[0013] In U.S. Pat. No. 4,081,360, issued Mar. 28, 1978 to Tan et al., a light solvent is added to coal liquefaction fractions for suppressing the formation of asphaltenes.

[0014] A variety of chemical treatments are also disclosed in the art for affecting foulants including the use of dispersants and viscosity reducing agents. The dispersant-plus-solvent approach has been disclosed for affecting asphaltenes, and a variety of suitable dispersant compositions are known and available to the trade for this purpose, such as disclosed by U.S. Publication 2006/0014654. Asphaltene precipitation inhibitors have also been disclosed for use in continuous treatment or squeeze treatments of well formations.

[0015] However, feed sources can vary significantly in their composition, and individual dispersing agents and viscosity reducing agents can operate effectively only in a limited range. Even small changes in the oil composition can have a major effect on the dispersing properties for asphaltenes. Also, even though dispersants and precipitation inhibitors address the problem of slowing or preventing asphaltene precipitation, once deposits form, the use of such inhibitors is negated because the removal generally requires a cleaning, scraping or hydrotreating procedure to remove the deposits. This is undesirable as it usually requires a reduction or complete shut-down of production.

SUMMARY OF INVENTION

[0016] Embodiments disclosed herein relate to the mitigation of deposits or decreasing the rate of deposit formation as a result of foulants in various hydrocarbon streams, such as residuum fractions. More specifically, embodiments disclosed herein relate to a method for selecting a solvent or mixture of solvents useful for mitigating deposit formation, cleaning existing deposits, and/or decreasing the rate of deposit formation. Decreasing the rate at which deposits may form and/or increasing the rate at which deposits may be removed can dramatically improve process economics (e.g., decreasing down time as a result of deposit formation).

[0017] E~~In one aspect, e~~mbodiments disclosed herein relate to a process for dispersing foulants in a hydrocarbon stream. The process may include the steps of: determining a nature of foulants in a hydrocarbon stream; selecting a solvent or a

mixture of solvents suitable to disperse the foulants based upon the determined nature; and contacting the foulants with the selected solvent or mixture of solvents.

[0018] ~~In another aspect, e~~Embodiments disclosed herein relate to a process for affecting a condition of foulants in a hydrocarbon stream, including: feeding a hydrocarbon stream to a refining process; determining a nature of foulants in the hydrocarbon stream; establishing input parameters and input components for a thermodynamic model, wherein the model results are used to select a mixture of hydrocarbons suitable to affect the foulants in a desired manner based upon the determined nature; contacting the foulants with the selected mixture.

[0018a] In one aspect, there is provided a process for dispersing foulants in a liquid hydrocarbon stream, the process comprising the steps of:

determining a nature of foulants in a liquid hydrocarbon stream by measuring a value of the liquid hydrocarbon stream and estimating a hydrogen to carbon ratio of the liquid hydrocarbon stream based on the measured value;

selecting a solvent or a mixture of solvents suitable to disperse the foulants based upon the determined nature, wherein a hydrogen to carbon ratio of the selected solvent or mixture of solvents is less than the estimated hydrogen to carbon ratio of the liquid hydrocarbon stream; and

contacting the foulants with the selected solvent or mixture of solvents.

[0018b] In another aspect, there is provided a process for affecting a condition of foulants in a liquid hydrocarbon stream, comprising:

a. feeding a liquid hydrocarbon stream to a refining process;

b. determining a nature of foulants in the liquid hydrocarbon stream by measuring a value of the liquid hydrocarbon stream and estimating a hydrogen to carbon ratio of the liquid hydrocarbon stream based on the measured value;

c. establishing input parameters and input components for a thermodynamic model, wherein the model results are used to select a mixture of hydrocarbons suitable to affect the foulants in a desired manner based upon the determined nature, wherein a hydrogen to carbon ratio of the selected mixture of hydrocarbons is less than the estimated hydrogen to carbon ratio of the liquid hydrocarbon stream;

d. contacting the foulants with the selected mixture.

[0019] Other aspects and advantages will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

[0020] Figure 1 is a proposed chemical structure representing asphaltene

[0021] Figure 2 is a general flow diagram showing a process for dispersing foulants according to embodiments disclosed herein.

DETAILED DESCRIPTION

[0022] Embodiments disclosed herein relate to the processing of hydrocarbon streams containing foulants, such as asphaltenes and other asphaltene-like compounds. Asphaltenes, in general, refers to a class of compounds, and not a pure component. They consist of tens of thousands of chemical species and the composition is not well defined. In addition, they appear to interact with each other and the other oil constituents in a complex manner. The multiple hypothetical structures proposed for asphaltenes lead to different, inconsistent modeling approaches. One proposed structure for an asphaltene is illustrated in Figure 1.

[0023] Hydrocarbon streams containing foulants may come from a variety of sources, including well-head condensates, crude oil, heavy crude oil, synthetic crudes, crude petroleum oils, atmospheric or vacuum residua, topped crudes, reduced crudes or fractions thereof. The sources can also contain other suspended matter such as