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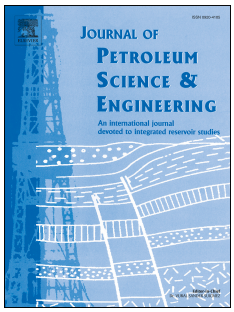

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The effect of pressure and hydrocarbon expulsion on hydrocarbon generation during pyrolysis of continental type-III kerogen source rocks

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ABSTRCT: In order to define the role of water and lithostatic pressure in petroleum formation of continental type-III kerogen source rocks, semi-closed hydrous pyrolysis experiments were conducted with 50 - 1200 bar water pressure and 125 - 2000 bar lithostatic pressure under 480 °C. This investigation is very helpful for the explorations of shale gas and deep petroleum in China. Increasing water pressure from 50 to 325 bar can't affect the yields of gaseous hydrocarbon, oil and bitumen, but increasing of water pressure leads the more oil and less gaseous hydrocarbons generated from continental type-III kerogen in 325 - 1200 bar water pressure range under semi-closed condition. The decreasing yields of gaseous hydrocarbon, dryness of gaseous hydrocarbon and hydrogen primary confirms that increasing water pressure may promotes the primary reaction but decreases the cracking magnitude of oil. The decreasing values of S_2、HI、H/C in the pyrolysised samples confirm that high water pressure can promote the efficiency of hydrocarbon generation from continental type-III kerogen, while maturation of kerogen correspondingly increases showing by increasing values of VR and Tmax. In 125−625 bar lithosatic pressure range，oil cracking and primary reaction from type-III kerogen may be promoted for the decreasing effect of expelling hydrocarbon. The increasing of hydrogen and gaseous hydrocarbon yields also confirms that cracking of oil is enhanced during this pressure range. The decreasing trends of oil and gaseous hydrocarbons yields indicates that hydrocarbon generation rate was reduced by the high lithosatic pressure in 625 to 2000 bar pressure range. The increasing values of S_2, HI, H/C, and decreasing values of VR, Tmax of pyrolysised samples confirm the retardation effect of highlithostatic pressure on the efficiency of hydrocarbon generation and maturation. Besides, the results also indicate that expelling hydrocarbons strongly