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Saline Lacustrine Source Rocks and their Generated Gas Composition

LIU Chenglin[1], ZHENG Shijing[2], LI Haohan[2], LIU Jun[2] and ZHANG Xuan[2]

1 *Key Laboratory of Shale Oil and Gas Geological Survey, Institute of Geomechanics, Chinese Academy of Geological Sciences, Beijing 100081, China*
2 *China University of Petroleum, Beijing 102249, China*

Based on salinity, organic geochemical tests and gas generation simulations of mudstones, this paper has studied the effects of salinity on organic matter richness, types and thermal maturities and generated gas composition of Tertiary saline lacustrine source rocks in the western Qaidam basin. There are no apparent relationship between organic matter richness (total organic carbon and chloroform bitumen A) and salinity of source rocks when Cl^- concentration is less than 1 mg/g. organic matter richness increases to the peak and then decreases with the increase of salinity of source rocks when Cl^- concentration exceeds 1 mg/g (Fig. 1). The higher the salinity is and the more likely kerogen is to be sapropelic and planktonic. Through increasing hydrocarbon productivity and decreasing activation energy, salinity promotes hydrocarbon generation process of saline lacustrine source rocks (Fig. 2, Tab. 1). Increased salinity totally makes generated gas $\delta^{13}C_1$ of source rocks turns heavier (Tab. 2). Natural gas from hypersaline and saline lacustrine source rocks tends to be sapropelic while that from brackish and fresh lacustrine rocks is generally humus.

Key words: Salinity, organic matters, hydrocarbon generation simulation, hydrocarbon generation, activation energy

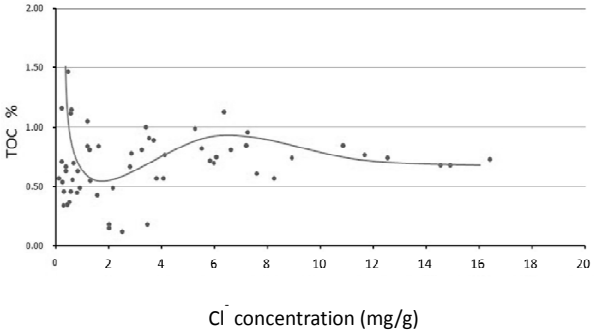

Fig. 1. The relationship between Cl^- concentration and total orgainc carbon (TOC) of source rocks from deep and semi-deep lake facies.

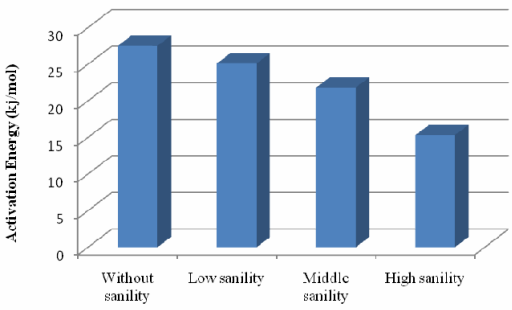

Fig. 2. The average apparent activation energy of the N1 mudstone of Well Wudong 2 under different salinities.

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* Corresponding author. E-mail: liuchengl@263.net

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Table 1 Oil and gas yields of the N1 mudstone of Well Wudong 2 under different temperatures and salinities

	Temperature (°C)	Gaseous hydrocarbon yield (mg/g.c)	Liquid hydrocarbon yield (mg/g.TOC)	Hydrocarbon yield (mg/g.TOC)
5000ppm of Cl^- concentration	300	3.8	89.7	93.5
	350	18.6	128.6	147.3
	400	115.1	86.5	201.6
	450	200.4	74.2	274.6
	500	321.8	51.6	373.5
Distilled water	300	1.5	81.2	82.7
	400	75.5	75.1	150.6
	450	170.7	54.2	224.9

Table 2 Generated gas δ^{13}C1 (‰) of the N1 mudstone of Well Wudong 2 under different temperatures and salinities

Temperature (°C)	300	350	400	450	500
10000ppm of Cl^- concentration	−42.5	−40.2	−36.5	−35.7	−35
5000ppm of Cl^- concentration	-	-	−35.5	−35	−35
distilled water	−44.7	−41.5	−39.3	−34.5	-

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