

Fast SARA implementation and FTIR analysis of the resulting fractions

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Bitumen is a product from the crude oil refining process used mainly as the binder in asphalt pavement. Due to its chemical complexity, which is built of various organic and traces of inorganic compounds, it is rather difficult to identify and analyse molecular components and structure. Therefore, one approach to study bitumen is based on separation techniques. The main separation method used in industry is chromatography, which utilizes the polarity-based properties of molecules. The obtained fractions are termed as SARA, which is an acronym for “Saturates, Aromatics, Resins and Asphaltenes.” To analyse these fractions many different spectroscopic methods were implemented over the years. Amongst all, infrared spectroscopy is the one used most, due to the fact, that a semi-quantitative analysis of constituents and emerging functional groups is achievable.

In this study an optimized version of SARA separation [1] was implemented and the analysis of the obtained fractions was carried out with FTIR. It is a novel chromatographic technique, using filtration and solid phase extraction to obtain the described fractions. Further enhancements in the experimental setup led to reproducible separations and subsequently to reproducible FTIR spectra. The obtained spectra are semi-quantitatively discussed and compared to the base spectrum of each binder. Furthermore, a functional group analysis was carried out to determine the presence of specific functional groups in the SARA fractions.

[1] Sakib, N. and Bhasin, A., *Measuring polarity-based distributions (SARA) of bitumen using simplified chromatographic techniques*. International Journal of Pavement Engineering, 2018: p. 1-14.