

## The interaction between heavy petroleum fractions

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The objective of this study was to investigate the interaction of two heavy and polar fractions indigenous to crude oil, namely, asphaltenes and resins. Although many articles in the technical literature often refer to the interaction between these two crude oil solubility-class compounds, it still represents a controversial subject. According to some authors resins act as dispersants that prevent the flocculation and deposition of the intrinsically unstable asphaltenes fraction. Others visualize asphaltenes and resins as a family of compounds that combine to form a lyophilic colloid susceptible to phase separation under unfavourable compositional-, temperature- or pressure –conditions. More recently, even the existence of interactions between these two fractions has been questioned [1]. In this contribution the subject is presented in terms of the binding of resins by asphaltenes. The studies were carried out basically quantifying resins uptake observed when asphaltenes dissolved in toluene were precipitated by n-heptane containing dissolved resins. The results obtained for samples separated from different sources, indicate that asphaltenes precipitation always occurs concomitant with a reduction in the resins solution concentration. Considering that the dispersions were equilibrated for long period, the curves may be considered to represent equilibrium binding isotherms. The isotherms presented different traces indicating that saturation was occurring in some case while collective association following an initial plateau was observed for other samples. The results analyzed by Hughes-Klotz reciprocal plots [2] indicate that around three resins molecules associate to each asphaltene molecule.

### References

- [1] Mullins, O. C. et al "Asphaltene Gravitational Gradient in a Deepwater Reservoir as Determined by Downhole Fluid Analysis", SPE 106375, 2007
- [2] Price, N. C.; Dwek, R. A.; Principles and Problems in Physical Chemistry for Biochemists, Oxford Science Publications, London, 1979