

PALAYESH PARAFFIN KHAVARAN

NATURAL SULFUNATED ASPHALT, AsphAsol disperses easily, stabilizes shales, has no HSE impact

AsphAsol: Performs in WBM like sulfonated asphalt. Costs 25-50% less.

AsphAsol is a cost-effective, high-performance additive effective in a wide range of water-based systems for both low and high temperature wells. AsphAsol is renowned as an excellent shale stabilizer.

AsphAsol disperses quickly and easily in water-based muds

AsphAsol is a free-flowing powder that mixes easily through the hopper and disperses with only mild agitation. It is tolerant of contaminants and eliminates the need for additional surfactants or coupling agents.



Properties and features of AsphAsol

- > Free-flowing powder resists clumping
- > Compatible with most water-based systems
- > Disperses with mild agitation
- > A naturally occurring, mined material
- > Effective in both low and high temperature wells

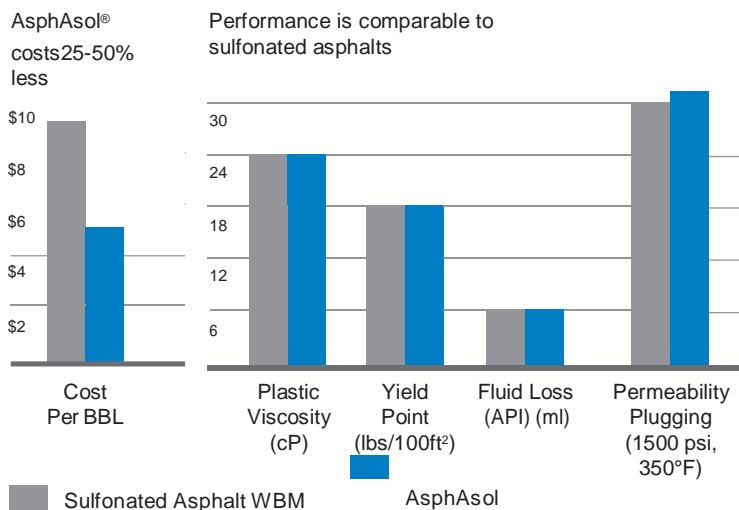
Ease of use, with a wide range of performance benefits

- > Mixes easily through the hopper
- > Controls fluid loss and seepage
- > Stabilizes shales
- > Prevents lost circulation
- > Strengthens the wellbore
- > Minimizes differential sticking
- > Maintains lubricity in tight formations
- > Is safe and environmentally friendly

Get the performance of sulfonated asphalt and pay 25-50% less

AsphAsol performs comparably to sulfonated asphalt at a much lower cost. Plus, AsphAsol requires no additional surfactants or coupling agents, so it further lowers costs by allowing you to use fewer additives.

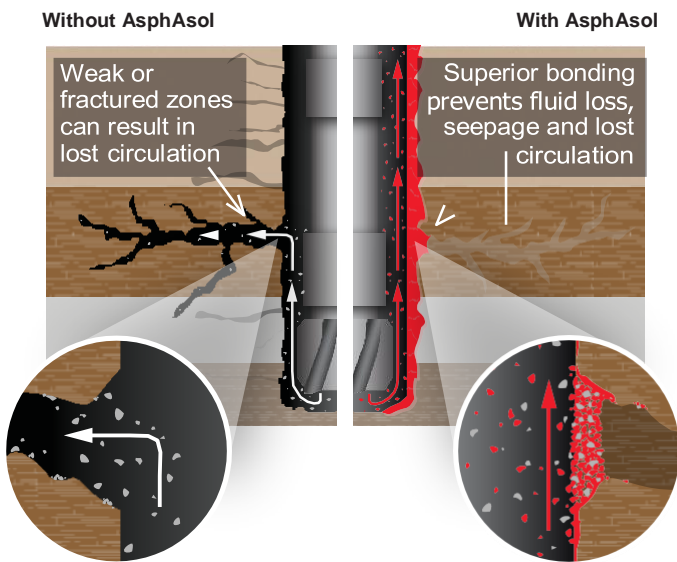
Water-Based Mud Applications:



