ELEMENTIS
A global specialty chemicals company

Enhanced Performance Through Applied Innovation

THIXATROL® RM14

Low Shear Rate Rheology Modifier for OBM

GENERAL INFORMATION

Designed for horizontal and vertical drilling, **THIXATROL RM14** is a unique proprietary organic product that builds low end rheology while having minimal impact on high shear rate rheology. It is very efficient at building structure in invert emulsion drilling fluids with a synthetic, mineral oil or diesel oil based continuous phase.

THIXATROL RM14 imparts anti-sag properties to an OBM. For enhanced hole cleaning and faster rates of penetration, drilling fluids using **THIXATROL RM14** have lower HSRR:LSRR ratios (ie: lower Plastic Viscosity for a given Yield Point). This highly desirable (flat with respect to shear rate) rheological property is stable through 350ºF.

THIXATROL RM14 is available in liquid form for ease of handling. Alone it can gel base oil. Formulation in combination with organophilic clay is recommended. The efficiency of **THIXATROL RM14** improves the cost performance of building rheology over conventional rheology builders used in invert emulsion drilling fluids.

THIXATROL RM14 exhibits an excellent balance of dispersibility, for initial viscosity build, efficiency for cost effectiveness and tolerance to adverse conditions for reduced depletion rates. Sag control properties are significantly improved as compared to drilling fluids incorporating only conventional rheological additives.

PERFORMANCE CHARACTERISTICS

- Increased LSRR (6 RPM) with minimal impact on HSRR (600 RPM)
- Improved anti-sag properties for better hole cleaning
- Stable to bottom hole temperatures through 350ºF
- “Flatter” rheological profile with respect to both shear and temperature.
- Reduced PV for a given YP
- Improved ECD control at reduced temperatures
- Fragile gels
- Shear thinning rheological profile for improved ROP
- Compatible with conventional invert emulsion drilling fluid additives and contaminants
- Builds viscosity in clay free systems or in combination with organoclays
- More than four times the efficiency at building rheology as compared to conventional OBM viscosifiers
- Easily dispersible for initial viscosity build

APPLICATIONS

The required concentration of **THIXATROL RM14** is dependent on:

- Oil/water ratio
- Base oil type
- Density of the system
- Type and concentration of surfactants / emulsifiers / wetting agents
- Type and concentration of organophilic clay

A fluid with a higher oil/water ratio (i.e. 90:10) will require more **THIXATROL RM14** than a fluid with a lower oil/water ratio (i.e. 70:30). A higher density fluid will generally require less **THIXATROL RM14** as compared to a lower density fluid.

Generally, concentrations will be in the range of 0.25 to 3.0 pounds per barrel. The ratio of organophilic clay to **THIXATROL RM14** will typically range from 1:1 to 10:1. Viscosity can be built in:

- Oil Based Drilling Fluids
- Completion Fluids
- Packer Fluids
- Invert Emulsion Drilling Fluids
- Workover Fluids
- Clay Free Drill –In Fluids

THIXATROL RM14 can be added at the mud plant when building new mud or can be added directly to the mud pits when building volume during the drilling process. **THIXATROL RM14** should not be used in combination with any other polymeric rheological additives without first pilot testing. **THIXATROL RM14** can be used with or without organophilic clay. The addition of some organophilic clay is recommended to achieve the most efficient and temperature stable rheological system.

Adequate agitation is necessary when incorporating **THIXATROL RM14** into the oil based fluid. The amount of shear necessary will depend on the temperature of the mud, the rate of rheological additive addition, the oil/water ratio, and the amount of solids and/or weight material in the system.

HEALTH AND SAFETY DATA

Before using this product please consult our Safety Data Sheet (SDS) for information on safe handling and storage. The SDS can be found on the company website.

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CHEMICAL & PHYSICAL PROPERTIES

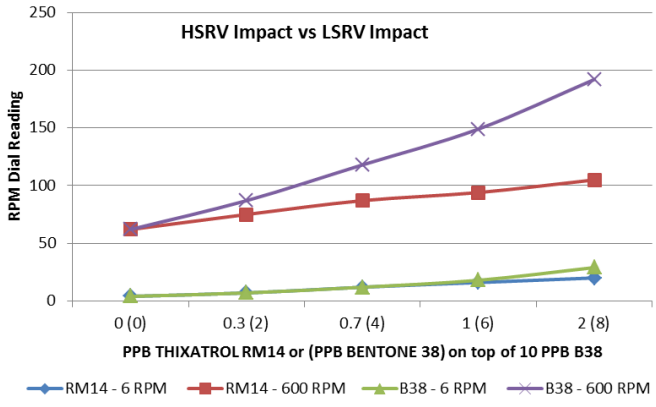
Composition	Oil soluble organic
Color	Yellow to amber
Form	Liquid
Specific gravity	0.96
Flash point	>210ºF
Solubility	Water insoluble
Pour point	20ºF

