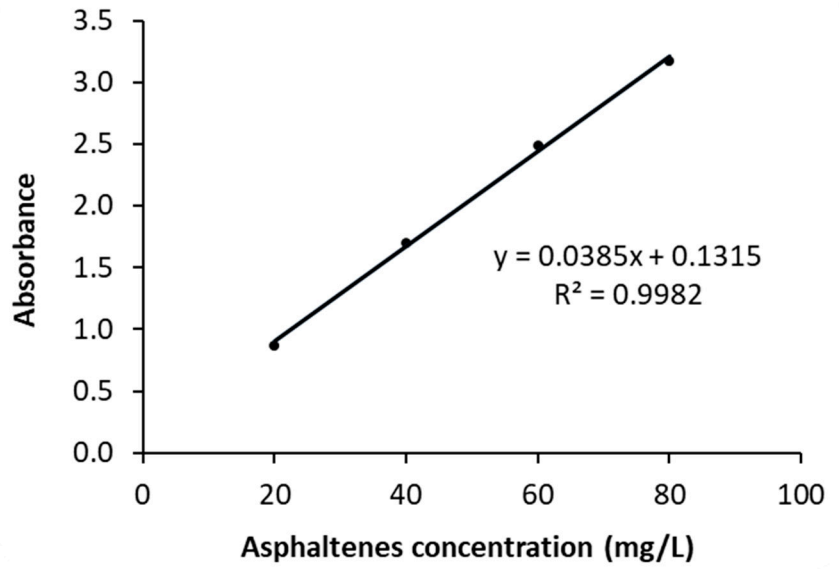


Figure S1. Calibration curve obtained for the EHO asphaltenes in toluene solutions.

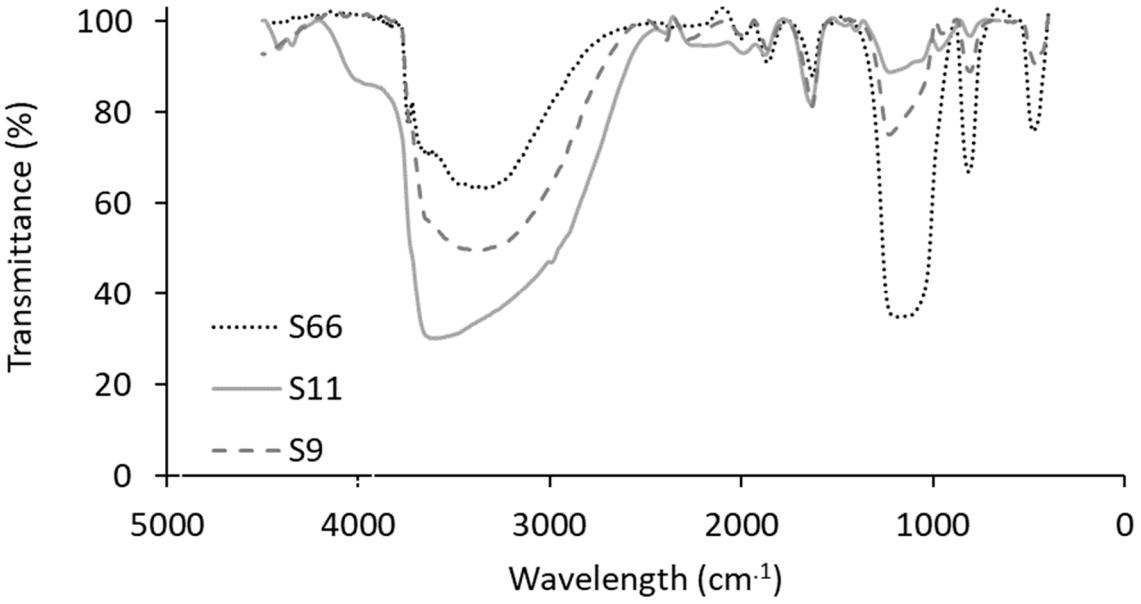


Figure S2. FTIR analysis for S9, S11 and S66 nanoparticles.

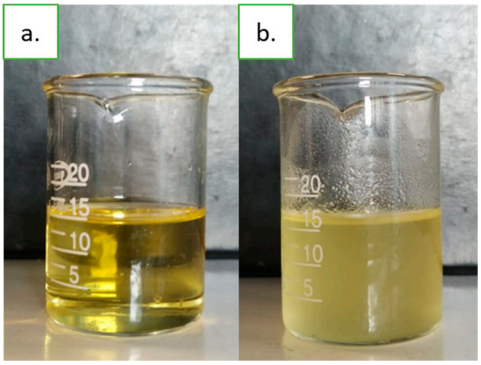


Figure S3. The visual appearance of a) the carrier fluid and b) the nanofluid. .