AsphAsol has overwhelming performance advantages over alternatives

	Cost-effective	High Temperature	Controls Fluid Loss	Minimizes Differential Sticking	Stabilizes Wellbore	Non-Clumping	Strengthens Wellbore	Smear Effect	Coats & Bonds	Minimal Odor
AsphAsol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lignite	✓	✓	✓	X	X	✓	X	X	X	✓
Oxidized / Sulfonated Asphalts	X	X	✓	X	✓	X	✓	✓	X	X
Bitumen	✓	X	✓	X	X	X	X	✓	X	X
Petroleum Coke	✓	✓	✓	X	X	✓	X	X	X	X
Coal	✓	X	✓	X	X	✓	X	X	X	X
Grahamite	X	✓	✓	✓	X	✓	✓	✓	X	✓
Glance Pitch	✓	X	✓	✓	✓	✓	X	✓	X	X

Unique bonding and plugging properties prevent formation damage

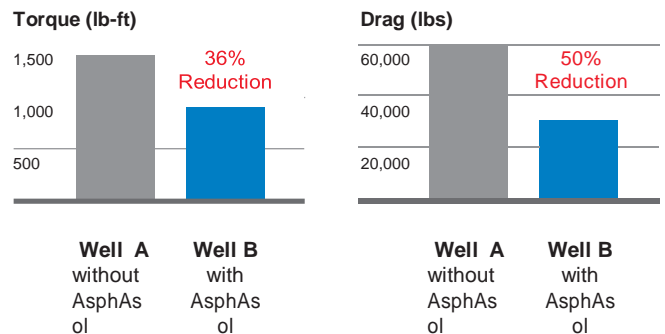


Proven to reduce torque and drag

In the South Pass Area of offshore Louisiana, the operator wanted to reduce torque and drag. Wells in this area are normally deviated approximately 30° from vertical and are drilled with a conventional lignosulfonate mud.

- > **Well A:** Conventional and bead-type lubricants were used for torque and drag reduction.
- > **Well B:** 3-4 ppb of AsphAsol were added at approximately 10,600 feet.

Upon measurement, the torque on well B was reduced 36% and drag was reduced 50%. Caliper log comparisons from the two wells indicated substantial improvement.



Effective at controlling hole enlargement

Hole enlargement is a problem for wells drilled in the South Pars Area. On average, hole enlargement was approximately 50% in the 12.25 inch holes. Once 4 ppb of AsphAsol were added to the conventional water-based formulation, holeenlargement was reduced to 15% in the same section.



Faculty of Research & Development in Upstream Industry
Petroleum Engineering Research Division
Drilling & Well Completion Technologies & Research Group



Client : Parafin Khavaran Co	Sample Type: Natural Sulfunated Asphalt
Order ID : 1908098	Date of Test: 1395/7/10

Mud Composition	60/40 Ca ⁺⁺	80/20 Ca ⁺⁺		
Gasoil ml	187.5	181.5		
Primary Emulsifier ml	10.5	10.5		
Lime gr	12	8		
Sample - FLC gr	13	10		
SAT CaCl ₂ Brine ml	140	57		
Secondary Emulsifier ml	3.5	3.5		
Viscosifier gr	0.5	0.5		
Limestone gr	-	238		
properties / Test Condition	Rolled In Roll Oven at 200-250 ^{oF} for 4 Hrs, Rheology measurement at 140 ^{oF} and HPHT F.L at 180-250 ^{oF} with 500 ^{psi}			
	sample	index	sample	index
θ600	45	40	60	50
θ300	27	25	34	30
Pv	18	15	26	20
Yp	9	10	8	10
Gel	3/4	6/7	3/4	4/5
E.S @ 120 ^{oF}	362	>400	476	>450
HP/HT (500 ^{psi} /180-220 ^{oF})	3.0	<3	6.0	<3
Mud Weight	64	64	90	90
Settling	Nil	Nil	Nil	Nil

Note: Since, the sampling is not performed by RIPI; the results are limited to submitted samples.

