Helium resources and the discovery of the first supergiant helium reserve in China — Hetianhe gas field in Tarim Basin

TAO XIAOWAN [1*], LI JIANZHONG[1], ZHAO LIBIN[2], LI LIWU[3], ZHU WENPING[2], XING LANTIAN[3]

[1] *Research Institute of Petroleum Exploration & Development, PetroChina, Beijing 100083, China*

(*correspondence: taoxiaowan@petrochina.com.cn)

[2] *Tarim Oilfield Company, PetroChina, Korla, 841000, China*

[3] *Lanzhou Center for oil and gas Resources, Institute of Geology and Geophysics, CAS, Lanzhou, 730000, China*

Helium is an important strategic scarce resource, which is related to national security and the development of high-tech industries. However, China is poor in helium and most of it depends on imports. The situation of resource security is very serious, so it is very important to carry out helium resource survey. Based on the investigation of helium resources in the seven major petroliferous basins and other areas in China, it can be concluded that the helium in natural gas in petroliferous basins in Central and Western China is radioactive origin from crust. Its enrichment is controlled by the distribution of acid rock or basement rich in U and Th, structural traps and fracture. The helium in the petroliferous basins located on both sides of Tanlu fault zone in eastern China is originated from the mixing of mantle and crustal sources. Its enrichment is controlled obviously by fracture. The high content of helium in water-soluble gas in geothermal water or hot springs is mainly crustal source. In this study, the Hetianhe gas field and its peripheral areas in Tarim Basin with good helium display but uncertainties are selected for the systematic exploration of helium resources. Through fine sampling and analysis of the 11 natural gas samples from Hetianhe gas field and its peripheral areas, it is found for the first time that Hetianhe gas field is rich in helium, with helium volume content ranging from 0.30% to 0.37% (average 0.32%).As originated from crust, the proven reserve of helium gas is $1.9591\times10^{8}m^{3}$. So, Hetianhe gas field is the first supergiant helium rich helium gas field discovered in China.