

Infineum Crude Oil Additives



Performance you can rely on.





Our solutions

Wax management

Infineum U-series combines world-class technical and formulation expertise to produce additives designed to treat a wide range of waxy crude oils that deposit in the oil field or during storage.

Our field proven chemistry, in combination with treat-rate optimisation and in-house laboratory testing, means that whatever your unique challenge we have a solution for you.

Our wax management additives effectively disperse and modify wax crystal structures in crude oil to keep them moving whether it be at the source of production, during transportation or at the refinery.

Asphaltene management

Asphaltene instability and deposition can cause issues in both upstream operations, where flowlines can become severely restricted or plugged, and during downstream blending operations where they contribute to fouling of heat exchangers.

Infineum U-series additives prevent this by stabilising the asphaltenes in the oil and reducing the tendency to agglomerate.

Infineum U-series additives are proven to improve crude oil flowability by increasing dispersancy and decreasing deposition



Producing



Midstream



Refinery



Storage



Transportation

Infineum U-series are globally registered enabling accessibility for use in most regions.

A microscopic view of various oilfield chemical additives, appearing as elongated, needle-like or rod-like structures in shades of white, yellow, and orange, set against a dark blue background.

Infineum offers a breadth of expertise

We provide the support and the products you require,
when and where you need them.

You can rely on our understanding of diverse global markets,
dedicated, local account teams and proactive technology
support for advanced additive technology.

Performance you can rely on.



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Infineum U-series additives modify the wax crystals as they precipitate. The interactions between the wax crystals and the additive inhibit the agglomeration into larger crystals and the deposition tendency of the wax.

Performance evaluation

Infineum extensively evaluates additive performance in crude oils from around the world. In addition to industry recognized tests, such as the cold finger and flow loop tests, Infineum has developed screener tests to effectively replicate field conditions and evaluate additive performance.

Wax Settling Test

One of the key challenges in the transportation of crudes is reducing wax settling to maximize the amount of product delivered to the customer.

Infineum's new, high-throughput bench test, developed to simulate crude oil storage in rail cars, ships and crude storage tanks, has demonstrated good correlation with larger scale tests.

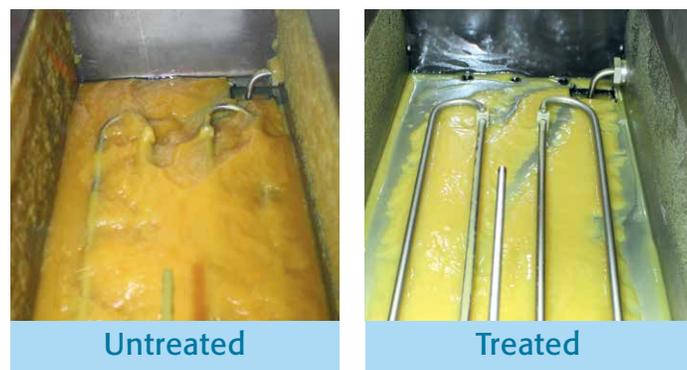


Figure 1: Infineum in-house wax settling test bench test demonstrating the effect of crude oil treated with Infineum additive solutions.

Figure 1 above shows a 10 liter Eagle Ford oil test where the crystal structure of the wax was significantly altered allowing for a >90% reduction in remaining waxy material and a quick clean-up of the test rig as opposed to the untreated oil where a hot xylene soak had to be employed.

The wax settling test rig was miniaturized and validated so multiple samples can be tested simultaneously with less oil. This allows for a quick turnaround on additive screening in the crude oil of interest and faster more insightful recommendations to the customer.

