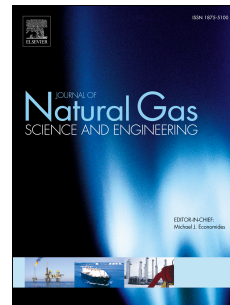


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Geochemical characteristics and possible origin of shale gas in the Toolebuc Formation in the Northeastern part of the Eromanga Basin, Australia

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1 **Geochemical characteristics and possible origin of shale**
2 **gas in the Toolebuc Formation in the Northeastern part of**
3 **the Eromanga Basin, Australia**

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11 **ABSTRACT**

12 The geochemical features of shale rocks and shale gas samples, which were
13 collected from six wells in the northeastern part of the Eromanga Basin,
14 were analyzed in detail. The results show that these shale rocks are enriched
15 in thermally immature Type II organic matter and shale gases are
16 dominated by CH₄ (65% to 83%) with minor C₂H₆ and C₃H₈. Their $\delta^{13}\text{C}_{\text{CH}_4}$
17 (-53.9‰ to -51.1‰) and δDC_1 (-236‰ to -205‰) values indicate that the shale
18 gas samples represent a mixture of thermogenic and biogenic gases. This
19 inference is also supported by the fact that the actual measured $\delta^{13}\text{C}_{\text{CH}_4}$
20 values are significantly lighter than the theoretical $\delta^{13}\text{C}_{\text{CH}_4}$ values (-47.31‰
21 to -45.57‰). Biogenic methane is the primary biogenic gas, which is
22 generated by CO₂ reduction. Secondary biogenic gas has been ruled out due

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