



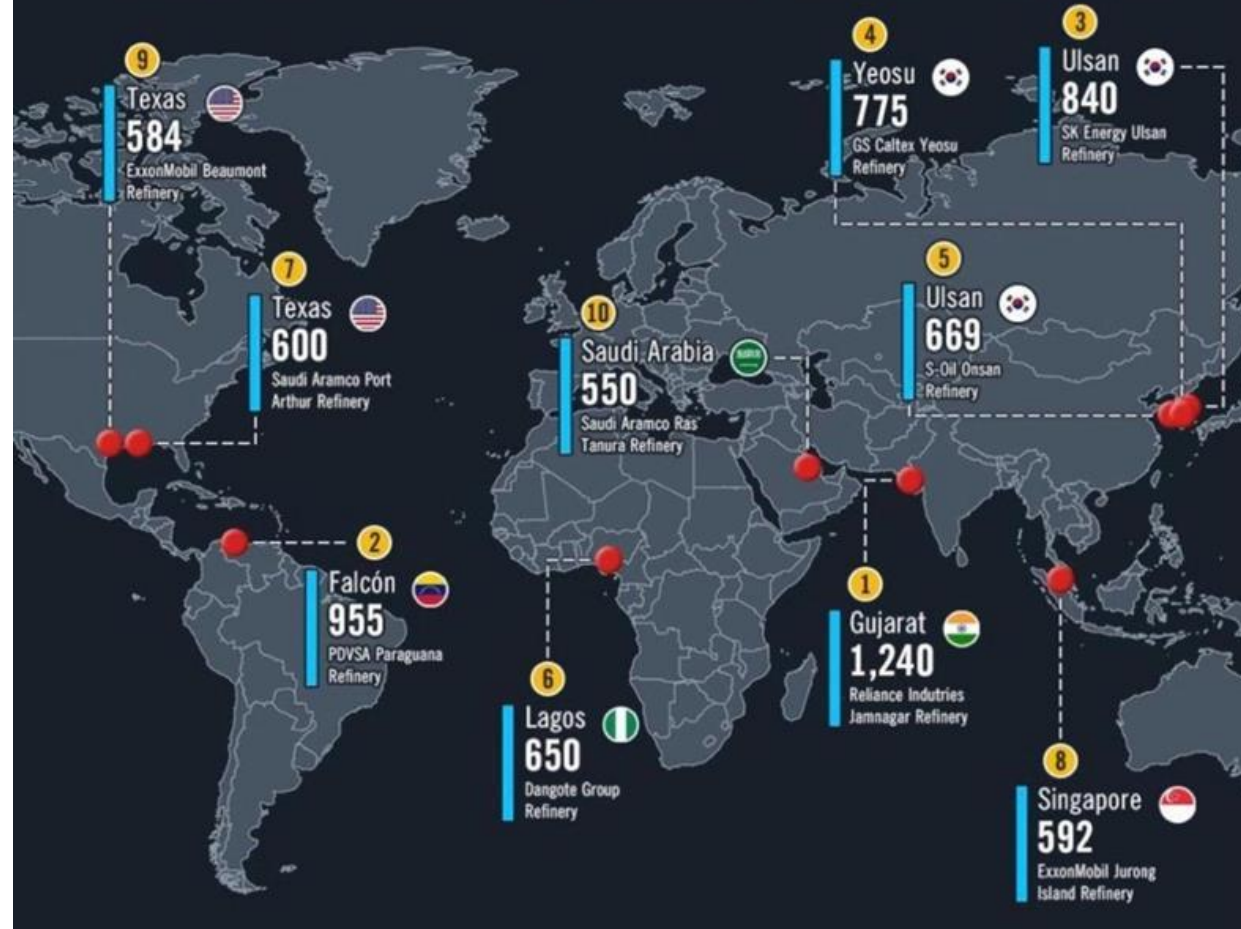
From Chemistry to Digital Intelligence Smart Crude Management Next-Gen Assessment and Monitoring Tools for Refineries' Profitability

Mervyn Ong / Dorf Ketal Chemicals

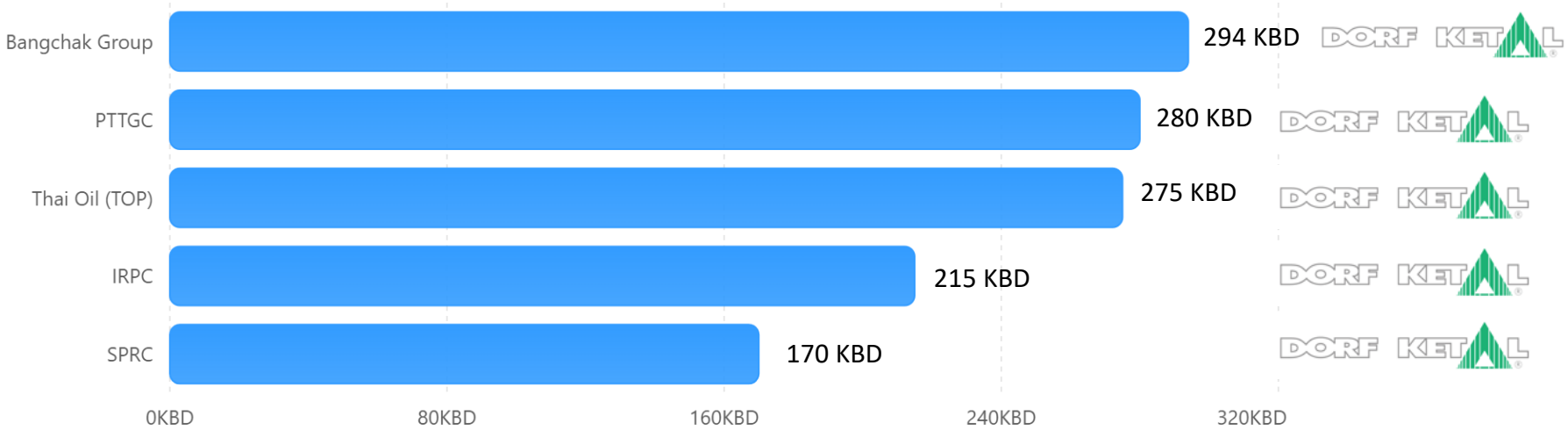
5th Thailand International Chemical Engineering & Chemical Technology | 10th Jun 2026

TOP 10 WORLD'S LARGEST OIL REFINERIES IN 2026

Largest oil refineries and their capacities in (thousands of barrels per day)

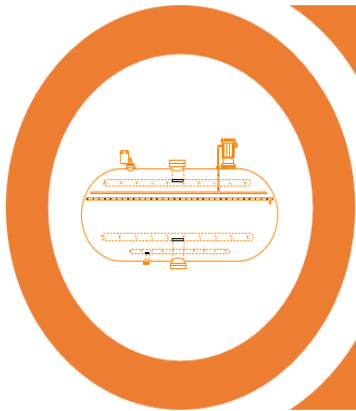


Achieving Refinery Excellence with Dorf Ketal – TH Refiners



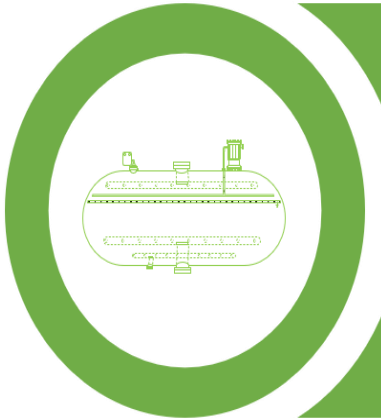
Source: Company annual reports and industry outlook reports, Total National Capacity: 1,234 KBD

Plants	Program
BCP - CDU2	Only Chemical Treatment program
PTTGC6 - CDU/CRS	Crude Management & Chemical Program
TOP – CDU 1,2&3	
IRPC – CDU 1&2	
SPRC – CDU 1&2	



Past program: Desalter Operating Challenges

- Solid carryover and low desalting efficiency issues.
- Dirty Brine every crude switch
- Incompatibility → Stable emulsions
- Slop treatment & Reprocessing costs
- Throughput loss & ETP impact



Achieving Desalters Excellence with Dorf Ketal

- Consistently achieved desalter KPIs at maximum DP mix valve operation
- Increase Desalting Efficiency & Solid removal efficiency were improved.
- Able to increase % slope treatment
- No Throughput loss or ETP impact

Our New Integration arm – Water Treatment Solutions



📅 12 May, 2026 17:02:05 IST

Dorf-Ketal enters water treatment space with Vasu Chemicals acquisition



Dorf-Ketal Chemicals India has acquired Vasu Chemicals' water treatment business. This move marks Dorf-Ketal's entry into India's industrial water treatment sector.

