

The properties of asphaltenes and their interaction with amphiphiles

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Table S1 Properties of Karamay residue and Lungu residue

Items	Karamay residue	Lungu residue
Density(20℃) /g·m ⁻³	0.9442	1.0072
Viscosity(100℃) /mm ² ·s ⁻¹	109	1250
Condensation point /℃	2.0	40.0
C, wt%	86.60	85.61
H, wt%	12.50	10.29
H/C	1.73	1.44
S, wt%	0.13	2.92
N, wt%	0.41	0.47
Carbon residue, wt%	7.01	18.41
Ash content, wt%	0.085	0.125
Molecular weight(VPO)	471	750
Saturate, wt%	50.4	30.3
Aromatic, wt%	22.2	30.8
Resin, wt%	27.2	22.3
Heptane asphaltene, wt%	0.2	16.70

As shown in Fig S1, there is no absorption peak in the UV-vis spectrums of asphaltene. The absorbance at 450 nm is actually the scattering of light by asphaltene particles. However, there is a good linear correlation between the absorption or scattering at 450

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nm and the amount of suspended asphaltene particles. Thus, we use the absorbance to calculate the asphaltene concentration in heptane/toluene solution.

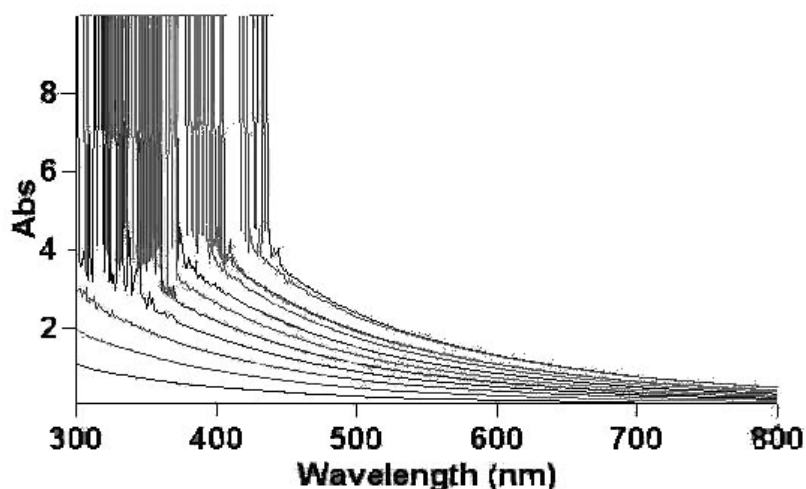


Figure S1 UV-Vis spectrums of different concentration asphaltene solution

All of the absorbances at the wave length range from 400nm-800nm have good linear relationships with asphaltene concentration (Alboudwarej, H.; et al. *Petroleum Science and Technology* **2004**, 22, 647-664.). We chose the absorbance at 450 nm because the relatively larger magnitude of absorbance would induce less error. The standard curve equation for Karamay asphaltene was $c=76.35 \text{ Abs}_{450} - 6.50$, the correlation coefficient was 0.9998;

and the standard curve equation for Lungu asphaltene was $c=80.84 \text{ Abs}_{450} - 1.01$, the correlation coefficient was 0.9979. Because there was almost no absorption at 450 nm in the UV-Vis spectra (Fig S2) of DBSA and DTAB, the calibration of asphaltene concentration was not affected by the addition of DBSA and DTAB. The 10 percents ethanol in the addition of DTAB did not affect the calibration either, because ethanol had no absorbance at 450 nm.

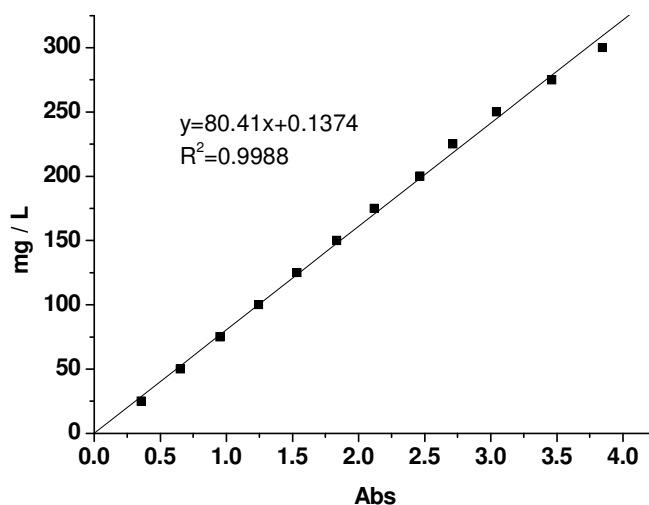


Figure S2 Working curve of Abs to concentration of asphaltene-toluene solution at the wavelength of 450nm