Impact of Molecular Association Energy on Asphaltene Precipitaion

T. OHATA[1]*, R. UEDA[1], M. NAKANO[1], H. NAKASHIMA[1] AND I. NISHIOKA[1]

[1]JAPEX Research Center, Chiba 261-0025, Japan (*correspondence: tomoya.ohata@japex.co.jp)

Asphaltene is a kind of hydrocarbon substance and occludes the flow during the oil production. The prediction of asphaltene precipitation is imperative when gas injection IOR is applied to the oil reservoir. Asphaltene is precipitated by aggregation of asphaltene molecular, therefore association energy between asphaltene and other moleculars is one of the most important factors for prediction. In this study, we evaluated the impact of molecular association energy, which is the property at molecular scale, on asphaltene precipitation under the reservoir condition by numerical case study.

We analyzed the properties and the asphaltene contents of field oil A and applied them to the simulation based on the Cubic-Plus-Association Equation of States (CPA-EOS) [1]. We calculated phase envelops with asphaltene onset pressure (AOP) curves in different values of the association energy between asphaltene and another heavy components like resin (EpsR; cross association energy). We found that the AOP curves were changed with different values of EpsR, and the asphaltene precipitation risk was higher at lower association energy. As a conclusion, presise estimation of EpsR is crucial for predicting asphaltene precipitation.

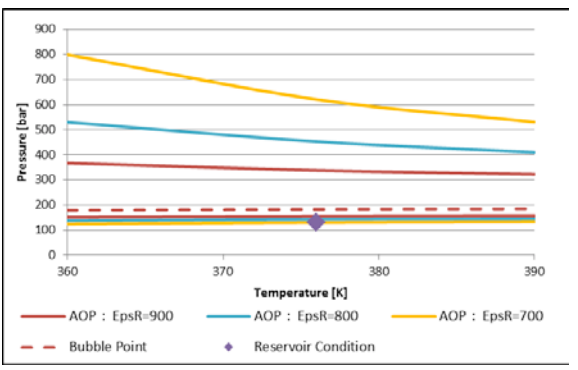

Figure 1: Phase envelop and AOP curves of oil A at each EpsR (Asphaltene is precipitated under the condition between the AOP curves).

[1] Zhidong Li and Abbas Firoozabadi (2010) *Energy Fuels* **24**, 2956–2963.