

## **Direct Dating of Charge Events Using Illitic Clays Rb-Sr Isotope System : A Case Study from Silurian Bituminous Sandstones in the Tarim Basin, NW China**

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Illitic clay is commonly occurring in the Silurian bituminous sandstone (SBS), a significant hydrocarbon exploration target in the Tarim Basin, NW China. SEM, TEM, XRD investigations suggest that illitic clays in the SBS are dominated by the mixed layer illite/smectite (i.e. I/S). This study presents new Rb-Sr ID-TIMS data of five well-characterized illitic samples from the SBS, with five pieces of subsample analyses for each. Subsample analyses construct isochronous trends although the yielded ages often have large errors ( $107 \pm 40$  Ma,  $138 \pm 76$  Ma,  $351 \pm 37$  Ma,  $476 \pm 53$  Ma), except one from the well TZ67 ( $231 \pm 11$  Ma). The large error may be attributed to the insufficient Rb/Sr fractionation. Two precise ages,  $364 \pm 11$  and  $418.2 \pm 6.9$  Ma, are yielded by two-sample regressions (YM35-1&H6, KQ1&Q1) of which  $^{87}\text{Rb}/^{86}\text{Sr}$  are distributed in larger spans. The ages are consistent with the onset of hydrocarbon charge in respective regions. A negative correlation between Rb/Sr and the percentage of smectite in I/S suggests that different affinity of two elements to smectite and illite fractionates Rb/Sr, which may be explained by their substitution behaviour (e.g.  $\text{Sr}^{2+}$  tend to substitute  $\text{Ca}^{2+}$  in smectites while  $\text{Rb}^{+}$  substitutes  $\text{K}^{+}$  in illites). This study highlights the potential of illitic clay Rb-Sr geochronology for constraining hydrocarbon charge in sandstone reservoirs.