The acquisition aims to expand Dorf-Ketal's specialty chemical offerings. It also seeks to strengthen customer relationships and build a scalable platform for growth in water treatment.

Vasu Chemicals is a provider of industrial water treatment solutions, offering a comprehensive portfolio of specialty chemicals, process solutions and integrated dosing systems for water treatment plants and industrial applications. With revenues exceeding \$35-mn, Vasu Chemicals is ranked among the top three players in India, supported by technical capabilities and long-standing relationships with government and private sector customers across a diversified end-market base.



India's leading Industrial Water Treatment solutions provider



Strong team of **800+** individuals with advanced chemistry expertise



Dedicated manufacturing facility with capacity of **3000** MT/annum



Served **1000+** customers across 10 countries



"A strategic step for Dorf-Ketal to expand into adjacent, high-value specialty chemical applications – natural extension of Dorf Ketal's industrial specialty chemicals platform."

Sudhir Menon, Chairman & Managing Director

Chemistry to Digital Intelligence – Crude Unit Analyzer

Overhead
Corrosion Control
Program



Traditional
monitoring
approach by spot
sample and testing

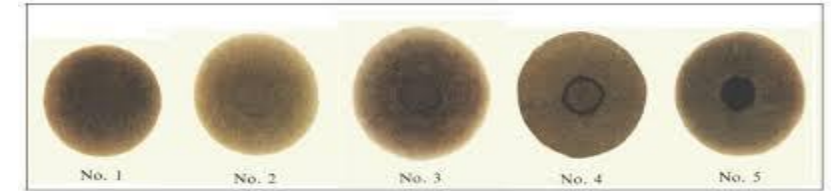


Online analyzer
with automatic
sampling and
analyses



Recent Supply chain Disruptions and the Impacts of Changing Opportunity Crudes

Crude Compatibility



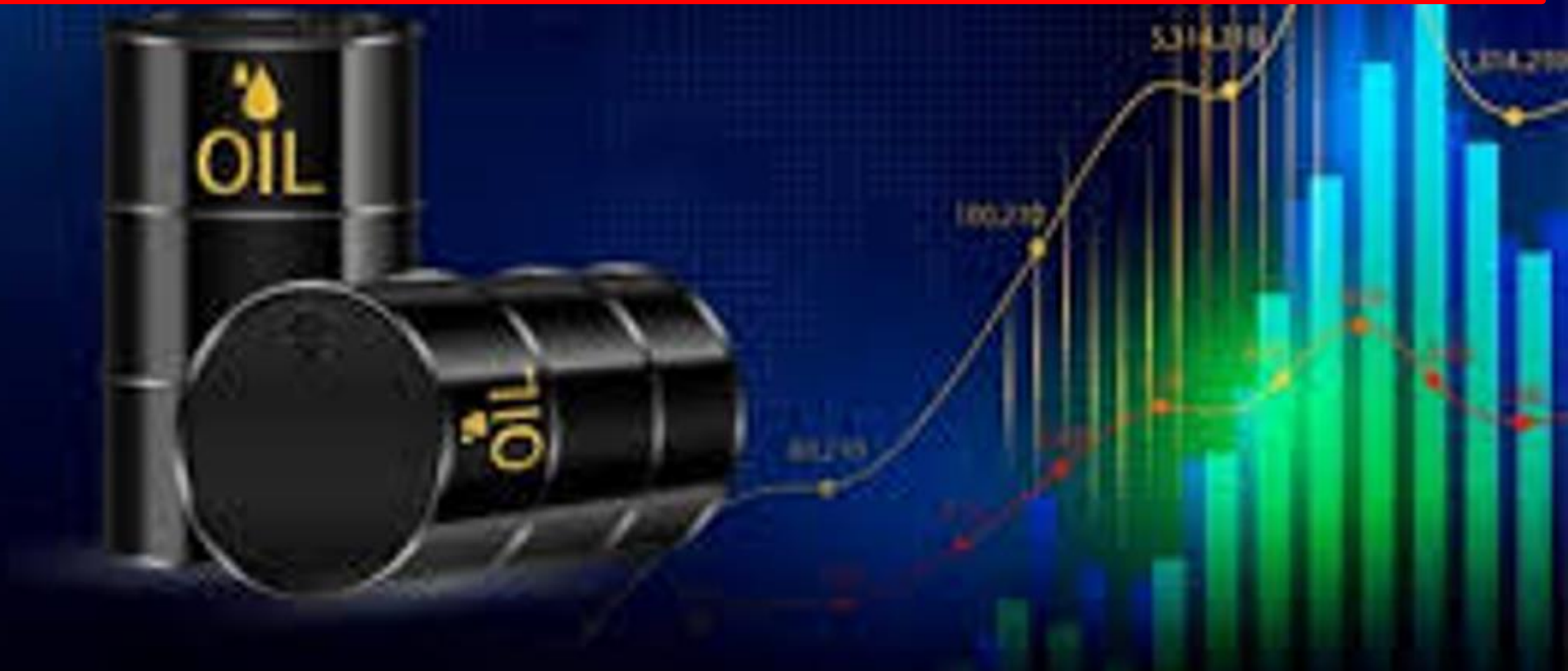
- Caution to be taken when blending paraffinic (e.g WTI) and asphaltenic crudes (Arab / Basrah)
- Incompatible crudes lead to sludge in crude tanks, desalter rag layers and increased fouling in pre-heat trains
- Need for proactive crude purchase screening to ensure blend compatibility.

Hot Pre-heat Train fouling Management



- Crudes with high metals and asphaltene content encourage metal catalyzed asphaltene deposition in the pre-heat train which increase fouling rate and huge energy loss to refiners
- Need for well balance solution of fouling control monitoring and chemical solution at the preheat train for furnace fuel energy savings and carbon penalty reduction.

Crude Purchase Assessment Tools



Advanced Crude Risk Intelligence System (ACRIS™)- for compatibility analysis and Fouling management

(Web – Based Tool)

Proactive evaluation before
crude purchase decision is
made

- ACRIS™ – Advanced Crude Risk Intelligence System
 - ❖ Integrates traditional oil compatibility model functionally with crude blend optimizer tool
- Web - Based model for refinery to access and evaluate the blend compatibility
 - ❖ Customized with dedicated User ID and Password
 - ❖ Subscription based model (think: **NETFLIX**)
- Crude Data and Processing Experience can also be referred in a one-stop solution

ACRIS™ Application

DORF KETAL

ACRIS™
Advanced Crude Risk Intelligence System

User Login

Email

Password

Login

Forgot Password?

DORF KETAL

ACRIS™
Advanced Crude Risk Intelligence System

User Login

OTP Verification

Enter OTP

Verify OTP

DORF KETAL

ACRIS™

Crude Blend Compatibility Dashboard

Sr	Crude Name	Crude Blend %
1	Basrah Heavy	50
2	Al Shaheen	50
3		0
4		0

Total %: 100.00

Evaluate Blend

Compatibility Result

≤ 1.2 : Incompatible
1.2 – 1.4 : Near Compatible
> 1.4 : Compatible

Basrah Heavy
Al Shaheen

→

Compatible

Compatibility Number : 1.98

Disclaimer: The crude compatibility predictions are based on historical lab data of the individual crude mentioned. Please note that crude properties and quality may vary from parcel to parcel.

<https://tools.dorfketal.com/>

DORF KETAL

Downstream

Troubleshooting using ACRIS™

≤ 1.2 : Incompatible

1.2 – 1.4 : Near Compatible/Incompatible

> 1.4 : Compatible

- **Blend 1:** Miri Light 12%, Seria Light 12%, Mero 35%, Tupi 35% - compatibility index output is **incompatible**

- **Blend 2:** Miri Light 41%, Seria Light 49%, Mero 5%, Tupi 5% - compatibility index output is **compatible**

Crude Blend Compatibility Dashboard

Sr	Crude Name	%
1	Miri light	12
2	Seria Light	12
3	Mero	38
4	Tupi	38

Compatibility Result



≤ 1.2 : Incompatible
1.2 – 1.4 : Near Compatible
> 1.4 : Compatible

Blend Components

Miri light
Seria Light
Mero
Tupi

Incompatible
Compatibility Number: 0.55

Disclaimer: The crude compatibility predictions are based on historical lab data of the individual crude mentioned. Please note that crude properties and quality may vary from parcel to parcel.

