Characteristics of the abiogenetic gas reservoir in Xujia abyssal fault depression of Songliao basin, China

ZHUO SHENGGUANG[1]*, WANG XIANBIN[2], LIU HONGLIN[3], TUO JINCAI[2] AND WANG JIANMIN[4]

[1]Northeast University at Qinhuangdao, China (*correspondence: zoe200200@163.com)
[2]Key Lab of Petrol Resources Research, CAS, Lanzhou (xbwang@lzb.ac.cn)
[3]Daqing Petroleum Institute, Daqing, China (lhl973@126.com)
[4]Daqing Drilling & Exploration Engineering Co., Daqing, China (wangjianmin002@cnpc.com.cn)

Many sets of low-angle faults in supracrust of the Songliao basin were detected, and the complex seismic phases indicated existence of complicated structures in its midcrust and lowercrust. The earth crust of the basin has both concentric circle structures and blocky structures, and boundaries of the fault blocks might serve as the channel for thermal fluid migration in the depth [2]. In this area, the distribution of volcanic massif was controlled by the basement deep faults of NNW to nearly SN direction. The volcanic rocks were mainly intermediate-acid rocks formed in the tectonic environment of an active continental margin, and originated from the crust and mantle.

The gas-bearing formation was buried under 3km~4.5km. According to analyses of natural gas samples taken from 26 wells, the alkane carbon isotope δ13C presents characteristics of the reverse sequence, and the hydrogen isotope δD, characteristics of the positive sequence, which reflects their abiogenetic source [3].

The lithology of volcanic gas reservoir mainly consists of rhyotaxitic clasolite of explosive or pyroclastic flow phases, most of effective reservoir beds are the upper phase or external phase of volcanic belts, usually being layers or thin layers of 10-20m.

The pores of volcanic gas reservoir could be classified into four types: 1) primary pores of original rocks, 2) diagenetic pores, 3) diagenetic fractures, 4) secondary tectoclases and weathered fractures. Types 2 and 3 are the most effective reservoir space which were formed in volcanic eruption process of cooling and aftercooling.

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Combining geochemical zonality coefficient values with weights of evidence to evaluate patterns of mineralisation

M. ZIAII AND F. DOULATI ARDEJAN*

Faculty of Mining, Petroleum and Geophysics, Shahrood University of Technology, Shahrood, Iran (*correspondence: fdoulati@shahroodut.ac.ir)

The geochemical zonality coefficient (ν_z) of elements and their spatial associations with particular geological, geochemical and structural factors are critical aspects of mineral distributions that must be considered in exploration and understanding ore geometry [1]. Spatial relationships between mineral occurrences and geological features can be quantified by the weights of evidence (WofE) method which considerably depends on the contrast value [2]. This paper presents a new approach by combining the strenghts of the ν_z and WofE in evaluating mineral occurrence distributions. This new approach was tested on copper occurrences in the NW and SW Iran. The results suggest that the proposed method is more successful than any existing method for the identification of such occurrences. Investigations were carried out for a major lithostratigraphic sequence in the SW Iran (Jabal-Barez). The ν_z determined for the Kerver copper occurrences in the Jabal-Barez area suggests the significance of this area for further exploration. The most important novelty of this article in mining geochemistry is to extend the model proposed for a local scale to a regional scenario.

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