

Effects of Multiple Processes on Methylbenzenes in Petroleum

Van Aarssen, Ben G.K.¹, Trevor P. Bastow² (1) Curtin University of Technology, Perth, Australia
(2) CSIRO Land and Water, Floreat Park, Australia

Methylbenzenes are present in most crude oils and are of special interest due to their specific properties, such as a relatively high volatility and solubility in water, and their relatively low resistance to biodegradation. These characteristics make methyl-benzenes suitable for interpreting processes that affect the composition of crude oils such as water washing, evaporative fractionation and (early) biodegradation. Source effects can be quite conspicuous within the tri- and tetramethylbenzenes, with several low maturity oils relatively high in 1,2,3,4-TeMB and 1,2,3-TMB, derived from carotenoid precursors. Maturity affects the relative abundances of the isomers in characteristic ways, leading to enrichment of the more stable isomers.

In short, methylbenzene distributions contain important information about the history and accumulation of crude oils, which can in principle be revealed by sorting out the effects that different processes have on methylbenzenes. This is especially useful for light oils and condensates, where much other geochemical information is not available. We have developed simple, quick and accurate methods for analysing all methylbenzenes quantitatively without loss of volatiles. This has allowed for the collection of data from a large variety of oils. This paper will present results from the large dataset and provide evidence for the effects that source, maturity, biodegradation and evaporation have on the composition of the methylbenzenes. Case studies will be presented underlining the practical aspects of interpreting methylbenzene data.