

## Effect of different aromatic fraction on the colloidal properties of Tahe atmospheric residue

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The Tahe atmospheric residue(THAR) was mixed with FCC slurry oil and HVGO respectively. Effect of the two fractions on the colloidal stability of THAR was evaluated by mass fraction normalized conductivity method[1]. The conductivity was measured at  $35 \pm 0.1^\circ\text{C}$  at the frequency of 1KHz. The mass fraction normalized conductivity of samples could be calculated by the dilution ratio and the conductivity of samples. The colloidal stability parameter (CSP) was defined as the mass ratio of solvent to sample at the highest value of the mass fraction normalized conductivity, namely at the asphaltene precipitation onset. The mass ratio of n-heptane to residue at the onset of asphaltene precipitation was shown in Table 1.

**Table 1**

The CSP of THAR mixed with FCC slurry oil or HVGO

Samples	10:1	10:3	1:1	3:10
THAR: FCC slurry	1.84	1.62	1.07	0.78
THAR: HVGO	2.03	1.92	1.63	0.88

It can be seen from Table 1 that the addition of these two fractions in atmospheric residue exhibited negative effect on the colloidal stability of residue system, and the negative effect of adding FCC slurry oil was stronger.

Characterization of composition polarity[2,3] was carried out and their influence on CSP of THAR was investigated. The mean dipole moment values of fractions of THAR and two additives were shown in Table 2. The difference of polarity between additives and THAR had relation to the colloidal stability decrease of mixture. The mean dipole moment values of aromatic and resin in HVGO were higher than that for FCC slurry oil, and the HVGO showed higher stabilizing activity than those in FCC slurry oil.

**Table 2**

The mean dipole moment values of fractions

Fraction	THAR	FCC Slurry Oil	HVGO
Saturate	-	-	-
Aromatic	1.24	0.55	0.79
Resin	5.42	3.29	4.58
Asphaltene	26.5	-	-

Asphaltene agglomeration was studied by small-angle X-ray scattering(SAXS) technology[4]. The SAXS data was analyzed by using a monodisperse

model, assuming the colloidal aggregates are spherical. It was found that asphaltene macrostructure changed along with the addition of two additives and the particle size of asphaltene decreased.

**Table 3**

The diameter of asphaltene agglomeration (nm)

Samples	10:3	3:10
THAR: FCC slurry	10.6	8.4
THAR: HVGO	10.4	8.3

### Reserences

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