ELEMENTIS

A global specialty chemicals company

Enhanced Performance Through Applied Innovation

BENTONE® 920

Economical rheological additive for drilling muds and working fluids in low temperature environments

GENERAL INFORMATION

BENTONE 920 rheological additive is an easy to disperse, rapid yielding, economical organobentonite viscosifier for oil–based muds, invert emulsion muds, completion fluids and workover fluids.

BENTONE 920's unique composition delivers a dry process gellant that requires less time and shear to build full rheology in drilling fluids, and that yields at low field temperatures. **BENTONE 92**0 is also significantly more efficient in mineral oils and alpha olefins than conventional organoclay viscosifiers.

BENTONE 920 is suitable for drilling fluids based on mineral and other low toxicity oils, synthetics, as well as diesel and crude oils.

CHEMICAL & PHYSICAL PROPERTIES

Composition	organically modified bentonite clay
Color	light tan
Form	finely divided powder
Specific gravity	1.7
Moisture	4.0% maximum

These are typical properties not to be used for specification purposes.

APPLICATIONS

Viscosifying drilling fluids including:

- Oil-based drilling muds
- Invert emulsion muds
- Packer fluids
- Completion fluids
- Workover fluids

Based on:

- Mineral Oils
- Low toxicity oils and fluids
- Diesel oil
- Crude oil
- Alpha Olefins (PAO,LAO,IAO)

- Manufacturing fluids at low temperatures
- Conditioning mud before storage
- Increasing suspending properties of packer fluids
- Preparing spotting fluids to free stuck pipe

ATTRIBUTES

BENTONE 920 gellant

- Disperses easily in less time with less shear
- Cost-effectively builds viscosity and yield point
- Yields at temperatures as low as 35°F/2°C, where conventional organoclays can be ineffective
- Highly efficient in low aromatic, mineral and other low toxicity oils
- Suspends weighting materials and other solids
- Improves cuttings carrying capacity and hole cleaning
- Increases emulsion stability
- Aids control of fluid loss to the formation
- Confers temperature stability to the fluid
- Is not harmful to the environment

INCORPORATION

Good agitation should be used for mixing when using **BENTONE 920** additive. Since it is an easier-dispersing organoclay, less work will be needed to incorporate it into the drilling fluid, and the need to circulate down-hole to build full rheology is significantly reduced. The amount of stirring needed during incorporation will depend on the temperature of the oil. At room temperature, when only moderate shear is used, gelation should begin in 10 to 15 minutes. Increased levels of shear will shorten the mix time. As the oil temperature is reduced, more time will be needed for viscosity build to begin. **BENTONE 920** will gel oils at temperatures as low as 35°F/2°C, but prolonged agitation will be required, especially if only moderate shear is available.

A chemical polar activator may be needed in some systems to ensure full development of rheological properties. In invert muds, where water is present in the mud, it acts as the activator, and a separate activator is not needed.

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However, in all-oil systems or in other fluids where no water is included in the formulation, or where water is unwanted, a chemical activator such as methanol or propylene carbonate should be added. Mixing 5% of water, by weight, into the activator can enhance its efficiency.

The following activators have proved effective for **BENTONE 920**

Suitable chemical activators	*Use level as percentage of **BENTONE 920** weight*
Methanol/water (95/5)	33 %
Propylene carbonate	33 %
Propylene carbonate/water (95/5)	33 %

LEVELS OF USE

The level of use depends on the rheological properties needed, and on the type of base oil being used. Pilot trials are recommended to optimize performance before field use.

Typical loadings are:

Mud Type	Pounds per Barrel	Kg/m³
All-Oil		
Diesel Fluid	6 – 10	17 – 29
Mineral Oil	8 – 14	23 – 40
Invert Emulsions		
Diesel Fluid	2 – 6	6 – 17
Mineral Oil	6 – 12	17 – 34
Alpha olefins (PAO, LAO, IAO)	6 – 12	17 - 34

PERFORMANCE

Invert Muds

Diesel Invert, 80/20, 14 ppg
Aged 16 hrs. @ 250°F, Tested at 120°F

Formulation	
#2 Diesel, bbl	0.52
Primary Emulsifier, ppb	9
Secondary Emulsifier, ppb	2
Lime, ppb	5
BENTONE 920, ppb	3
Fluid Loss Additive, ppb	8
Barite, ppb	325
Brine, 30% $CaCl_2$, bbl	0.17

Properties	Initial	@250°F
Plastic Viscosity, cPs	23	35
Yield Point, lbs./100 ft²	17	13
Gels, 10 sec/10 min, lbs./100 ft²	8/11	10/12
ES, volts	679	612
Brookfield, 0.3 RPM, cPs	23,200	23,200

Mineral Oil Invert, 80/20, 14 ppg
Aged 16 hrs. @ 300°F, Tested @ 120°F

Formulation	
Mineral Oil, bbl	0.52
Primary Emulsifier, ppb	9
Secondary Emulsifier, ppb	2
Lime, ppb	5
BENTONE 920, ppb	6
Fluid Loss Additive, ppb	8
Barite, ppb	325
Brine, 30% $CaCl_2$, bbl	0.17

Properties	Initial	300°F
Plastic Viscosity, cPs	32	46
Yield Point, lbs./100 ft²	10	10
Gels, 10 sec/10 min, lbs./100 ft²	9/11	5/9
ES, volts	700	645
Brookfield, 0.3 RPM, cPs	16,800	20,000

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All-Oil Muds*

All-Oil – No polar activator

Aged 16 hrs. @ 150°F, Tested @ 120°F

Formulation

Base Oil, bbl (#2 Diesel or Mineral Oil)	0.78
Emulsifier, ppb	0.75
Lime, ppb	1
BENTONE 920, ppb	5 or 10
Barite, ppb	325

Properties - #2 Diesel	Initial	
	5 ppb	10 ppb
Plastic Viscosity, cPs	10	16
Yield Point, lbs./100 ft^2	2	21
Gels, 10 sec/10 min, lbs./100 ft^2	3/3	10/11
Brookfield, 0.3 RPM, cPs	9,200	31,200

Properties – Mineral Oil	Initial
	10 ppb
Plastic Viscosity, cPs	18
Yield Point, lbs./100 ft^2	6
Gels, 10 sec/10 min, lbs./100 ft^2	6/6
Brookfield, 0.3 RPM, cPs	8,200

* All Oil Mud Performance: Properties developed in formulations without a polar activator. Yields and Brookfields will increase if an activator is used.

All muds tested at 120°F.

Note: Initial properties- aged 16 hours at 150°F

HEALTH AND SAFETY DATA

Before using this product please consult our Material Safety Data Sheet for information on safe handling.

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