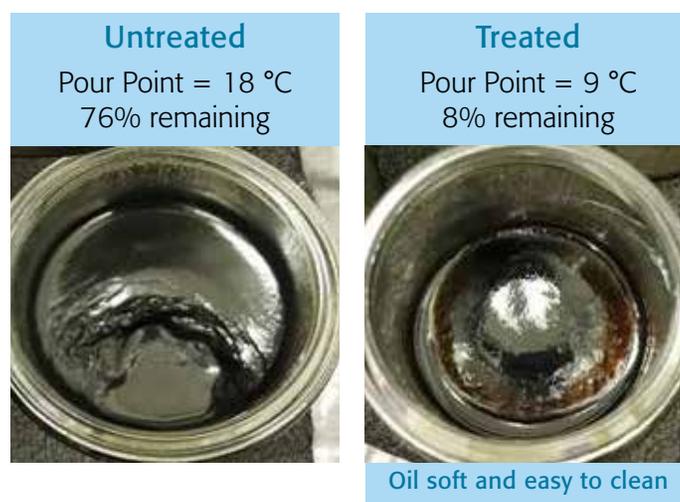


Figure 2: Miniaturized wax settling test that goes beyond the pour point for additive performance.

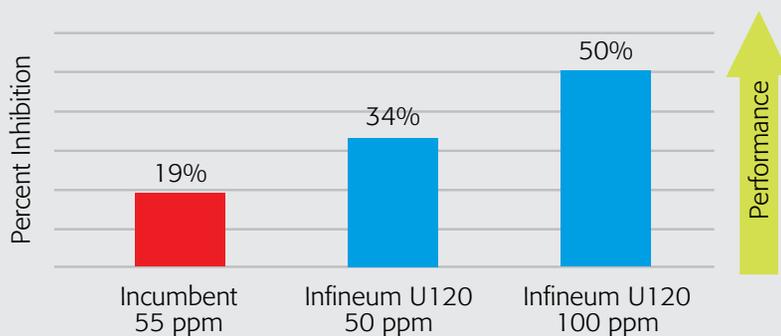
Wax settling test also dives deeper into the additive-wax interaction. For example, due to a slower cooling rate that was more consistent with field conditions vs. the pour point test, the untreated oil in Figure 2 was effectively gelled at 22 °C. Using the Infineum wax settling test, Infineum U110 reduced the pour point to the desired target of < 10 °C, and Infineum U110 was able to keep the wax loosely suspended allowing for near complete extraction from the test jar. Other additives screened met the pour point target but left a ball of wax in the bottom of the jar. Without this information, an additive meeting the pour point target could have been selected leaving the customer with a deposit in their storage tank.

Wax management

Infineum understands the importance of **modifying wax crystal structures** and **keeping them moving through the system**

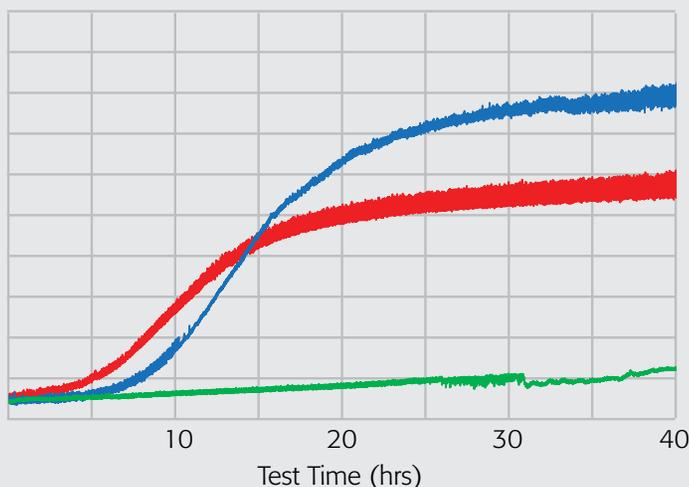
Case study: Gulf of Mexico

A customer was experiencing topside deposition. Infineum additives were screened using the cold finger and flow loop tests. **Infineum U120 was found to be superior to incumbent chemistry** and has been successfully deployed in an upstream application on a continuous basis.



Cold finger testing showed Infineum U120 increased paraffin inhibition by 79% compared to the incumbent chemistry at the same treat rate in the customer crude oil.

Gulf of Mexico Crude Oil



Flow Loop showing that Infineum U120 greatly minimized paraffin deposition and outperformed the incumbent chemistry in the customer crude oil.

