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CRUDE OIL ANALYSIS

INFLOW
CRUDE BLENDING

Minimise organic deposition with industry-leading technology

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Blending opportunity crudes brings about asphaltene deposition and the formation of crystalline organics.

InFlow provides a fully integrated solution to organic deposition in crude blending.

'Opportunity' Crudes

Refinery processes are increasingly challenged for many reasons. To improve margins and remain competitive, refiners are processing more 'opportunity' crudes. These include those with high concentrations of paraffin, asphaltenes and wax.

Opportunity crudes, or 'heavy' and 'high acidic' crudes, are appealing feedstock on the market.

However, processing these is particularly challenging due to their higher solids and sulphur content, potential for harbouring asphaltenes and increased viscosity.

Blending opportunity crudes can also pose challenges for stability and compatibility.

InFlow is designed to maximise crude value by integrating quality monitoring and organic deposition constraints. This provides a fully integrated solution to organic deposition in crude blending.

Intertek InFlow

Our programme assesses refiners' crudes and crude blends using Near Infrared (NIR) and Intertek proprietary technology (InFlow).

Organic deposition is validated by microscopy, while InFlow examines chemical composition and physical properties to generate stability and instability constraints taking account of interactions between crude oils.

The programme also takes account of the effects of time on the deposition of organic material.

This data can assist the crude blender to optimise blends within organic deposition constraints integrated solution to organic deposition in crude blending.

Crude and condensate samples

InFlow Aggregate Plots

Different types of sample have different types of spectra. InFlow uses aggregates to group samples of the same type.

These tend to have similar properties, shown by colours on the aggregate plot.

Within InFlow, the NIR spectra of heavy and light crudes, chemical composition (i.e. aromatic and paraffinic differences) and organic deposition properties are visualised and validated by microscopy.

The stability of blends is determined from experimental data and by calculation utilising our blending algorithm, with aggregate plots used to visualise the instability and stability regions.

Programme Elements

The key elements of InFlow are:

- IR/NIR Spectroscopy – using FT-IR/FT-NIR
- Intertek Proprietary Technology
- Intertek matrix blending algorithm
- Blend stability constraints
- Blend instability constraints
- Experimental blend stability constraints
- Spectral blending algorithm
- Microscopy
- Quality tracking (fingerprinting)

Crude Quality Fingerprinting

The combined solution utilises NIR and InFlow to track and monitor crude quality.

Crude qualities vary between batches - variation is normally assessed by checking API gravity and sulphur. However, we use NIR fingerprinting, which takes account of crude quality change and offers an insight into neat crude deliveries and the potential effects of changes. An assessment of compatibility of the neat crude samples within a blend can be undertaken, enabling refiners to ensure the recipe used meets current refinery constraints.

Blend Evaluation Reports

For each crude blend, we make an assessment based on NIR spectra, typical blend properties and refinery constraints. The experimental results and calculations from the blend recipe evaluation are used to generate a set of blend reports for target crude distillation unit recipes. The blend evaluation reports include blend recipes that meet refinery constraints, a summary of neat crude properties, calculated blend properties, the percentage range of crudes blended and minimum, maximum, average and span percentages.

Existing Asphaltene Methodology

Identifying the deposition of asphaltenes by optical density is used within existing methods (ASTM D7157, D7060 and D7112) to identify parameters (such as S value and FRmax) for neat crudes. Pure solvents and titrants such as heptane and toluene are used; these methods assume that there is no interaction between the crudes when blended. However, crude oil is a colloidal system which changes during blending.

The parameters are measured by optical density at a single wavelength which is not representative of chemical change or interactions between crudes.

FOR MORE INFORMATION

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