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The Characteristics of Generation and Distribution of CO_2 gas pools in Songliao Basin

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Gases which include high component of CO_2 are widely distributed in Sonliao basin. 12 gas pools have been found and 65.18 x 10^8 m^3 reservoir has been proven up to now. The CO_2 gas pools are mainly distributed in K1q and K1yc in Changling and Xujiaweizi fault depressions. The main characters of CO_2 gas pools are $\delta^{13}C_{CO2}$>-8‰ and R/Ra=1.9~7.2(Table 1) indicate that the CO_2 in CO_2 gas pools are mainly of magma origin according to 10 of CO_2 gas pools in Songliao Basin..

Table 1 Geochemical Characteristics of high Composition of CO_2 gas well in Songliao Basin

Well	Lithology	Formation	Compsition of main components of gas(%)		Carbon isotope compsiton(‰）	
			CO_2	CH_4	$\delta^{13}C_{CO2}$	R/Ra
QS1	Sandstone	K_1q^4	80.09	12.93	ND	ND
QS8	Sandstone	K_1q^4	85.55	13.39	-3.92	ND
QS10	Sandstone	K_1q^4	80.73	1.95	-3.73	ND
QS11	Sandstone	K_1q^4	95.73	2.18	-5.30	ND
G6	Sandstone	K_1q^4	90.20	4.30	ND	ND
G9	Sandstone	K_1q^4	97.05	2.65	-8.44	ND
H81-3-1	Sandstone	K_1q^3	94.92	2.53	-8.00	ND
H77	Sandstone	K_1q^4	96.14	1.71	ND	ND
CS4	Volcanic rocks	K_1yc	69.62	22.00	-7.50	2.08
CS7	Volcanic rocks	K_1yc	77.81	18.56	-5.80	1.90
CS2	Volcanic rocks	K_1d	93.98	4.18	-6.70	ND
CS2	Volcanic rocks	K_1yc	98.53	0.90	-6.60	4.54
CS6	Volcanic rocks	K_1yc	98.69	0.41	-6.30	3.78
FS9	Volcanic rocks	K_1yc	82.49	15.96	-6.15	ND
FS9-1	Volcanic rocks	K_1yc	89.15	9.48	-5.69	ND
XS10	Volcanic rocks	K_1yc	90.41	3.76	-4.43	ND
W2	Sandstone	K_1q^3	99.02	0.61	-4.04	6.87
W4	Sandstone	K_1q^3	89.92	9.69	-8.83	ND
W5	Sandstone	K_1q^3	93.43	3.74	-4.95	6.3
W5	Sandstone	K_1q^{1+2}	99.48	0.52	-4.60~-6.07	ND
W6	Sandstone	K_1q^3	97.77	1.39	-4.31	7.2

Content: (R is the $^3He/^4He$ of samples, Ra is the $^3He/^4He$ of air)

Geological background and analysis of fluid inclusion indicate that the CO_2 in Changling, De hui and Gu long etc fault depression are mainly forming lately. The reasons are following. The first is that the fluid inclusions of CO_2 are late period fluid inclusions which are banded occurrence in cracks of transecting quartz grain or transecting widen quartz (Fig 1). Their homogenization temperatures are 120~140ºC. So, the forming stage of CO_2 may be mainly between 72Ma and 48 Ma. The formation and distribution of CO_2 are relatives with many kinds of faults including lithosphere faults, crust fractures, basement rifts and overburden faults especially relatives with NE-NNE deep faults which have strike slip motion in late stage (Fig2). These kinds of faults mainly controlled depression formation in early stage and had NE-NNE left-lateral strike slip motion in late stage. Also, volcanic erupted with amazing amount of CO_2 in this stage and the faults became the channel of the CO_2 migration and then prompted the formation of CO_2.

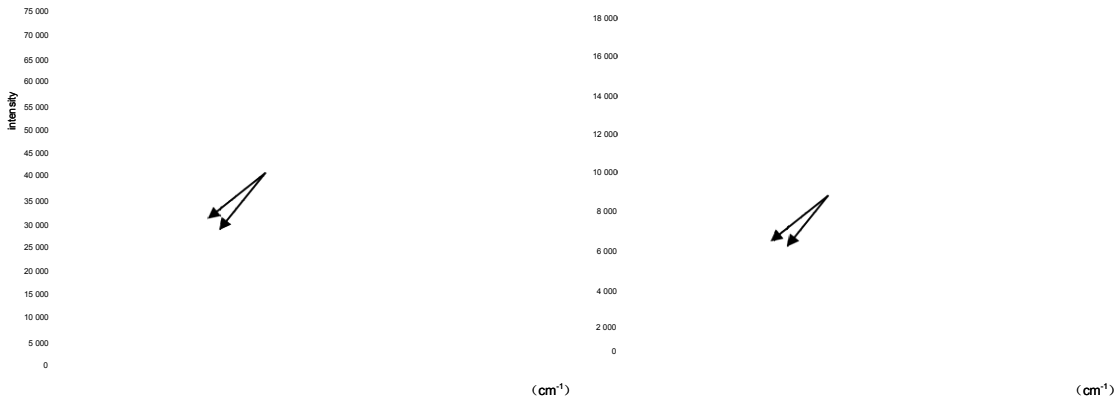

Fig 1: Laser Romam spectrum of gas fluid inclusion in lately stage of transecting widen quartz

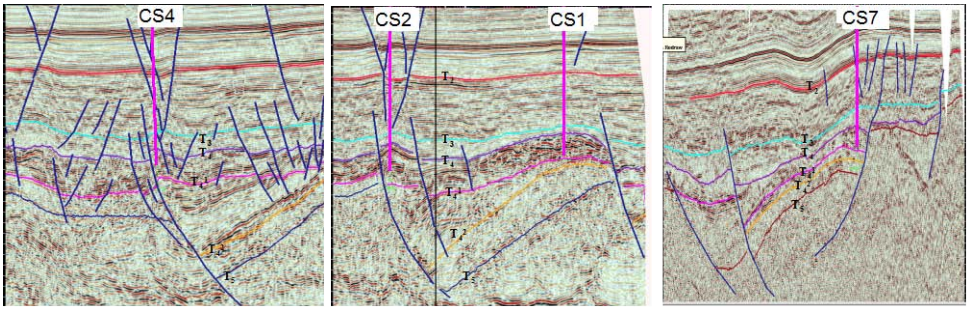

Fig 2: The characters of lately stage faults controlling the distribution of CO_2 in Changling fault depression