Crude Blend Compatibility Dashboard

Sr	Crude Name	%
1	Miri light	49
2	Seria Light	41
3	Mero	5
4	Tupi	5

Compatibility Result



≤ 1.2 : Incompatible
1.2 – 1.4 : Near Compatible
> 1.4 : Compatible

Blend Components

Miri light
Seria Light
Mero
Tupi

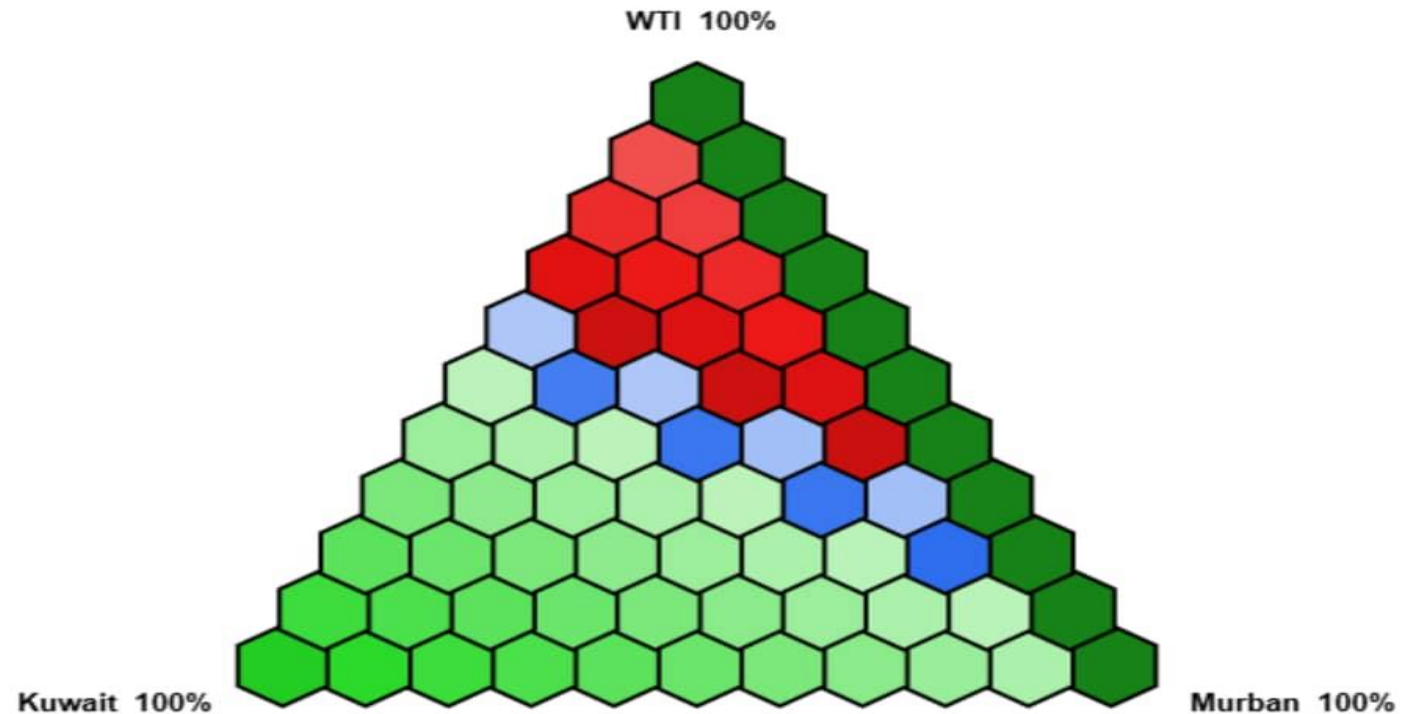
Compatible
Compatibility Number: 2.03

Disclaimer: The crude compatibility predictions are based on historical lab data of the individual crude mentioned. Please note that crude properties and quality may vary from parcel to parcel.

Ternary Analysis Plot : Blend Optimizer in ACRIS™

Compatibility Scale ● Incompatible : ≤ 1.2 ● Near Compatible / Incompatible : 1.2 – 1.4 ● Compatible : > 1.4

- After identifying the potential crude compatibility risks,
- Identify the most optimised crude blend to avoid the incompatible zones

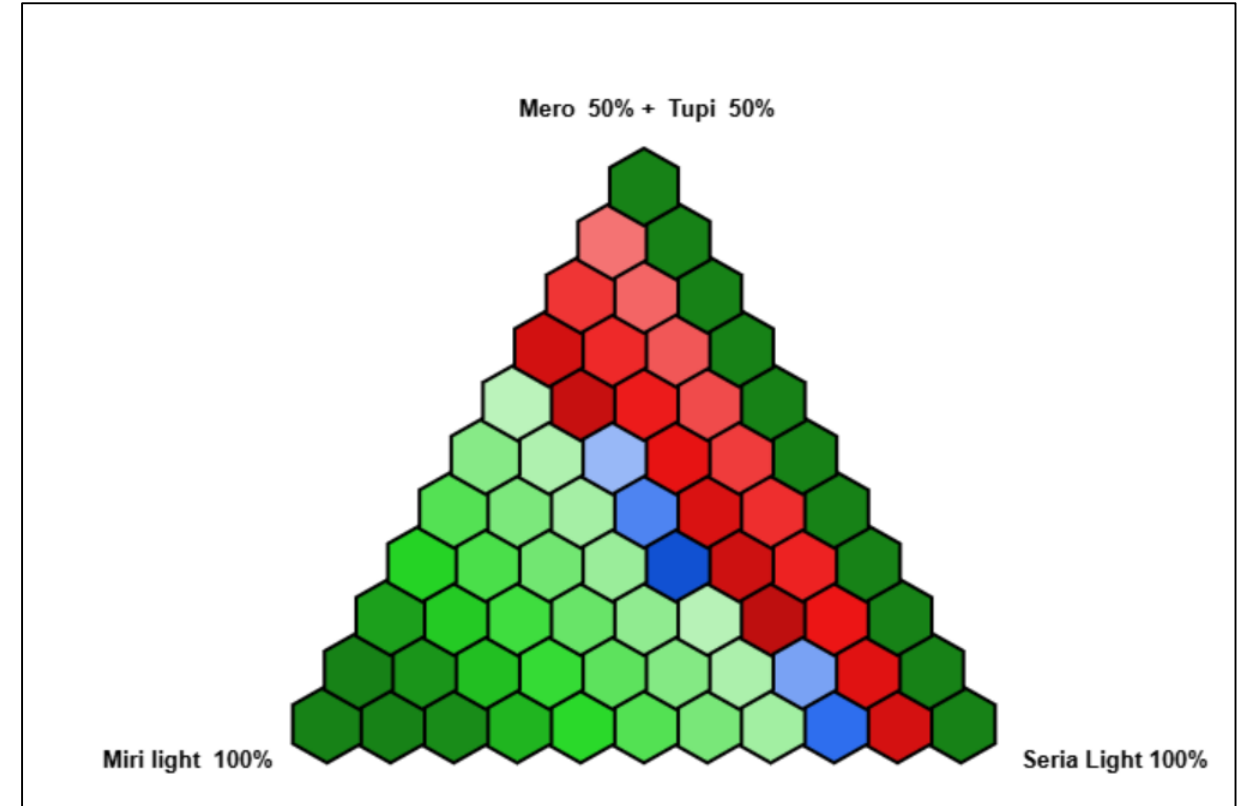


Troubleshooting using Blend Optimizer in ACRIS™

Ternary Analysis Plot Optimizer

- Crude plotted at top vertex - (top is 100% and bottom 0%)
- Crude plotted at left vertex - (left is 100% and right is 0%)
- Crude plotted at right vertex - (right is 100% and left is 0%)