14 PPG; 85:15 - MO
Increased LSRR for Improved Anti-Sag Properties

THIXATROL® RM14	0 ppb	0.7 ppb
Bentone® 38	14 ppb	10 ppb
OFI 900 Visc. @ 120°F	HR 150°F 120°F Test	HR 150°F 120°F Test
600 RPM Reading	118	87
300 RPM Reading	76	56
200 RPM Reading	60	45
100 RPM Reading	40	31
6 RPM Reading	12	12
3 RPM Reading	11	11
Apparent Visc., cPs	59	44
Plastic Visc., cPs	42	31
Yield Point, Lbs/100 ft^2	34	25
TAU O, Lbs/100 ft^2	10	10
HTHP filtrate, 300ºF; cc corrected	2.0	2.2
Electrical Stability	1998	1797
10 Sec Gel / 10 Min Gel	16 / 21	26 / 35
Jefferson SAG (lbs/gal)	1.61	0.47

14 PPG, 85:15 / Escaid 110 Base Oil / HR 16 hr @ 150ºF

← Cost Effective
← Reduced HSRR
← Same LSRR
← Reduced PV
← HTHP Fluid Loss
← Reduced Sag



Flat Rheology for Improved ECD Control

Mud Weight	12			
Base Oil	IAO			
Oil:Water	85:15			
Hot Roll 16 hr @ 150ºF	**B155/RM14 4/ 0**	**B155/RM14 2 / 1**	**B155/RM14 6 / 0**	**B155/RM14 2 / 2**
600 RPM reading	52	52	68	62
300 RPM reading	32	32	44	38
6 RPM reading	7	6	12	11
3 RPM reading	7	6	11	10
SA 16 hr @ 40ºF				
600 RPM reading	160	130	228	167
300 RPM reading	107	72	161	97
6 RPM reading	31	9	55	9
3 RPM reading	29	8	53	7
ECD, ppg	13.0	12.4	13.6	12.6

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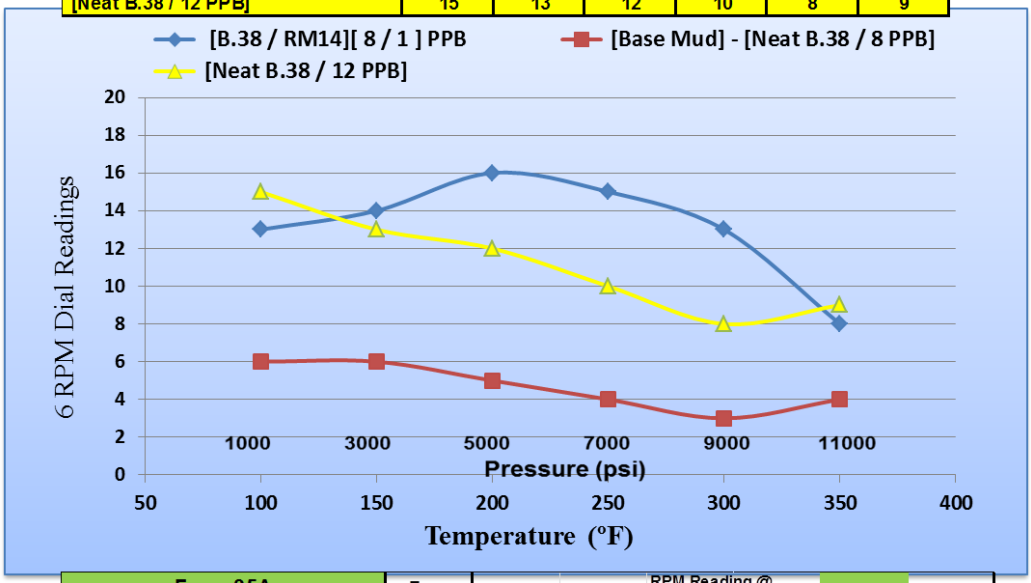
THIXATROL® RM14

