Stability of Drop-In Blends of "New And Old Fuels"

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New fuels such as e-fuels and biofuels are entering the markets and will initially in some industries be used as drop-in to conventional fuel due to volume scarcity and current restricting specification on blend volumes.

In the global shipping industry 300 million m3 of fuels are consumed annually. There are strict requirements to avoid phase instability of these bunker fuels due to the heavy economic impact that e.g. plugging of injectors leading to engine failures and loss of propulsion may have. The reduced limits of sulfur in classical fossil bunker shipping fuels have also reduced the stability reserved in these fuels making them more prone to solids precipitation and sludging.

The new fuels have markedly different chemical composition compared to classical fuels and hence the thermodynamics of blending need to be considered as different and therefore reevaluated or redesigned. Despite this classical asphaltene precipitation based stability tests such as spot-tests (ASTM D4740) or P-value (ASTM D7060) estimations are being used involving classical pairs of solvents and non-solvents.

The oxygen content of biooil (derived eg from pyrolysis of biomass such as wood) is very high, rendering them not only acidic (TAN numbers as high as 70) but also very polar. Hence the solubility in say heptane may be very scarce and false positives may be obtained during heptane addition.

The hydrotreating of biooils to remove the oxygen and reducing primarily the acidity will also affect the miscibility significantly, and hence the results obtained from the prevailing and accepted stability tests in e.g. the shipping industry.

We work on evaluation of new methods for blend stability testing as well as methods to improve stability as the content of biooil is increased.