The compatibility index is evaluated and iterated at intervals of 10% of each component plotted of the vertex and a color mapping is displayed with green being 'compatible', blue being 'near compatible/near incompatible' and red being 'incompatible'

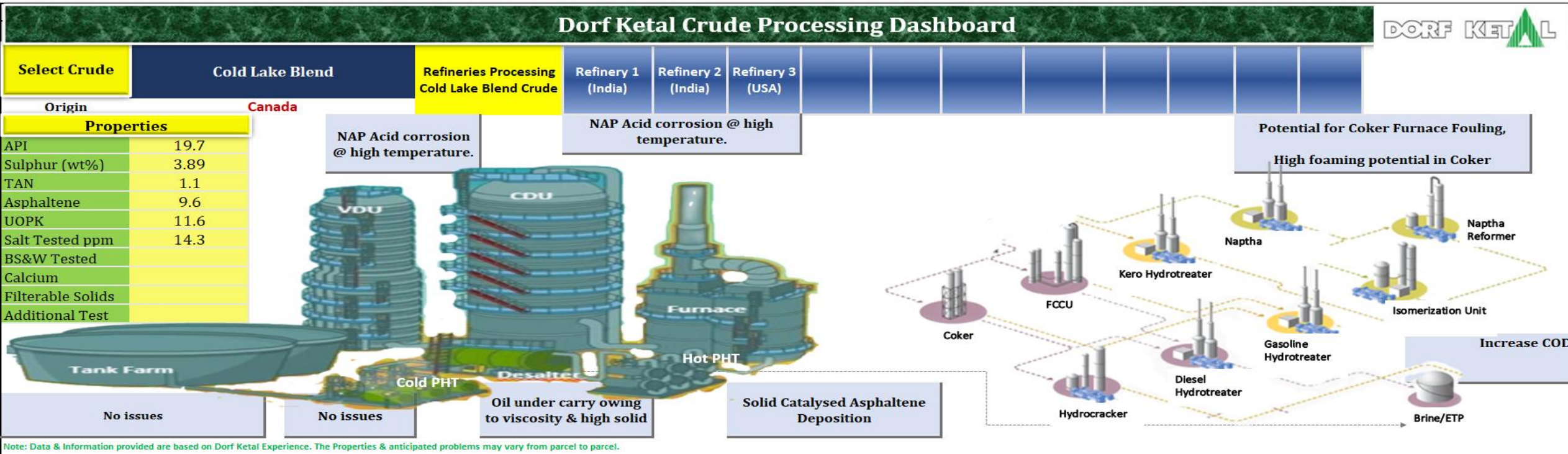


Based on above plot analysis, the variable crude to keep the blend compatible is Miri Light, the area in which blend transitions from green zone to blue/red zones. Depending on the blend ratio and crudes among Seria Light/Mero/Tupi, having at least 40% minimum of Miri Light is required to keep the compatibility index of overall blend > 1.4 i.e. compatible.

Integration of Crude Processing Experience Dashboard

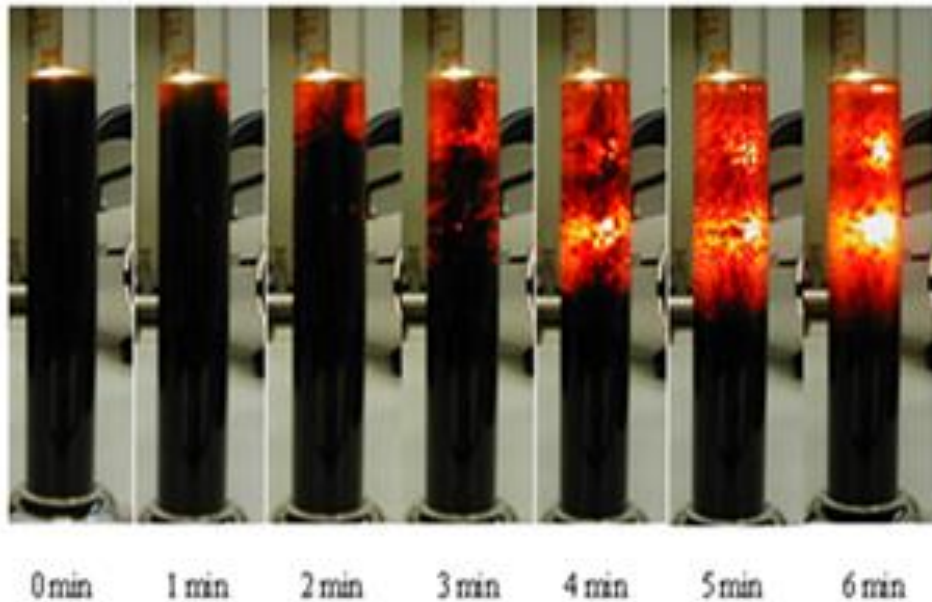
CRUDE DASHBOARD ILLUSTRATION

- Captures the important properties of the crude,
- how many refiners treated by Dorf Ketal have processed the crude, at what %,
- specific issues with respect to specific units etc.
- Dorf Ketal will also suggest the necessary steps to be taken in order to process the crude without any significant issues.



Conventional Asphaltene Dispersancy Test

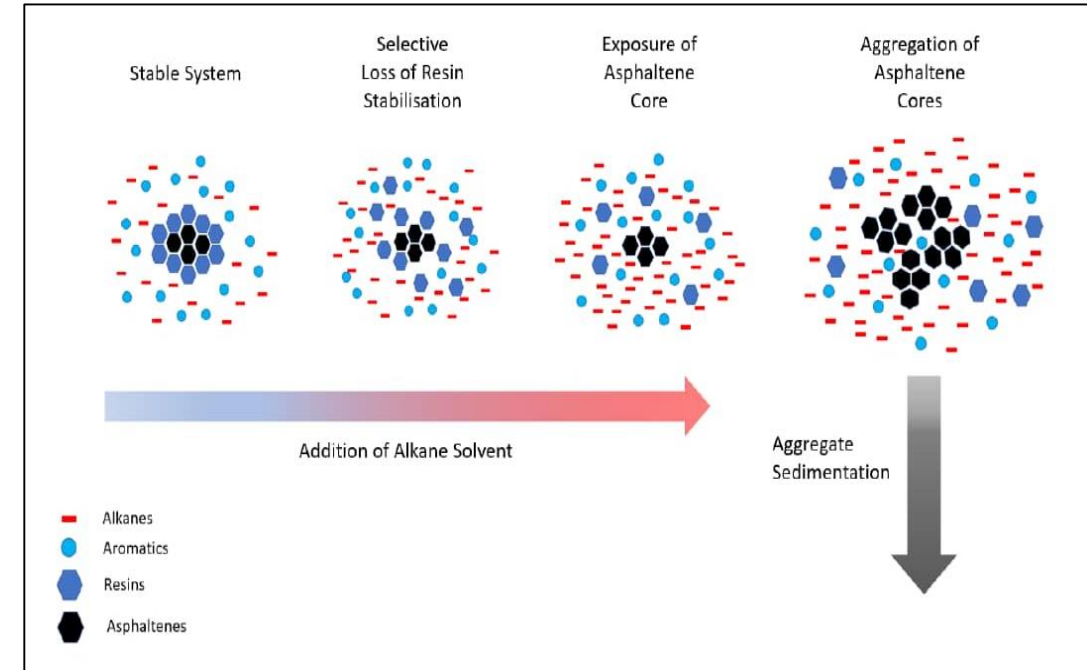
- De-stabilize Asphaltenes present in the crude oil by using a paraffin solvent to reject these compounds.
- The procedure also assists in screening various additives that would help in stabilizing the Asphaltenes in such a solution.
- Transparent tubes → Higher transmittance → Minimal Asphaltene in dispersed phase



**Without
Stabilizer Additive**



**With
Stabilizer Additive**



Asphaltene Stability Profiler (ASP)

- ❑ ASP is a compact NIR photometer. It is easily portable and easy to implement at site
- ❑ It helps the monitoring of fouling control programs by determining the Relative Stability of the Crude oils.
- ❑ The destabilization, flocculation and sedimentation of Asphaltenes can be reproducibly tracked by measuring change in the obscuration of transmitted light.
- ❑ Works on method equivalent to ASTM D7061-18.



