

Mantle or crust?: Hydrogen genesis in Jiyang sag, Bohaibay Basin, east China

Z. J. JIN^{1*}, Q. Q. MENG¹, W. H. LIU¹, W. X. HU²,
Q. Y. LIU¹ AND D. Y. ZHU¹

¹Petroleum exploration and product research institute, Sinopec, jinzhj.syky@sinopec.com

²Department of Geosciences, Nanjing University

It was generally accepted that hydrogen-bearing matters, such as water, basalt can improve hydrocarbon generation ratio for source rock [1]. The hydrogen gas itself can also improve the hydrocarbon generation ratio as high as 147% for type II kerogen [2]. Thus, the hydrogen gas can deeply affect the resource assessment for petroliferous basin. To make the hydrogen origin and effect range clear is important to make progress in petroleum geology.

The mantle-derived fluid can input hydrogen gas to sedimentary basin, and its influence range was suggested to be limited, that is, near the fluid itself. We collected and analyzed the hydrogen gas in Jiyang Sag, including its content and isotopic character. The measuring results showed that:

(1) The hydrogen gas was generally distributed within the basin. Their content ranges from 6 to 100 ppm. Together with hydrogen, there were also helium gas ranging from 20 to 1200 ppm.

(2) The R/Ra value was not linear to the content of helium or hydrogen gas, which means that the helium or hydrogen gas has mixed genesis.

(3) The $H_2/{}^3He$ ratio suggested by Welhan J A et al [3] was employed to confirm the origin of hydrogen gas. All the samples' $H_2/{}^3He$ ratio were lower than 2×10^6 , which suggested that the hydrogen gas has clear character of mantle origin in Jiyang Sag, even they located far away from the deep fault, which was thought to be migration tunnel for mantle-derived fluid.

It suggested that, the mantle originating hydrogen gas was commonly distributed in the most part of Jiyang Sag. When the source rock was concerned, it can be safely to say that the mantle fluid can affect much more source rock by hydrogenation than we have learned before.

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