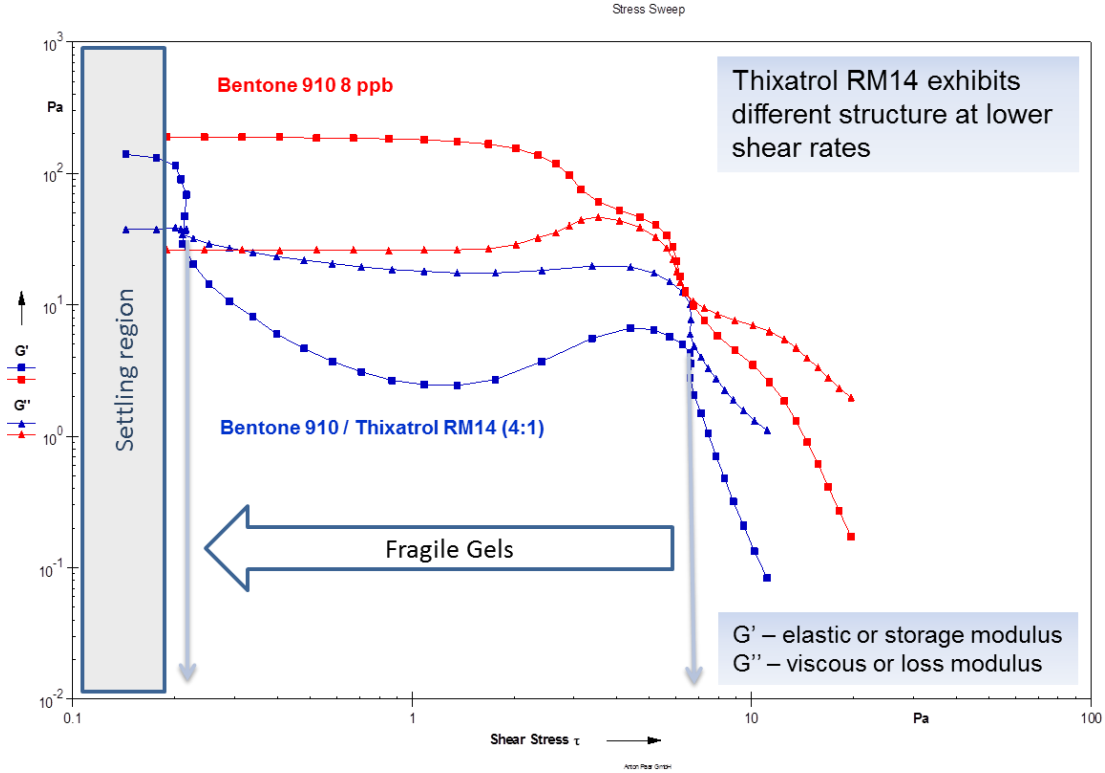
THIXATROL RM14 Fann iX77 Temperature Profile

	100	150	200	250	300	350
[B.38 / RM14][8 / 1] PPB	13	14	16	15	13	8
[Base Mud] - [Neat B.38 / 8 PPB]	6	6	5	4	3	4
[Neat B.38 / 12 PPB]	15	13	12	10	8	9



Fann 35A (HR at 150°F)	Temp	RPM Reading @ 600	300	200	100	6	3
[B.38 / RM] [8 / 1] PPB	120°F	71	45	36	25	12	11
[Base Mud] - [Neat B.38 / 8 PPB]	120°F	49	29	22	15	5	4
[Neat B.38 / 12 PPB]	120°F	77	49	41	30	11	10

Fragile Gels & Anti-Sag Properties



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THIXATROL RM14 PARCOM / Mysid / Lepto Data

MW > 600 (bioaccumulation not likely)	Class C	Oil soluble organic
Aerobic Biodegradation in seawater	OECD 306	33.4% at 2.0 mg/l
Marine invertebrate (Acartia Tonsa)	ISO 14669	LC50 (48h)>1,000 mg/l
Marine Algal (Skeletonema Costatum)	OECD 201	EC50 (72h): >37.1 mg/l
Marine Sediment (Corophium volutator)	PC 1995	10day LC50>12,496 mg/kg
Juvenile fish (Cypinodon variegatus)	PC 1995	LC50 (96h)>37.1 mg/l
Mysidopsis bahia	USEPA	LC50 (96hr)>1,000,000 ppm
Leptocheirus plumulosus	USEPA	LC50 (96hr) ratio-42/168 -0.2

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