- Incumbent Inhibitors
- Blank
- Infineum U120

INFINEUM WAX PORTFOLIO

	Infineum U104	Infineum U110	Infineum U120
Active Ingredient (approx. %)	50	40	25
Polymer family	FVA	PA	EVA
Density (g/cm ³) @ 15 °C	0.913	0.906	0.906
Viscosity (cSt) @ 40 °C	92	140	474

To find out more about our full range of wax management additives, please contact us at crude.oil@infineum.com

Building on over forty years experience of preventing deposition in hot engines and marine transportation, Infineum is well placed to understand the issues experienced with asphaltene deposition in both upstream and downstream applications.

Asphaltene management

Asphaltenes are complex polyaromatic hydrocarbons found in crude oil which can agglomerate to form larger particles. These larger particles alone are not necessarily problematic, however, pressure and temperature changes as crude oil moves throughout upstream and downstream systems can cause compositional changes leading to deposition of these agglomerates and ultimately a reduction in flow.

Infineum has developed unique asphaltene inhibitors based on our historical knowledge of asphaltene deposition in engines and marine environments. The inhibitors interact with asphaltenes to disrupt the agglomeration and thus greatly reduce the particle size and the deposition tendency.

Dispersancy and deposition

Infineum extensively tests our asphaltene inhibitors using a variety of in-house and external testing methods. Ensuring our additives

effectively disperse asphaltenes is the first step in our screening process. We measure dispersancy using the asphaltene dispersancy test (ADT) seen below in Figure 3.

Dispersancy does not tell the whole story, however, so we also extensively evaluate our additives to determine their performance in reducing the deposition of asphaltenes. One example, is the pressurized flow loop in Figure 4.

This test enables the pressure reduction of a treated crude oil sample versus the untreated crude oil. Infineum U200 not only prevented deposition in the microbore coil, but created particles < 10 micron size. This combination of performance resulted in almost no measurable deposition occurring on the surface during the test. Infineum additives are an effective solution for keeping asphaltenes dispersed and reducing deposition thereby enabling maximum production.

