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Stable hydrogen isotopes of the alkane gases from the giant tight sand gas fields in China.

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Introduction and Aim.

By the end of 2010, the reserves and annual production of tight sand gases in China account for 39.2% and 24.6%, respectively of the total gas reserves in China. Among them, reserves and annual production of giant tight sand gas fields play an important role, and account for 37.3% and 23.5% respectively of the total. This contribution is aimed at the geochemical analyses of the alkane gases from these giant gas fields to provide directions for future exploration.

Materials and Method.

Due to our recent publication on the stable carbon isotopes of alkane gases from the tight sand gas fields , only stable hydrogen isotopes are studied here.

Results.

By the end of 2010, 15 giant tight sand gas fields have been found in China. Among them, 13 giant gas fields from the Ordos, Sichuan and Tarim basins have characteristic hydrogen isotopes of alkane gases as follows: (1) δD1 varies from -203‰ to -147‰ with an average of -175‰, δD2 varies from -178‰ to -108‰ with an average of -148‰, and δD3 varies from -180‰ to -96‰ with an average of -140‰; (2) Samples with δD1<δD2<δD3 account for 85.7% of the total, and six samples have partial hydrogen reversal with δD2>δD3. Five of them have the hydrogen isotopic reversal extent from 2‰ to 3‰, which are within the analytical error. It implies that these alkane gases are of primary origin which has not undergone any secondary alteration. (3) The lowest, average and highest values of each set of δD1, δD2 and δD3 increase with increasing carbon numbers, which is similar to the hydrogen isotopic values of the samples. This characteristic is clearly reflected in the alkane gases from the Ordos and Sichuan basins.

Conclusions.

Therefore, studies on the stable hydrogen and carbon isotopes of alkane gases from the giant tight sand gas fields have great significance in economic benefit and theoretic meaning to accelerate the exploration and development of giant tight sand gas fields in China.