

ASPHASOL

ASPHASOL shale inhibitor is a partially water soluble, water dispersible blend, containing sulfonated organic resins for water-base muds. It is used to aid in stabilizing shale sections, controlling solids dispersion and improving wall cake characteristics. Being partially soluble, ASPHASOL has the capability of plugging micro-fractured shales and sealing shales so that the hydrostatic overbalance from the fluid column is not transmitted to the pore pressure network of shale formations adjacent to the wellbore.

TYPICAL PHYSICAL PROPERTIES

Physical appearance Black-to-brown powder
Specific gravity 1.2 – 1.5
pH (2% solution) 9.1 – 9.5

APPLICATIONS

ASPHASOL can be used in most water-base muds. It is a free-flowing powder and can be added directly to the mud system through the mixing hopper. Unlike other shale control additives, it is not necessary to

premix ASPHASOL with oil and it contains no surfactants.
Normal concentrations of ASPHASOL range from 4 to 10 lb/bbl (11.4 to 28.5 kg/m³) for most applications.

ADVANTAGES

- ASPHASOL increases wellbore stability by:
- Plugging micro-fractures and sealing shales.
 - Inhibiting swelling and water wetting of shales.
 - Reducing High-Temperature, High-Pressure (HTHP) fluid loss.
 - Reducing torque and drag.
 - Improving filter cake quality.



PERFORMANCE

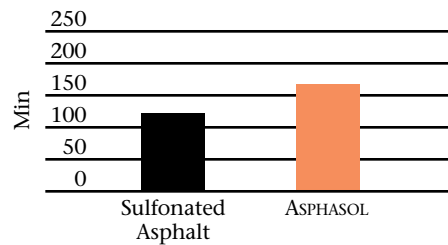
Triaxial testing was done by an independent laboratory to investigate the inhibitive effects of muds containing ASPHASOL. Figures 1 and 2 provide comparative results of triaxial testing done on a Golodrina shale with a simple bentonite/ Polyanionic Cellulose (PAC) system. With ASPHASOL the time-to-failure and the erosion rate were better than with standard sulfonated asphalt. Figures 3 and 4 demonstrate the same trend on Pierre shale with both a lignosulfonate and a Partially Hydrolyzed Polyacrylamide (PHPA)

-base mud. In these tests the cores were exposed to the circulating fluid for only 100 minutes so that the erosion rate could be measured prior to core failure.

Figure 5 demonstrates ASPHASOL's ability to reduce the HTHP fluid loss. ASPHASOL is roughly equivalent to standard sulfonated asphalt for reducing HTHP fluid loss.

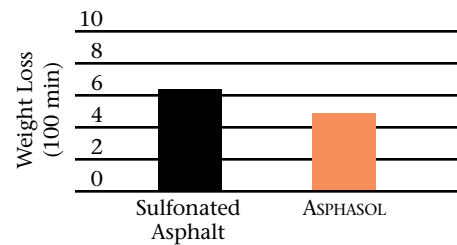
Figure 6 demonstrates ASPHASOL's ability to improve lubricity by reducing the coefficient of friction in a simple bentonite slurry.

Figure 1
Core Time to Failure Triaxial Test



Base Mud:
10 lb/bbl bentonite
0.75 lb/bbl PAC
5 lb/bbl sulfonated asphalt
or ASPHASOL
76.4 lb/bbl barite
pH adjusted to 9.3 with KOH

Figure 2
Erosion Rate Triaxial Test



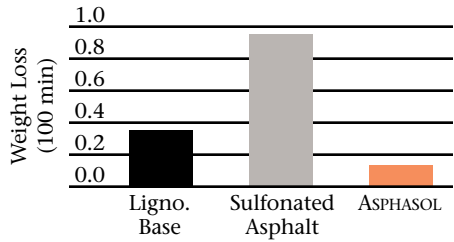
Mud Properties:

	Sulfonated	
	Asphalt	ASPASOL
Weight (lb/gal)	9.8	9.8
PV	19	16
YP	14	14
API F.L.	4.7	5.3

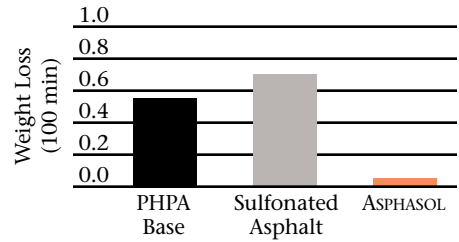


**PERFORMANCE
(CONTINUED)**

**Figure 3
Erosion Rate Triaxial Test**



**Figure 4
Erosion Rate Triaxial Test**



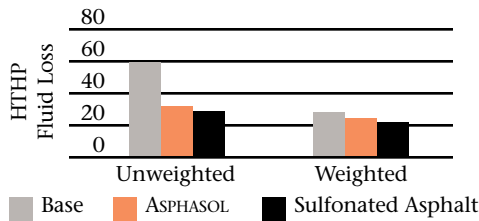
Lignosulfonate-Base
Mud Properties:

	<u>Sulfonated Asphalt</u>	<u>ASPASOL</u>
PV	19	14
YP	8	9
API F.L.	8.0	8.6
Additive (lb/bbl)	5	5

PHPA-Base
Mud Properties:

	<u>Sulfonated Asphalt</u>	<u>ASPASOL</u>
PV	7	7
YP	7	5
API F.L.	9.4	9.1
Additive (lb/bbl)	5	5

**Figure 5
HTHP Fluid Loss in Freshwater
Dispersed Systems**

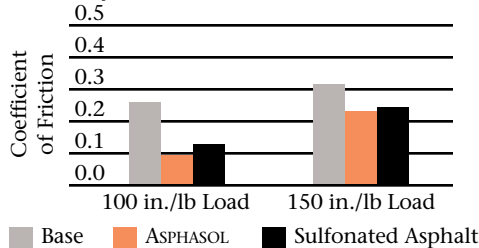


HTHP Fluid-Loss Test Muds:

Weighted: 27.5 lb/bbl
 API bentonite
 5.0 lb/bbl SPERSENE CF®
 30.0 lb/bbl rev dust
 114 lb/bbl barite
 6.0 lb/bbl sulfonated asphalt or ASPHASOL

Unweighted: 10.0 lb/bbl
 API bentonite
 1.5 lb/bbl QUEBRACHO
 75 lb/bbl kaolin
 0.5 lb/bbl soda ash
 6.0 lb/bbl sulfonated asphalt or ASPHASOL

**Figure 6
Lubricity**



Lubricity-Test Base Mud:

Freshwater: 10 lb/bbl
 API bentonite
 6.0 lb/bbl sulfonated asphalt or ASPHASOL



TOXICITY AND HANDLING

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described on the Transportation and Material Safety Data Sheet (MSDS).

ASPHASOL is not TSCA registered and cannot be used in the U.S.A. ASPHASOL D is TSCA registered and is a similar blended product.

PACKAGING AND STORAGE

ASPHASOL is packaged in 50-lb (22.7-kg), multi-wall, paper sacks.

Store in a dry location away from sources of heat or ignition, and minimize dust.

This material is supplied solely for informational purposes and M-I Drilling Fluids L.L.C. makes no guarantees or warranties, either expressed or implied, with respect to the accuracy or use of this data. All product warranties and guarantees shall be governed by the Standard Terms of Sale.



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