ASP helps in generating instantaneous results to check crude compatibility



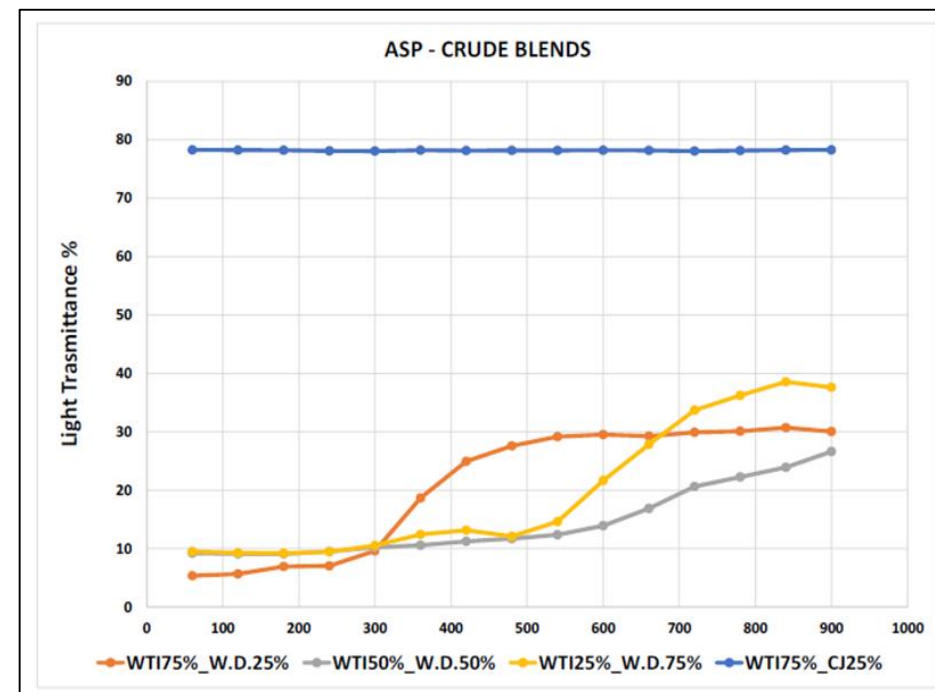
Based on the principle of change in light intensity over a period of time to measure the forced asphaltene destabilization



It generates a Stability Index

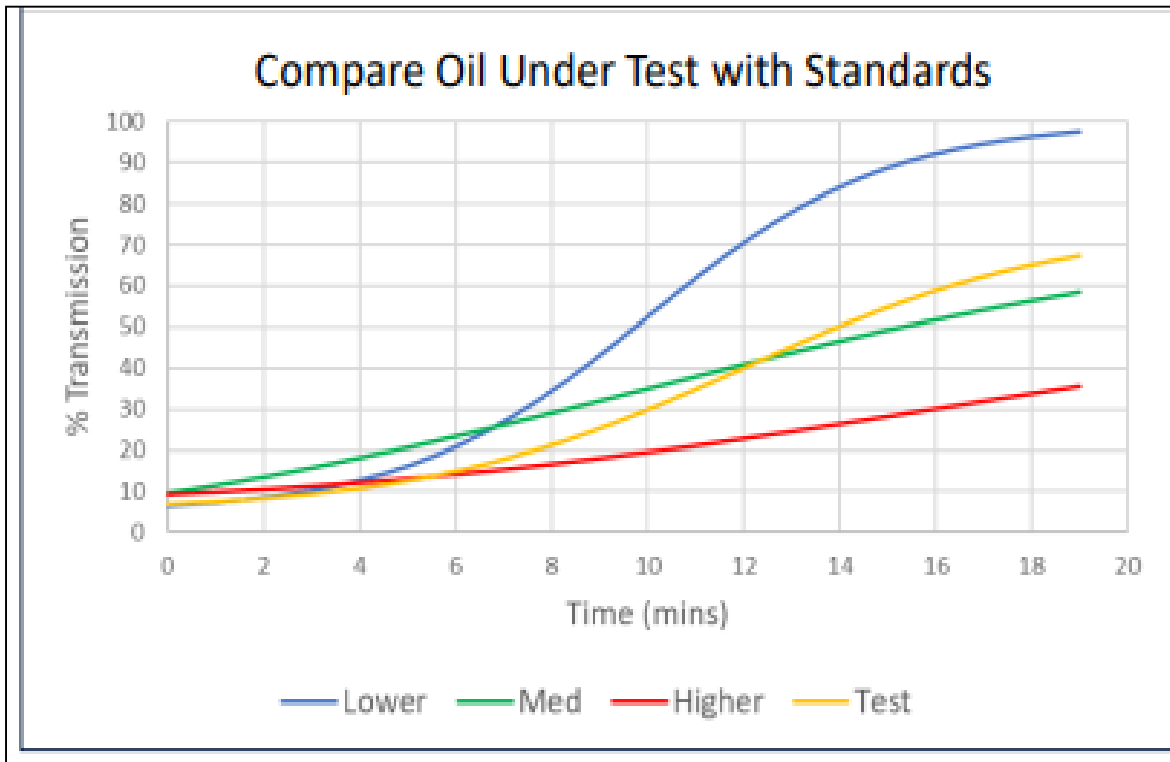
Use Case of ASP as value addition to overall monitoring:

- Validation of ACRIS compatibility outputs
- Measure relative crude stability with unknown qualities such as residue, slops
- Build customized database for crude relative stability
- Evaluate performance and dosage optimization for asphaltene stabilizer program



Relative Fouling Potential Evaluation

- Relative stability is used to compare the % transmittance of any new test crude in comparison with the % transmittance values of known crudes in the database which are having low, medium & high fouling propensity and also act as reference/ base line for testing any new crude blends fouling potential.

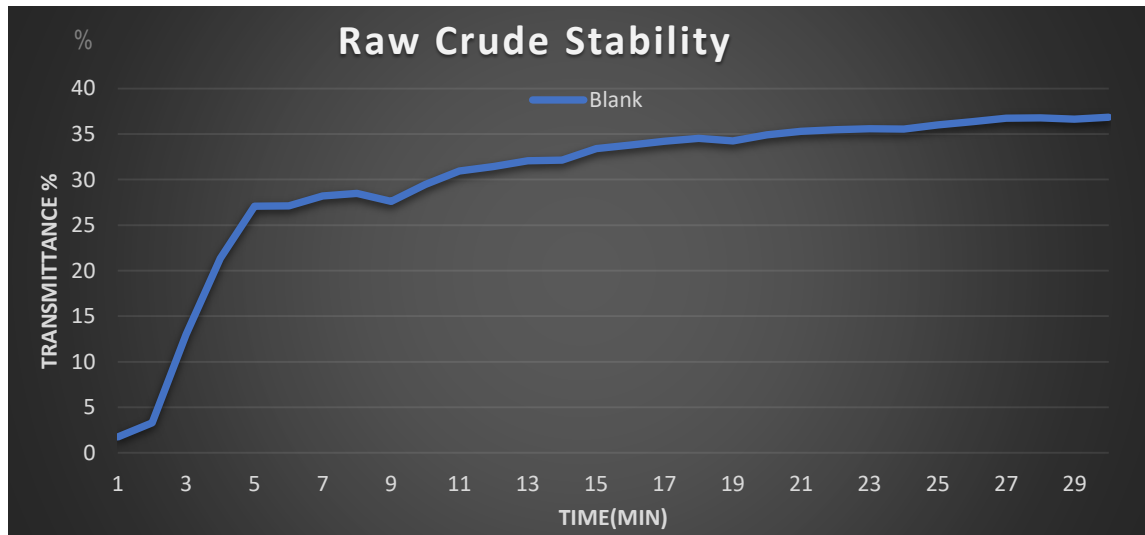


- Blue curve-the least stable blend
- Green curve- medium stable blend
- Red curve: the most stable blend
- Yellow curve: Relative stability of new test crude blend w.r.t to known red/green/blue curves

The curve data can be converted to fouling potential index based on various statistical methods to allow for database creation and benchmarking purposes.

