Active methanogenesis in the subsurface during development process

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Methanogenic biodegradation of organic matter provides us prospects of methane resource artificially generated continuously in the subsurface anaerobic condition. Unfortunately, this process is such a long period in the geological condition that human being can not wait for. However, several cases in China demostrate methanogenesis process could be very quick.

Examples presented in this article are related to the biodegradation of heavy oil components and the significant change of the associated gas characteristics. The first example is from Liaohe depression, Bohaiwan basin. Biodegradated gases were produced widely in the west of the depression, from 1300~1600 m, with temprature ranging from 45 °C to 60 °C. Accompanied crude oil had been biodegraded heavily above 4 degree biodegradation. During producing stage less than a decade, the dryness (C_1/C_{1+}) of gas became higher and higher from 0.92 to 0.97. Based on meterial balance method, about 80 percent of producing gas should be neogenicly generated. The second example is from Songliao Basin, Northeastern China. The dry coefficient of associated natural gas increased from the beginning 85% (40 years ago) to present 95%. And content of non-hydrocarbon components, such as H_2S and CO_2, slightly increases, too. The similar trend happened in the another field, Liuzhuang field of Jinhu depression in the Subei basin, Eastern China. Differently, the dryness of associated gas has been stable at 98 %, but the stable carbon isotope ratio of CH_4 varied from -51.2 ‰ to -53.6 ‰.

All those cases demonstrate that biogenic methane could be generated in amazing rates. Once appropriate conditions provided, the interesting geomicrobes can give us whatever we want.

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Mineral chemistry of the skarn type ores from Furong Tin deposit in Hunan Province, P.R.China

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Tin in skarns forms a significant part of the total Sn resource of South China. The Furong tin polymetallic deposit in the central Nanling region, South China is dominantly composed of skarn type ores hosted in Carboniferous and Permian strata and Mesozoic A-type granitic intrusions. In this study, mineral chemistry research has been carried out on skarn ores from No. 19 ore lode using microscope and EPMA analysis, in order to constrain the tin mineralization condition of skarn in Furong deposit.

Primary skarns in Furong deposit are mainly consisting of grossular-andradite, baicalite, ferro-edenite, malayaite, and minus idocrase, wollastonite, cassiterite formed under oxidizing conditions. The garnet and ferro-edenite are characterized with high Sn concentration (0.22~0.73%), distinctly higer than those formed under reducing conditions [1]. Accordingly, the primary skarn formed under oxidizing conditions. In this case, tin dominantly occurs as Sn^{4+} and entered the crystal lattices of skarn minerals.

Under the alteration of the F-, Cl- and Sn-riched ore-forming solution exsolved from biotite granite magma, the primary skarn was regressive metamorphosed to form hydrothermal minerals and ores. Along the endo-contact zones of the granite and the carbonate wallrock, the primary skarns were altered to type Ⅰ ores with the association of cassiterites + phlogopite + fluorite + magnetite, which mainly related to the hydrothermal fluids exsolved from biotite granite. The association of tremolite, diopside, chlorite, sulphide, i.e. Type II ores was formed along the exo-contact zones of the biotite granite, which was significantly influenced by the fluid from wallrock.

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