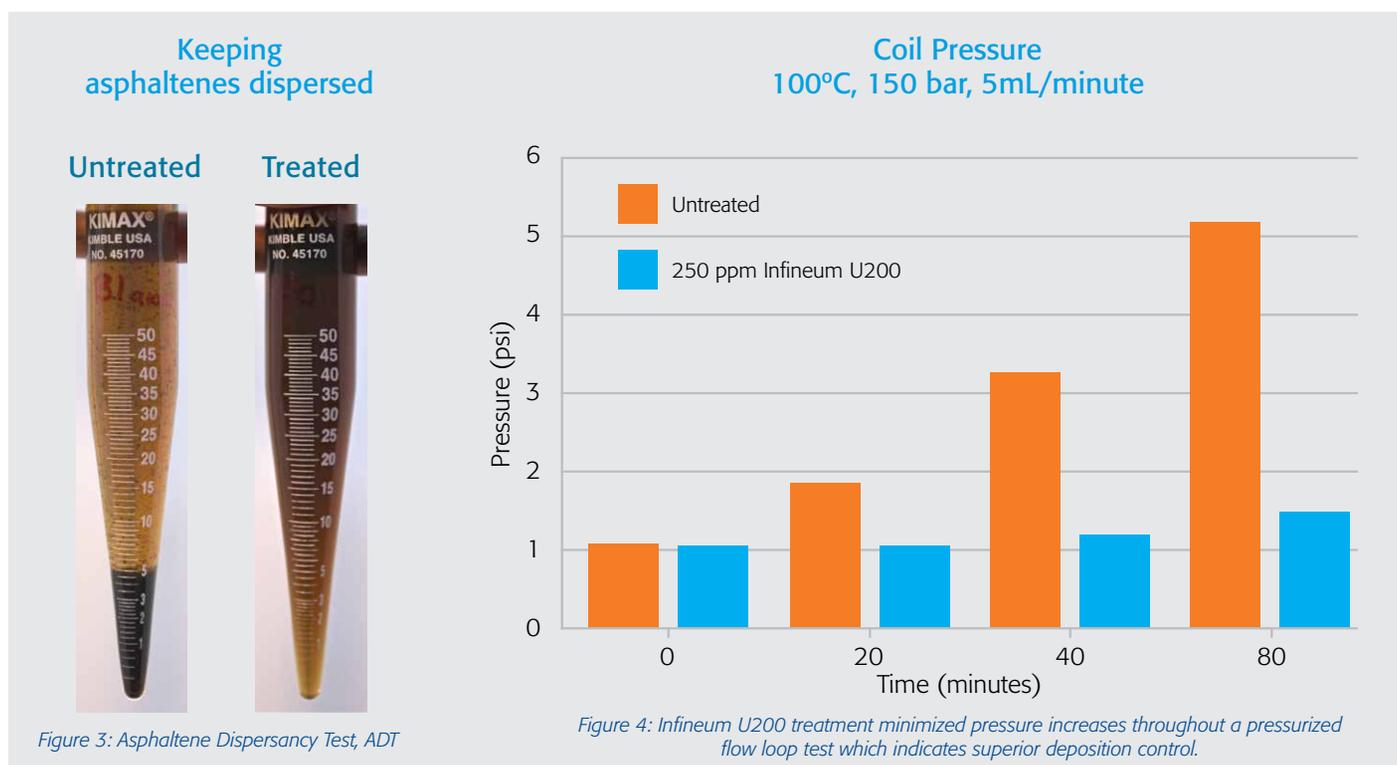


Figure 3: Asphaltene Dispersancy Test, ADT

Figure 4: Infineum U200 treatment minimized pressure increases throughout a pressurized flow loop test which indicates superior deposition control.

Asphaltene management

Refinery antifoulants

Infineum has developed a 5-rod thermal deposition test to more accurately mimic the crude oil heat exchanger bank compared to the single rod test. Each rod can be heated gradually and independently. The oil flows through the system in series from rod 1 to rod 5.

The gradual heating of the Infineum 5-rod thermal deposition rig more closely mimics the refinery heat exchanger bank compared to the single rod test.



Figure 5: Image shows the Infineum 5-rod thermal deposition rig.

Initial fouling temperature and severity of the fouling at each temperature can be identified.

Infineum refinery antifoulants increase the thermal efficiency of heat exchangers, reduce energy costs and help maintain process flow rate.

Untreated



Treated



Figure 6: Image shows a rod (top) with fouling of untreated crude oil and a rod (bottom) with minimal fouling after treating with an Infineum U-series additive.

Infineum additives show performance across a diverse crude slate and reduce loss of resistance at low doses.

