oil generation. This period is characterised by the development of kerogen thermal cracking reactions with catalytic reactions being still intensive.

At later mesocatagenesis stages as sedimentary rocks are submerging, temperature and pressure grow up and catalitically active clay minerals are transforming into low active ones. Catalitic cracking is less important now than thermal. Light paraffinic oils, gas condensates and dry gases are generated in these conditions, i.e. under still higher temperatures and pressures with insignificant catalitical influence of clay minerals.