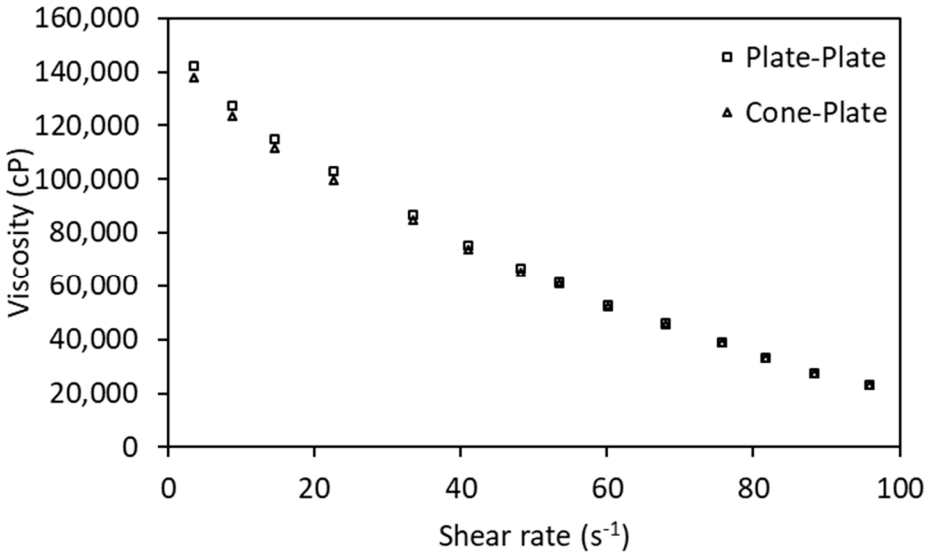


Figure S4. Rheological behavior evaluated for the EHO with a dosage of 5 vol% of xylene with plate-plate and cone-plate geometries at 30°C. .

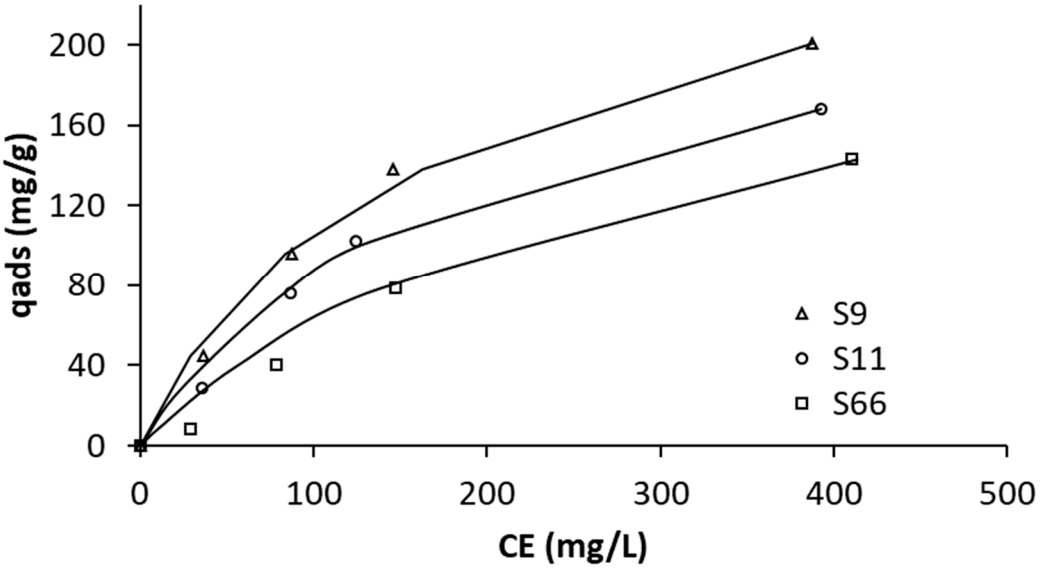


Figure S5. Asphaltenes adsorption isotherms performed for S9, S11 and S66 nanoparticles.

