

## Isotope effects in low-molecular-weight aromatic compounds from petroleum hydrocarbons originating from Fluvial-deltaic source rocks

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Low-molecular-weight (LMW) aromatic compounds in hydrocarbon fluids have scarcely been studied due to their volatility and their relatively low abundances in source rocks for fluid-source correlations. LMW aromatics are important components in condensates which lack biomarkers (*e.g.* hopanes) for correlation studies. These compounds are also more resistant to biodegradation compared to light aliphatics which are more widely used for fluid screening.

Here we have investigated the distribution of ethyltoluenes in condensates applying the principles of clay catalysis experiments reported in the literature [1] which suggest a significant mineral catalytic effect on the *ortho-para-meta* isomerisation of ethyltoluenes. Isomers differ up to 6‰ in  $\delta^{13}\text{C}$  values and this trend propagates in other compound classes (*e.g.* propyltoluenes). Condensates from the Northern Carnarvon Basin, North West Shelf of Australia, have been analysed by gas chromatography (GC-MS) and compound specific isotope analysis (CSIA) of stable carbon. Interpretations are also supported by site-specific isotope analysis using a Q-Exactive-GC Orbitrap-based-mass spectrometer. We suggest carbon-carbon cleavage during thermal evolution and isomerisation rearrangement under clay acid catalysis explain the isotopic differences reported in isomers of ethyltoluene. Computational chemistry tools have also been included for modeling. This study opens a new window in position-specific isotope geochemistry of organic molecules and for further research on novel isotopic applications of light aromatics in petroleum geochemistry.

### REFERENCES

[1] Atanda, Aitani & Al-Khataff (2015). *Chemical Engineering Research and Design* **95**, 34-46.