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Chemical composition and structure characterization of distillation residues of middle-temperature coal tar☆

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Abstract: The distillation residues of middle-temperature coal tar (DRMCT) were separated into saturate, aromatic, resin and asphaltene fractions by using the combination of solvent extraction and column chromatography separation. The isolated four fractions have been further characterized through the combination of elemental analysis, Fourier transform infrared (FTIR) spectra, proton nuclear magnetic resonance spectrum (^{1}HNMR) and molecular weight analysis. The analysis results confirm the view that the saturate fraction from DRMCT was mainly composed of long-chain alkanes and almost all of the heteroatoms (S, N and O) were existed in aromatic structures. The asphaltene fraction had the highest molecular weight, the most amount of heteroatom (especially oxygen) and was the most condensed with shortest alkyl side chains among all the fractions. In addition, for the heavier components, the resin and asphaltene fractions from DRMCT contained lower ratio of H/C, lower molecular weight and higher aromaticity degree when compared with crude oils.

Keywords: Coal tar; Separation; Characterization; Composition; Structure

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