S.A.R.Mortazavi
Manager of Drilling & Well Completion
Technologies & Research Group





Client : Parafin Khavaran Co

Sample Type Natural Sulfonated Asphalt

Order ID : 1908098

Date of Test: 1395/7/27

Evaluation of Sulfonated Asphalt

Property	Unit	Required	Result
Appearance	-	Blackish brown powder	Black with white grains
Moisture content	%wt	Max 10	13.4
PH 1%	-	Min 8.5	11.28
Solubility in water	%	Min 75	15.78
Solubility in gas oil	%	Min 25	0*
HPHT-fluid loss @ 300°f & 500 psi	Base	-	13
	Sample	25-30	8

Note: *According to the test results (above table), tested sample in dissolving gas oil experiment goes to make a hard bulk which is indicated absorbing gas oil in it.

Note: Since, the sampling is not performed by RIPI; the results are limited to submitted samples.

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QUICK REFERENCE GUIDE FOR APPLYING ASPHASOL ADDITIVE

Application	Material Needed
	Asphasol Additive
Stabilize shale formations	3 to 6 ppb (9 to 17 kg/m ³)
Impart lubricity	1 to 3 ppb (3 to 9 kg/m ³)
Reduce torque & drag	1 to 3 ppb (3 to 9 kg/m ³)
Control HTHP fluid loss	2 to 6 ppb (6 to 17 kg/m ³)
Thin, strong, compressible wall cakes	2 to 4 ppb (6 to 11 kg/m ³)
Emulsify oil into water-based mud systems	0.5 to 3 ppb (2 to 9 kg/m ³)
General hole conditioning (differential sticking, etc.)	2 to 6 ppb (6 to 17 kg/m ³)

MIXING GUIDELINES

If excessive product losses are being experienced over the shakers, it is recommended to employ coarser screen sizes during initial stages of product addition, and then switching over to finer sizes. It is not uncommon to experience a 10 to 20% loss over shakers during initial stages of additions, and in some areas may be considered normal and within acceptable limits.

Asphasol solubility is much dependent upon temperature, and circulation time. Asphasol will more rapidly mix into the mud system as the fluid temperature increases. If the mud is very cool, it may be best to hold off additions until it has a chance to warm up. An amount of Dilution may also be required during initial additions. Continual additions of Asphasol will be needed to maintain a sufficient concentration in the system if losses occur while drilling. Asphasol is consumed while depositing on drilled solids and on the well bore. It is advisable to add 50% more, one day following the initial treatment, to ensure adequate concentration. Use a conventional hopper when chlorides do not exceed 60,000 ppm. When adding to high salinity systems, pre-wetting the Asphasol with fresh water by adding through a chemical barrel or pre-mix tank will improve results.

PRE-MIXING

Asphalt materials (including Asphasol Additive), may have some preliminary losses over the shaker. Precautionary actions to eliminate or reduce this possibility may be necessary. Pre-mixing is recommended even if the product is not running over the shakers, as the thorough solubility before mixing with whole mud, leads to better hole stability. If Asphasol Additive cannot be added directly to the system through the hopper, it can be added to the system using a chemical barrel or pre-mix arrangement. Add 40-50 ppb of Asphasol Additive to the base mud and then bleed it into the active system. Agitation, stirring or circulation may possibly be required in the pre-mix tank or chemical barrel to prevent excessive settling. Pre-mixing in freshwater is recommended as the best method, even when adding to an oil base mud system. Make up salt such as calcium chloride can be added to the pre-mix, but this is usually not necessary as the amount of fresh water added to the system via concentrated pre-mix solutions will be negligible.

PRE-MIXING IN FRESHWATER

Mixing in freshwater might be the simplest and cheapest solution. Mix 40-50 ppb of Asphasol Additive in a slug pit of freshwater. There could be

PRE-MIXING IN HIGH SALT MUDS RIG SITE MIXING

Asphasol Additive can usually be mixed into high salt (60,000 ppm chlorides and up), high density drilling muds without problems if some extra steps are followed. If enough time is available, both products may be added gradually over several days to an existing system allowing both time and temperature and shearing at the bit to disperse the product. This slow addition of the product reduces losses at the shale shaker which would be expected under these conditions. However, if hole conditions require large amounts of Asphasol Additive be added quickly, it is best to prewet the Asphasol Additive with freshwater in a separate mixing tank. In fresh water large amounts of either product up to 200 ppb may be mixed to create a slurry that may be added direct to the mud system without much loss at the shale shaker.