Controlling factors and oil-gas geological significance of the high-quality reservoir of volcanic rocks: An example from Songliao Basin

Z.H. ZHAO[1]*, G.H. JIAO[1], P. SUN[1], X. LUO[1], J.X. XIAO[2], Z.H. WANG[1] AND F.Y. ZENG[1]

[1]Langfang Branch of Petroleum Exploration and Development Research Institute, Petrochina, Langfang 065007 (*correspondence: zehui_zhao@pku.org.cn)

[2]School of Energy Resources, China University of Geosciences (Beijing), Beijing 100083 (xiaojx@cugb.edu.cn)

The volcanic rocks of Yingcheng formation in Lower Cretaceous are the major reservoirs for the deep-buried gas in Songliao Basin. The comprehensive studies of features of volcanic rocks and their physical properties suggest that the formation of the high-quality reservoir of volcanic rocks is controlled by lithofacies, lithology, eruptive phase, fracture and post reformation in Songliao Basin. The volcanic lithofacies controls the primary pores and fractures, which are the basement for the formation of good reservoirs. The explosive facies is the best favorable zone for reservoirs. There are gas-pores built up on the top (belting) of volcanic rocks of the flood facies, which is the best favorable zone for reservoirs. The physical properties for reservoirs of volcanic rocks are usually good when they are more acidic rocks, which have well developed gas pores and corroded pores. The rhyolites or rhyodacites are suggested to be the best type of reservoir rocks. Besides, the more eruptive phases (recycle), superposed lithology and lithologic types, the better physical properties of reservoirs. The high-angle fractures developed inside the volcanic rocks contribute to not only the reservoir space but also the important role of connecting the pores, which are the key factors to the formation of high-yield wells. The deep fluids migrate through the high-angle fractures and then make the corrasion to the host rocks, therefore the area where the high-angle fractures are densely developed are easy to form the favorable reservoir zones with the assemblage of high-angle fractures and corroded pores. The hypergene diagenesis such as the gas dissipation, condesation, corrasion and solution, cataclasis, hypergene weathering and leaching *et al*. have the constructive reformation to the reservoirs, being favorable to the development of reservoirs. So, the high-quality reservoir of volcanic rocks are characterised by the explosive facies, the top of the flood facies, poly-eruptive recycles, fracture-developed rhyolitic volcanic rocks, which are the major production formation of deep buried gas in the Songliao Basin.

A riebeckite alkaline granite related to subduction setting in Chinese Altay Mountain

ZHENHUA ZHAO*, Q. WANG[1], Z. BAO, Y. LUO AND G. TANG

Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, China (*correspondence: zhzhao@gig.ac.cn)

The Burgen riebeckite alkaline granite is the oldest late Paleozoic alkaline granite with zircon U-Pb age of 338±1Ma and 358±4Ma in north Xinjiang. Geochemistry of trace elements and Sr-Nd-Pb-Hf isotopes have revealed a subduction-related tectonic setting for this alkaline granite generation. 1. High alkaline contents (K_2O+ Na_2O=8.56-10.62%), Eu strong depletion (Eu/*En 0.03-0.30), relatively rich in HREE ($(La/Yb)_N$0.82-1.69) and HFSE are typical. High positive ε Nd (t) (+6.78-+7.74) and ε Hf (t)(+9.86-+12.54), younger model ages of Nd (T_{DM} = 469-548Ma) and Hf (T_{DM}546-718Ma) and high zircon saturation temperature (880-1025℃) suggest the alkaline granite originated form high temperature depleted mantle.2. Diorite, quartz monzonite, monzonite and K-feldspar granite (about 350Ma)are closely distributed with the Burgen alkaline granite and composed of an association of I- with A-type granites. Middle Devonian and early Carboniferous basic-intermediate volcanic rocks and early Permian alkali-rich intrusions (300-280Ma) are wide distributed, but there lack of late Carboniferous (318-300Ma) magmatic activities. The association of I- with A-type granites and nearly 20 Ma gap of magmatic activities both suggest the alkaline granite was generated in a slab window. Ridge subduction or break off or roll back of the subducting oceanic slab may be responsible for the slab window generation and then asthenosphere upwelling leads to generation of high alkaline magma.