

World Congress on

Petroleum and Refinery

July 21-22, 2016 Brisbane, Australia

Micro/nano sized polysilsesquioxanes facilitate pour point depressing activity of polymeric pour point depressants

Bo Yao

China University of Petroleum, China

The polymeric pour point depressants (PPDs) have been widely used in pipelines transporting waxy crude oils. However, the performance of PPDs is still unsatisfactory for many waxy crude oils and is liable to be interfered by reheatment, pump-shearing and rest time. It has been verified that the inorganic nanoparticles could improve the performance of PPDs by modifying the morphology of precipitated wax crystals. However, the inorganic nanoparticles need to be organically modified before use and may perhaps cause some problems in downstream refinery. Polysilsesquioxanes micro/nano particles have good dispersing ability in organic solvent and good heat/shear resistance. In this paper, the polysilsesquioxanes micro/nano particles were used to disperse in PPDs matrixes to prepare composite PPDs. The composite PPDs could greatly improve the rheology of waxy crude oils that is, the pour point, viscosity, yield stress of waxy crude oils decrease greatly after composite PPDs addition. The DSC test showed that the composite PPDs act as nucleats of wax crystals and facilitate wax precipitation. The microscopic images of precipitated wax crystals showed that the addition of composite PPDs favors the formation of large spherical-like wax crystals, the structures of which are very compact. A possible heterogeneous nucleation mechanism was put forward: the composite PPDs particles provide models for the wax molecules to precipitate thus greatly modify of wax crystal morphology and improve waxy crude oil rheology. In addition, the organo-functional group types of methoxysilanes, size of polysilsesquioxane particle and polarity of polymeric PPD have multiple influences on the pour point depressing performance of the composite PPDs.

Biography

Bo Yao is currently a 3rd PhD candidate from China University of Petroleum. His PhD research focuses on the rheology of crude oils, pipeline additives, crude oil pipelines operation and associative computer simulation. He has his own understanding on the preparation of flow improvers of crude oils and their mechanism. As a PhD candidate, he has published several papers in reputed journals.

674780802@qq.com**Notes:**