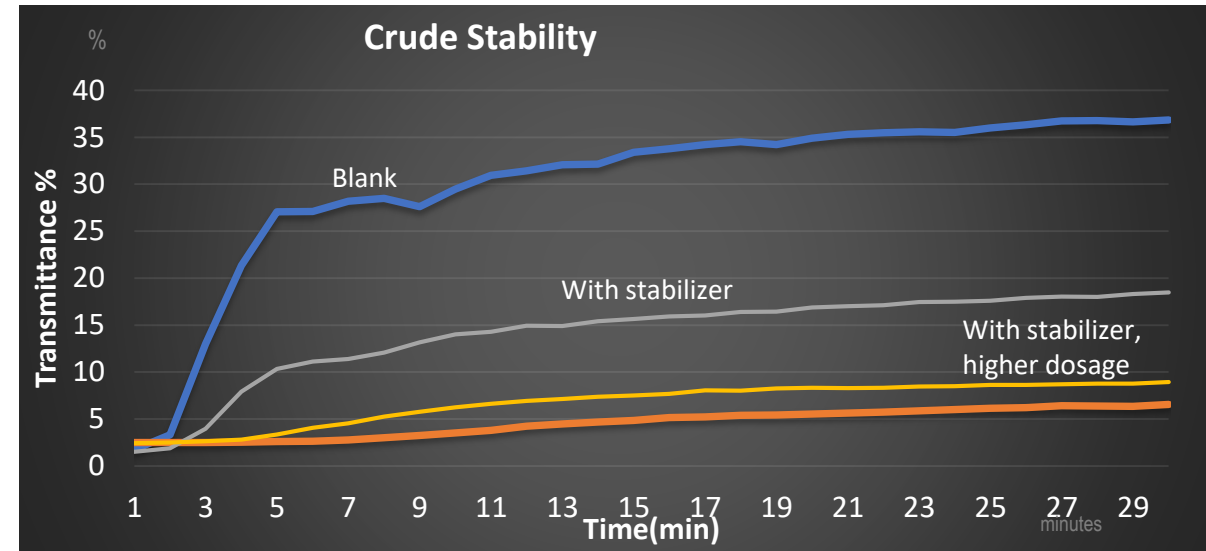
ASP - Case study

- This refinery was facing issues of incremental fouling in the preheat train and more desalter upset scenarios
- The crudes in the feed blend were tested in the ASP™ model



- The ASP results revealed issues with the crude blend stability which was causing the upset scenarios in the refinery

- The study was further extended to understand the improvement in crude blend stability with the stabilizer chemistry



- With addition of stabilizer chemistry, the light transmittance of the sample reduced because to reduced the asphaltene precipitation
- The chemical treatment was started in feed tanks with this chemical to improve its stability and reduce the upset scenario.

Synergy of ACRIS™ and ASP

ACRIS

Blend 1 Miri Light 12%, Seria Light 12%, Mero 35%, Tupi 35% **incompatible**

Crude Blend Compatibility Dashboard

Sr	Crude Name	%
1	Miri light	12
2	Seria Light	12
3	Mero	38
4	Tupi	38

Compatibility Result



≤ 1.2 : Incompatible
1.2 – 1.4 : Near Compatible
> 1.4 : Compatible

Blend Components

Miri light
Seria Light
Mero
Tupi

Incompatible
Compatibility Number: 0.55

Disclaimer: The crude compatibility predictions are based on historical lab data of the individual crude mentioned. Please note that crude properties and quality may vary from parcel to parcel.

Blend 2 Miri Light 41%, Seria Light 49%, Mero 5%, Tupi 5% **compatible**

Crude Blend Compatibility Dashboard

Sr	Crude Name	%
1	Miri light	49
2	Seria Light	41
3	Mero	5
4	Tupi	5

Compatibility Result



≤ 1.2 : Incompatible
1.2 – 1.4 : Near Compatible
> 1.4 : Compatible

Blend Components

Miri light
Seria Light
Mero
Tupi

Compatible
Compatibility Number: 2.03

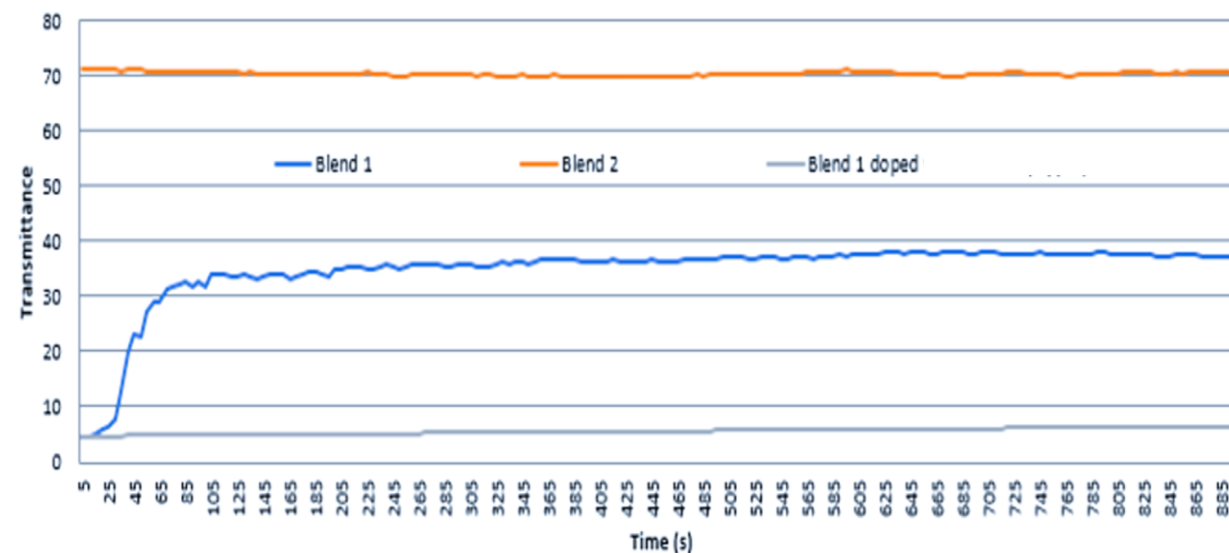
Disclaimer: The crude compatibility predictions are based on historical lab data of the individual crude mentioned. Please note that crude properties and quality may vary from parcel to parcel.

