Asphaltene deposit distribution in capillary tests

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If asphaltenes become unstable, they may form deposits that interfere with production. Whether and where deposits form is an area of active research. We have previously reported a test designed to examine the tendency of crude oils to form asphaltene deposits in a capillary tube [1]. An estimate of the average amount of deposit formed can be made from the weight of deposit recovered from the tube at completion of each test. Comparison of this amount with its effect on pressure drop across the tube provides some indication of whether the deposit is localized or evenly distributed. In this paper we report a significant improvement to the asphaltene deposition test that permits nondestructive evaluation of the distribution of deposit within the test capillary.

Two probe fluids, N_2 gas and glycerol, have been used to evaluate deposit distribution at the conclusion of deposition tests by displacing the remaining crude oil. N_2 gas is injected at constant pressure and the rate of oil production is recorded as a function of time. This rate varies with the local radius as the gas/oil interface moves through the capillary. Similarly, the tri-alcohol glycerol can be injected after displacing crude oil with N_2. In this case the flow rate is held constant and pressure drop reflects changes in local radius. Examples of uniform and non-uniform deposition have been found using these tests. Advantages and disadvantages of gas and liquid displacements are discussed and details of computational approaches are presented. The same principle may also be applied to other similar organic/inorganic deposition studies

Reference

[1] Wang, J.X., Buckley, J.S., and Creek, J.L.: "Asphaltene Deposition on Metallic Surfaces," *J. Disp. Sci. Tech.* (2004) **25**, 287-298.

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