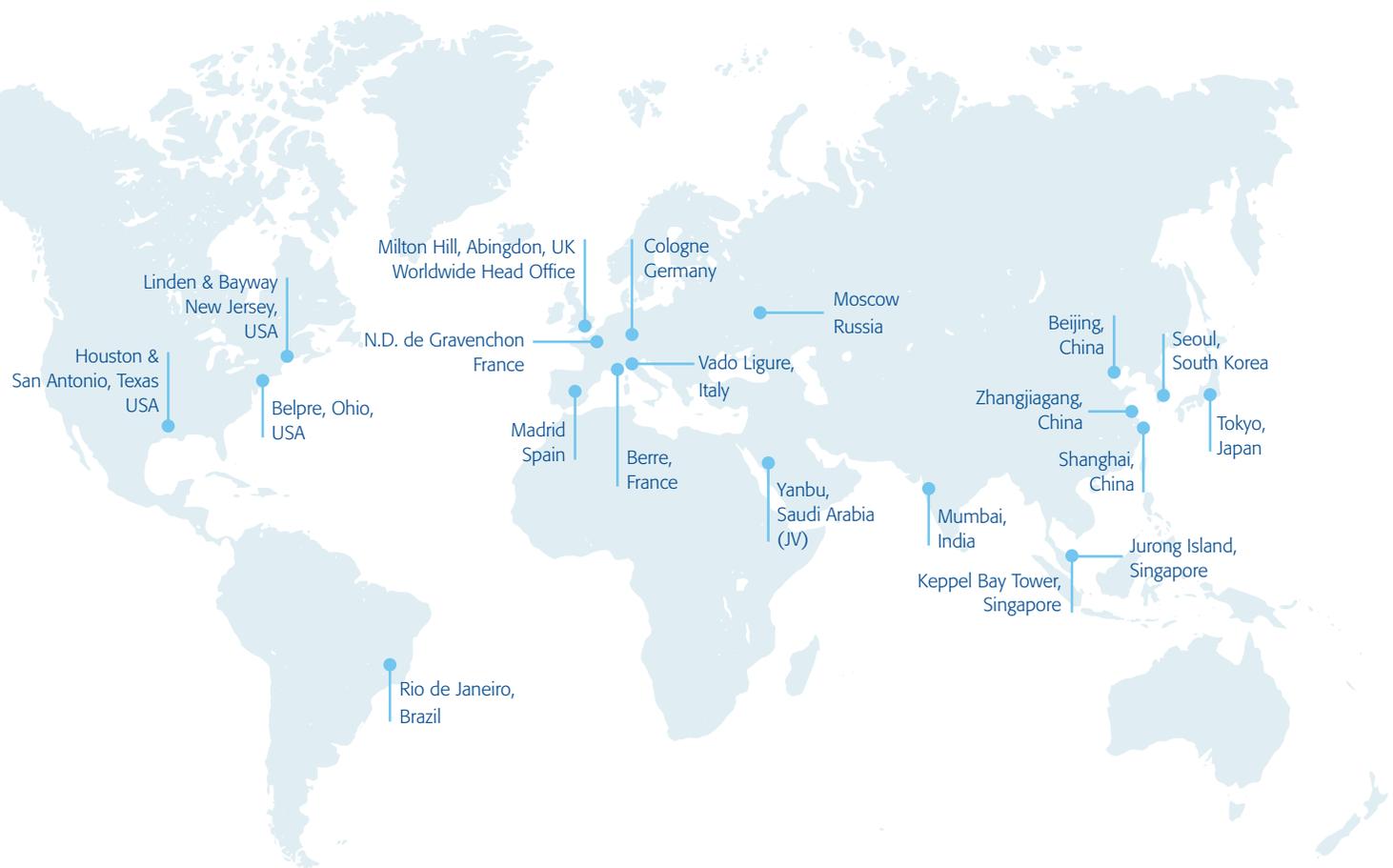
INFINEUM COMMERCIAL ASPHALTENE PORTFOLIO

		Infineum U200	Infineum U301
	Density (g/cm ³) @ 15 °C	0.953	0.957
	Viscosity (cSt) @ 20 °C	17	19
	Upstream Asphaltene Control	✓	
	Heat Exchanger Antifoulant		✓
Dispersancy Testing	S-Value ASTM DH57		
	Asphaltene Dispersancy Test		
Upstream Deposition Testing	Packed Bed Column		ND
	Flow Loop		ND
High Temperature Fouling	Alcor® HLPS – 1 Rod		
	Infineum 5-Rod Thermal Deposition		
	Rotating Fouling Unit	ND	

Infineum additive has shown consistent performance among a diverse crude slate

To find out more about our full range of asphaltene management additives, please contact us at crude.oil@infineum.com

Working with Infineum



Whatever your challenge, Infineum is able to assess your crude oil samples, evaluate our portfolio of additives and propose a solution to your needs.

Contact us today at crude.oil@infineum.com





About us

Infineum is a specialty chemicals company whose purpose is to create a sustainable future through innovative chemistry.

A joint venture between Shell and Exxon Mobil, Infineum is one of the world leaders in the formulation, manufacturing and marketing of petroleum additives for lubricants and fuels with operations and production facilities worldwide.

Delivering through powerful research and development capabilities around innovative chemistry, Infineum maintains its relentless focus on technology excellence, reliability, operational excellence and collaboration to deliver to customers *performance they can rely on*.

Infineum draws on a rich heritage that is underpinned by leading edge research and development activities. We are innovators of additive products, including those used in:

- Diesel and marine fuels
- Automotive, heavy-duty diesel and marine engine oils
- Crude oil
- Specialty applications such as transmission fluids, greases and industrial oil

Our smart solutions have become key components of today's most demanding applications and advanced hardware systems.

Infineum is a truly world-class organisation

Our global operations encompass:

- Worldwide production facilities
- Sales representation in more than 70 countries
- Business centres strategically located in the UK, USA, China and Singapore
- Business conducted in over 20 languages
- A global supply chain
- Multicultural business teams
- Over 2000 highly skilled and dedicated colleagues



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