Validation by Asphaltene Stability Profiler – ASP

Blend 1 Miri Light 12%, Seria Light 12%, Mero 35%, Tupi 35%

Blend 2 Miri Light 41%, Seria Light 49%, Mero 5%, Tupi 5%

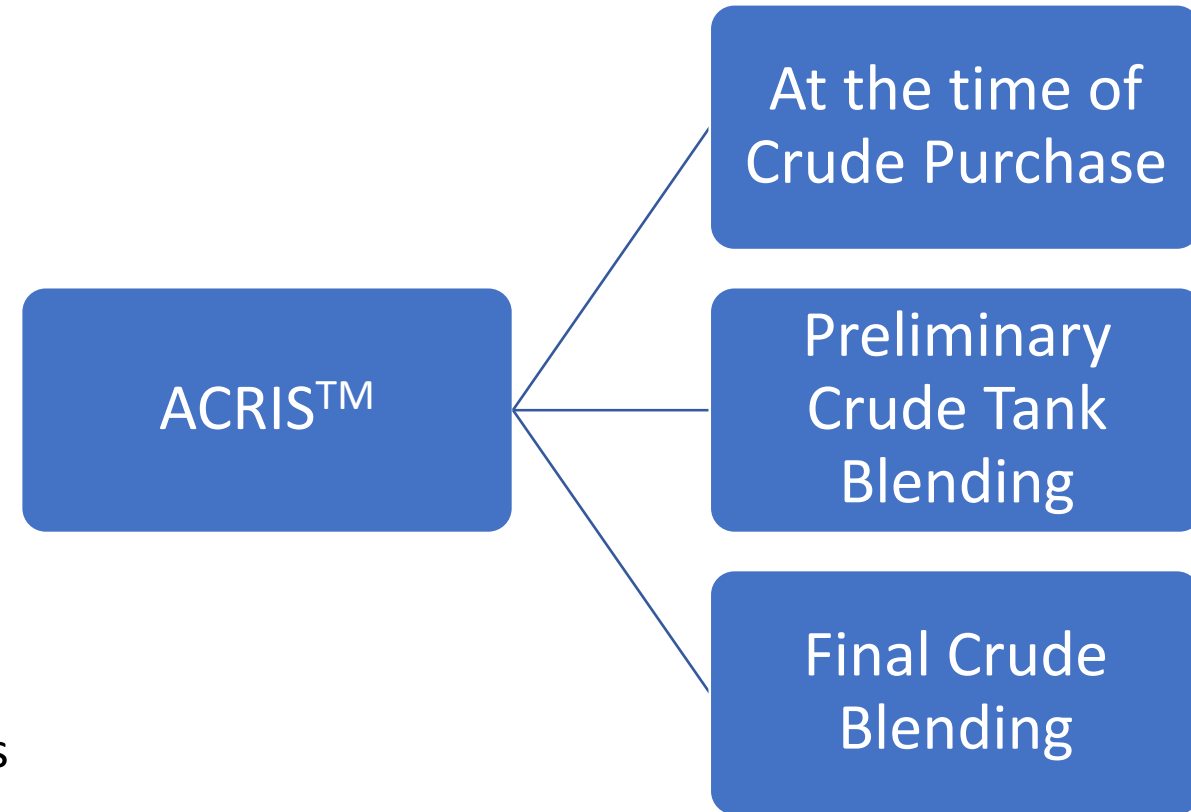
ASP: Transmittance Vs. Time



As observed in above ASP graphical output, blend 2 (Miri Light 41%) has stable light transmittance profile indicate good stability (compatible) while blend 1 (Miri light 12%) exhibit fast sedimentation as indicated by increased in light transmittance. Doping of asphaltene stabilizer can suppress the sedimentation.

Use of ACRIS™ + ASP as one stop package

- ACRIS™ can be used at different stages of Crude Purchase to Blend Process.
- When ACRIS™ output indicates Nearly Incompatible to incompatible:
 - Consider adjustment of blend ratio using optimizer
 - Asphaltene Stabilizer can be used
- Use of ASP as additional monitoring
 - Evaluate potential compatibility issues when blending feed with unknown qualities: slop, residues
 - Evaluate use of Asphaltene Stabilizer and help to determine an optimized dosage.

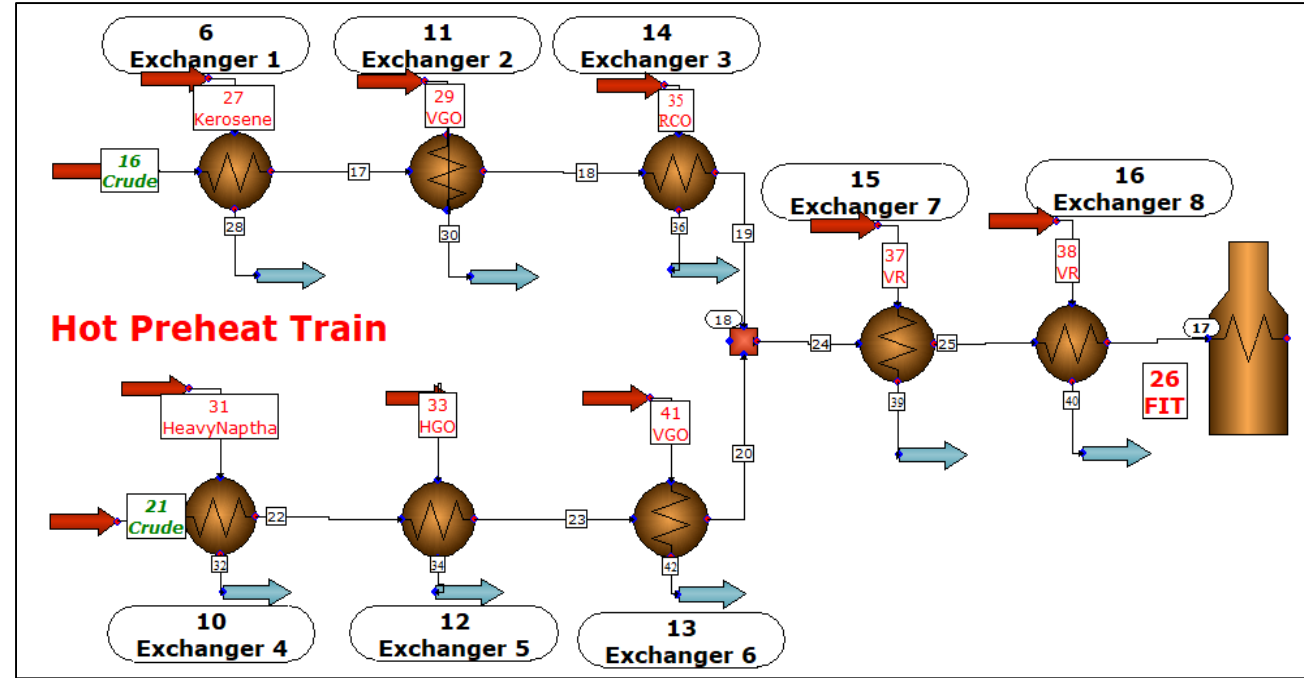


Crude Processing Monitoring tools for Fouling and Overhead Corrosion



Pre-heat train fouling simulation tool

- Fouling factor trends
- Duty trends
- HTC trends
- Comparison of performance with clean conditions
- FIT drop and comparison with clean conditions of exchangers

