



Evidences for natural gas formation from inorganic materials under Earth's upper mantle conditions

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Isotopic analysis of natural hydrocarbons and different geological and cosmological phenomena like black smokers, the spectral data from extraterrestrial objects, natural gas reservoirs in crystal rocks and etc. has ascertained a possibility for natural gas to originate from inorganic materials. At the same time information about direct synthesis of natural gas under Earth's upper mantle conditions is an achievement of the last year [Kutcherov et al. 2010].

Products of reaction between calcium carbonate (or graphite), iron(0) and water at 1500 K and 5 GPa, that occurred in the platinum capsule in CONAC chamber of high pressure apparatus or in pressless split-sphere multianvil "BARS" device, contained mixture of hydrocarbons similar to hydrocarbon part of natural gas. It was found that the nature of carbon donor affects the composition of the emerging hydrocarbon mixture, giving rise to either "dry" (methane-rich in case of graphite) or "fat" (rich in heavy hydrocarbons in case of calcium carbonate) gas.

Analysis of absolute quantities of observed hydrocarbons showed, that after four hours of the experimental mixture slow cooling, concentration of hydrocarbons was twenty times higher than in the case of quenching. This fact may be interpreted as an existence of unknown reaction during cooling or, more likely, effect of higher exposition time. Experiments that confirm formation of methane from inorganic materials has been carried out by different research groups with the use of diamond anvil cell technique (DAC). Methane is a dominant component of natural gas with concentrations up to 95%. Absence of higher hydrocarbons in the DAC experiments seems to be due to the specific technique peculiarities: low reaction volume; absence, till the recent time, of reference spectral information and overlap of the most intensive hydrocarbon signals in Raman spectra – technique that was used for analysis in all DAC experiments. Thus we may conclude that being transferred to high-volume technique like CONAC chamber, experiments, including natural minerals, will result in formation of natural gas – like mixtures.

Formation of oil hydrocarbons can occur at another thermobaric parameters comparing to natural gas, though the possibility of natural gas transformations to heavier compounds during migration or storage in reservoirs.

V.G. Kutcherov, A. Yu. Kolesnikov, T.I. Dyugheva, L.F. Kulikova, N.N. Nikolaev, O.A. Sazonova, V.V. Braghkin. Synthesis of complex hydrocarbon systems at Temperatures and Pressures corresponding to the Earth's upper mantle conditions. *Doklady Physical Chemistry*, (2010), 433, 132-135.