

## **Occlusion of Polyaromatic Compounds in Asphaltene Precipitates Suggests Porous Nanoaggregates**

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This study examined the occlusion of two polynucleararomatic hydrocarbons (PAHs) (pyrene and phenanthrene) in asphaltene precipitates. To test for occlusion inside the nanoaggregates, a toluene solution of asphaltene and each of these aromatic compounds was allowed to equilibrate and mix for two days to enable penetration into the asphaltene nanoaggregates, then the asphaltenes were precipitated with n-pentane, filtered washed and dried. To test for trapping and adsorption outside the nanoaggregates during precipitation, a solution of asphaltene in toluene was mixed with a solution of aromatic compound in toluene and n-pentane giving immediate precipitation, then allowed to equilibrate overnight, then filtered, washed, and dried. The PAHs in the asphaltene precipitates were determined quantitatively by gas chromatography using a high-temperature simulated distillation instrument. Pyrene and phenanthrene, which are normally soluble in the toluene-n-pentane solutions, were detected in the asphaltene precipitates at up to 3.4 wt% concentration. Trapping of PAHs outside of the nanoaggregates during precipitation gave less PAHs in the solid precipitate. This study shows that asphaltene aggregates can interact significantly with PAHs. The results are consistent with the presence open porous asphaltene nanoaggregates in solutions such as toluene.