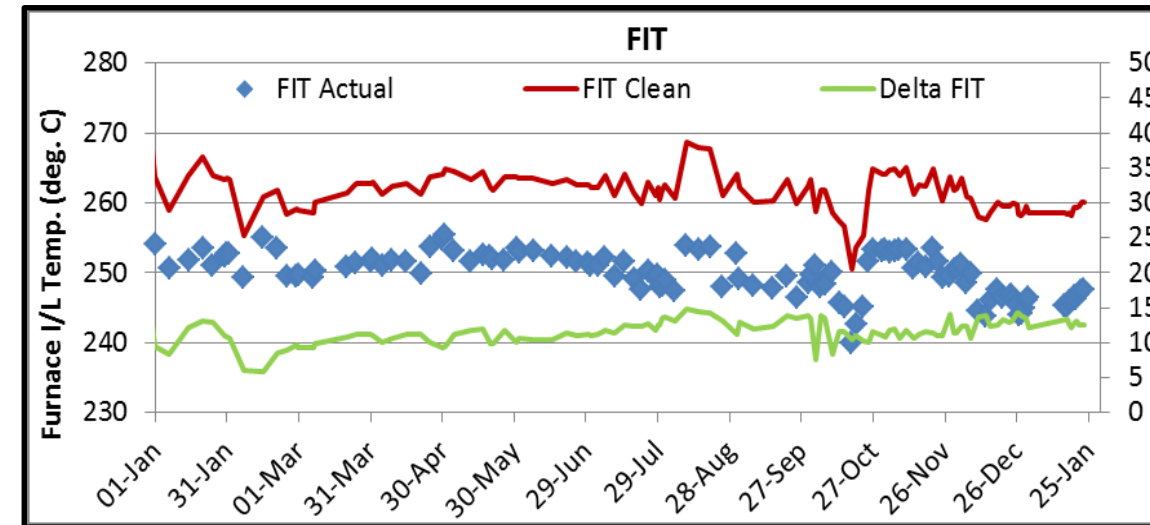


Simulation model to predict **Clean FIT** & **Actual FIT**

Actual FIT is based on real-time conditions from plant

Clean FIT is based on design fouling factor (SOR) considering clean conditions

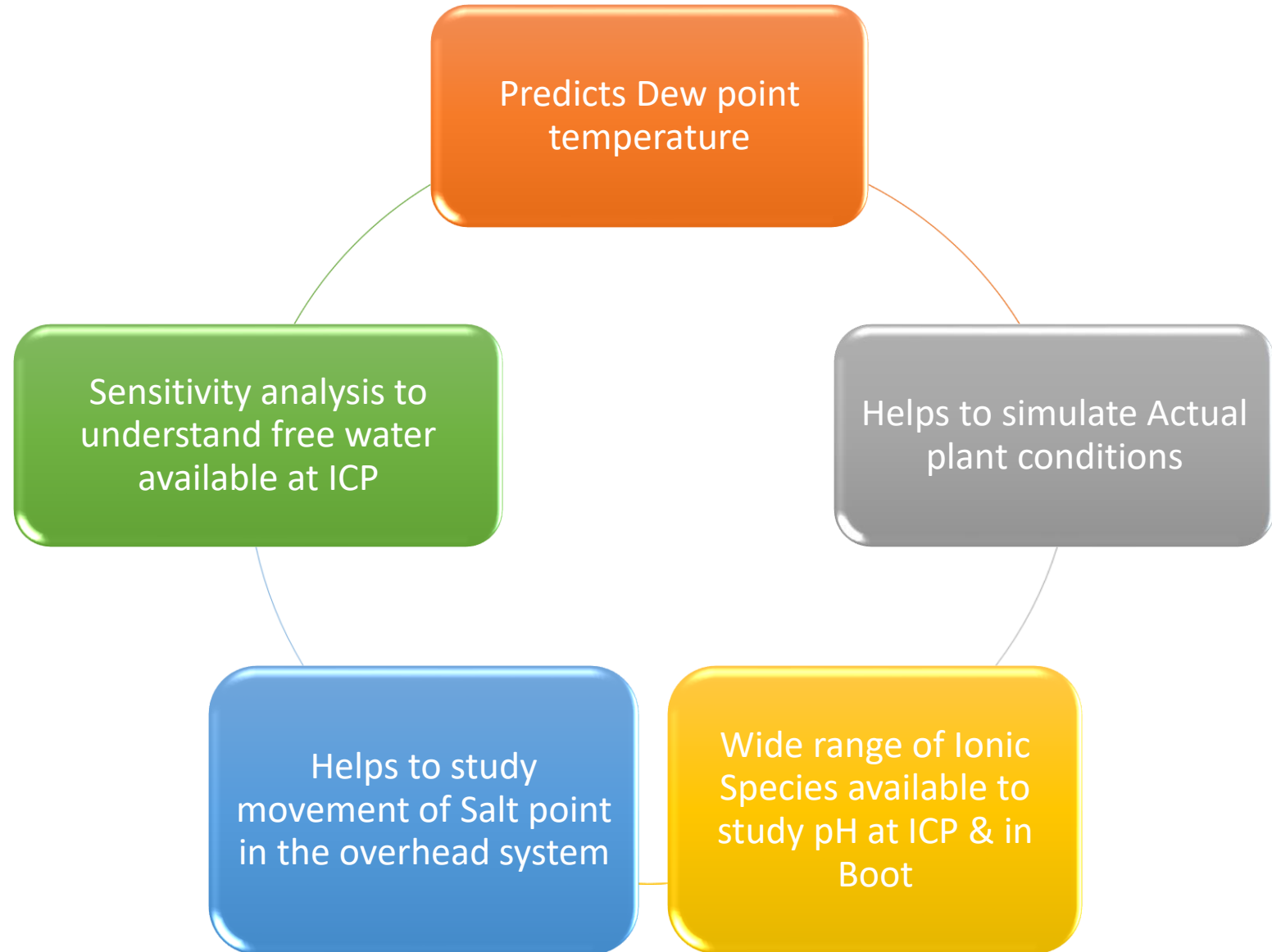
Delta FIT (Clean FIT – Actual FIT) is representation of actual fouling in unit.



Ionic Model – Column Overhead Simulation

Input for Ionic Model

- Overhead Distillation profile & Density
- Water in overhead system
- Defining Ionic Species
- Selection of Suitable Thermodynamic Package



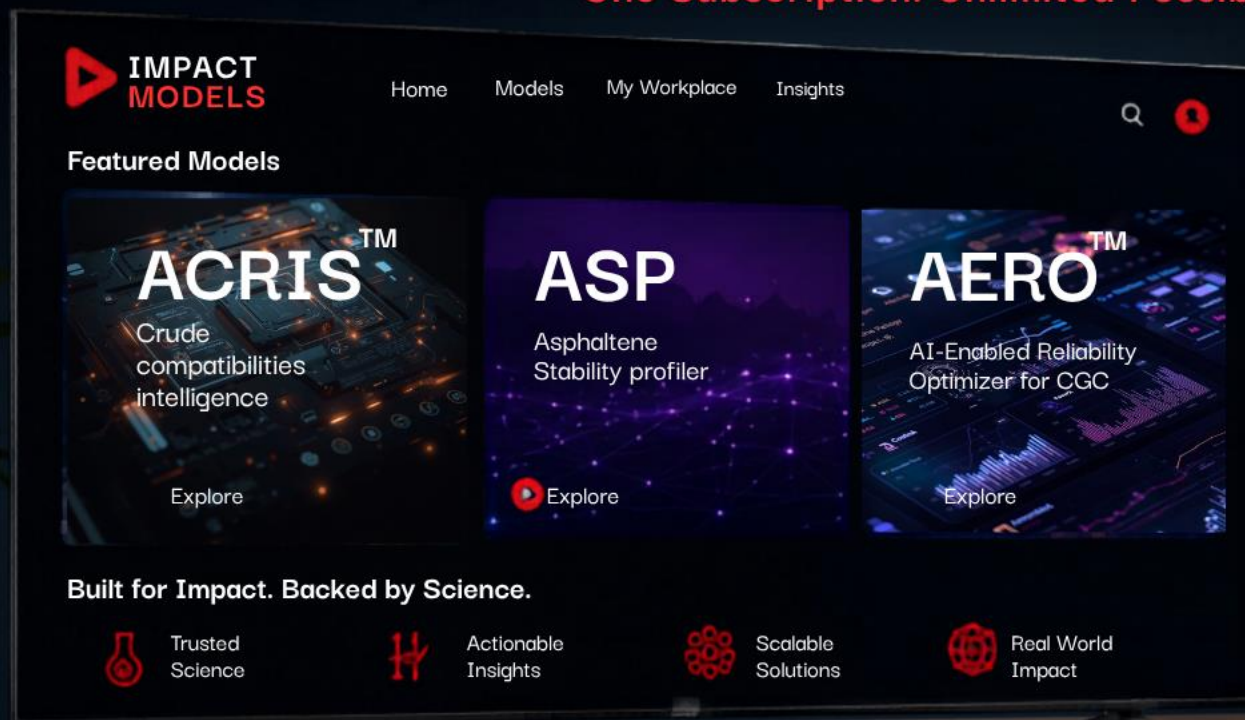
Proactive Crude Assessment + Real Time Monitoring

Proactive Crude Assessment	Real Time Monitoring Tools
Advanced Crude Risk Intelligence System (ACRIS™) ✓ Crude Purchase decision tool ✓ Understand the compatibility of the crude diet regarding asphaltenes precipitation before actual blending ✓ Understand the % of new crudes which can processed with crude diet without compromising crude unit reliability	Preheat Fouling Simulator ✓ Evaluate the performance and reliability of individual heat exchanger and overall network including furnace ✓ What-if analysis and cleaning sequence strategizing ✓ Evaluate benefits of antifoulant program
Asphaltene Stability Profile – ASP ✓ Understand the fouling potential of the crude diet with unknown qualities (e.g. slops) ✓ Evaluate the need of asphaltene stabilizer and determine optimal dosage to minimize asphaltene flocs	Overhead Ionic Model ✓ Evaluates the free water available at the overhead as well as understanding the dew point and salt point movement of system ✓ Understand the neutralizer dosages to achieve healthy sour water bulk pH

POWERFUL MODELS. REAL IMPACT.

Access ACRIS, ASP, AERO and more – Anytime, Anywhere.

One Subscription. Unlimited Possibilities.



NETFLIX-STYLE EXPERIENCE. SCIENCE-DRIVEN IMPACT.



ON-DEMAND ACCESS

Use powerful models whenever you need them.



ANYTIME, ANYWHERE

Access on web, tablet, or mobile. Work from anywhere.



FLEXIBLE & SCALABLE

Choose the plan that fits your needs. Upgrade or downgrade anytime.



DRIVE REAL IMPACT

Make better decisions. Mitigate risks. Create a sustainable future.

SIMPLE. TRANSPARENT. SUBSCRIPTION PLANS.

BASIC

Get started with essential models and core features.

\$99 /month

Start Your Impact

GROWTH

More models. More insights. Greater impact.

\$299 /month

Start Your Impact

MOST POPULAR

PRO

Full access to advanced models and premium features.

\$599 /month

Start Your Impact

ENTERPRISE

Tailored solutions. Dedicated support. Maximum impact.

Custom

Contact Us

Secure. Reliable. Always Evolving.

Cancel or change anytime.

Join thousands of organizations driving impact with our models.



DORF KETAL CHEMICALS

Innovation isn't just what we do,
It's who we are.

Thank You!



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