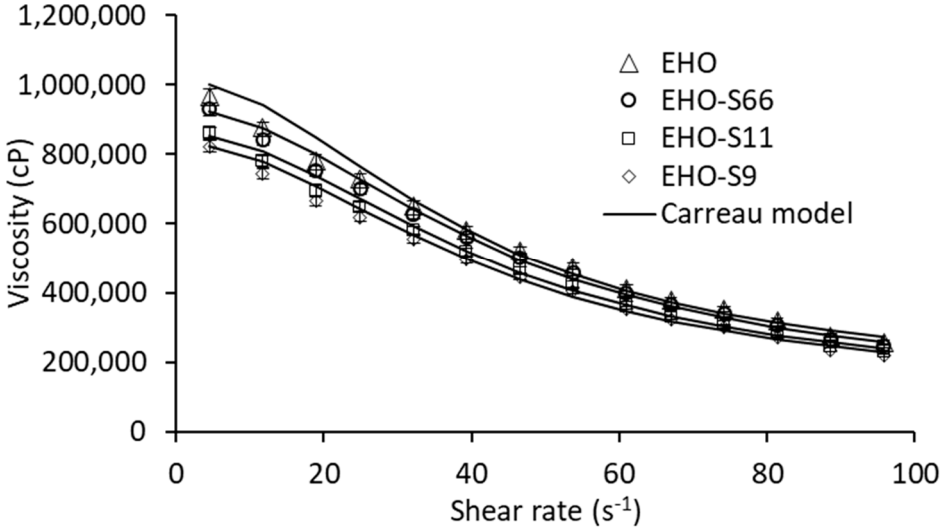
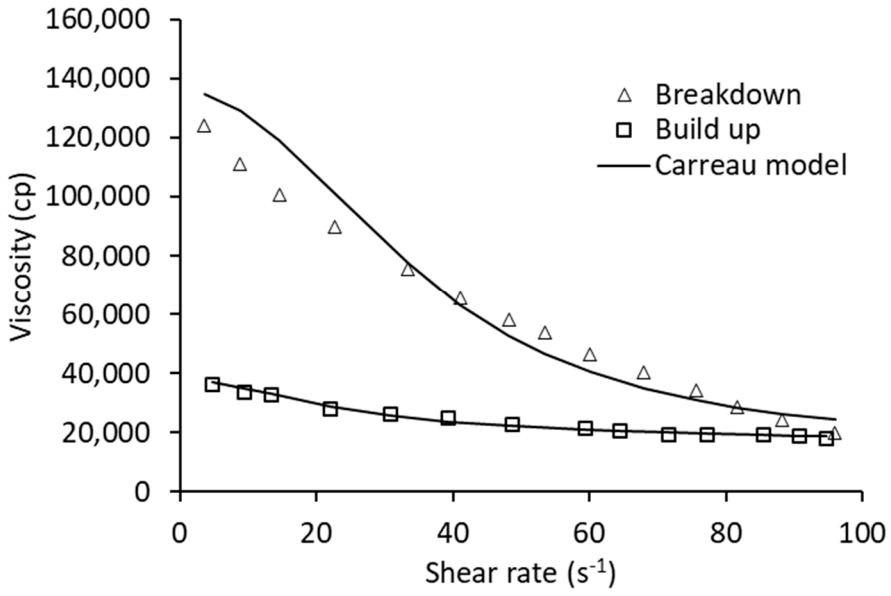
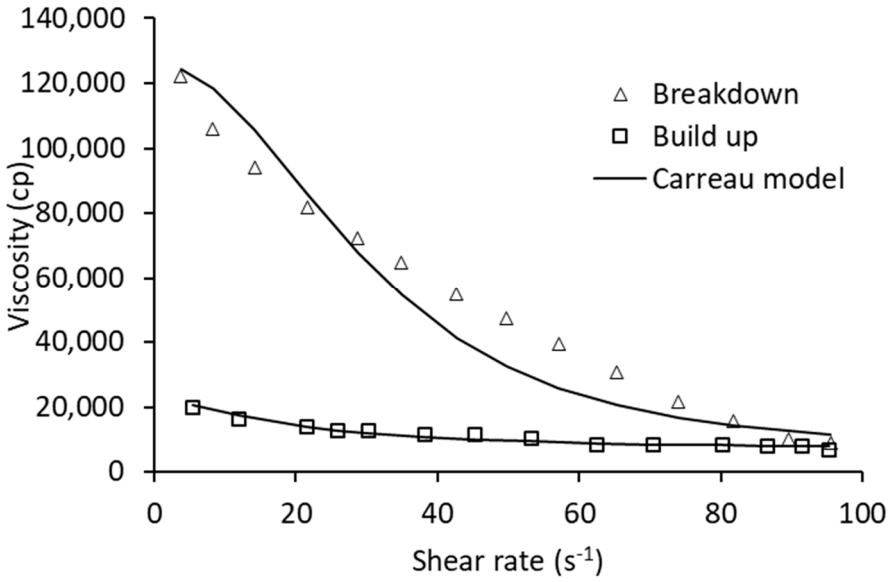


Figure S6. Rheological behavior of an extra-heavy oil (EHO) in the absence and presence of 1000 mg·L^{-1} of SiO_2 nanoparticles with different mean particle sizes of 9 (S9), 11 (S11), and 66 nm (S66) at 30°C. The symbols are experimental data, and the continuous lines are from the Carreau model.



(**a**)



(**b**)

Figure S7. Hysteresis behavior at 30 °C for an extra-heavy oil in the presence of 5 vol% of a) the carrier fluid composed of a xylene/dimethylformamide ratio of 0.2, and b) the nanofluid with S9 nanoparticles at 1000 mg·L^{-1} composed by the carrier fluid. The symbols are experimental data, and the continuous lines are from the Carreau model.

Table S1. SLE parameters for the obtained adsorption isotherms.

Sample	H (mg·g^{-1})	K (g·g^{-1}) (×10^{-4})	N (mg·g^{-1})	RMSE
S9	0.59	0.90	446.02	0.67
S11	0.81	3.84	422.95	0.99
S66	1.29	10.09	421.49	1.08