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(54) Titre : HUILE DE BASE POUR FLUIDE DE FORAGE

(54) Title: DRILLING FLUID BASE OIL

(57) **Abrégé/Abstract:**

An improved base oil for use in wellbore fluids during drilling, completion or production operations. The drilling fluid is one constituent of a drilling mud and can also contain emulsifiers, wetting agents, fluid loss control, water, lime, weighting agents and rheological control agents. The improved base oil is a blend of hydrocarbons in the range of C8-C24, preferably from C10-C18. The hydrocarbons consist of n-alkanes 10 to 80 % by wt, preferably <40% by wt, isoalkanes 20-90% by wt, preferably >50% by wt, and aromatics no greater than 20% by wt, preferably <10% by wt. The blended fluid has a preferred viscosity less than 2 cSt at 20°C and a pour point less than -30°C, preferably less than -40°C. The density should be less than 860 kg/m³ and preferably less than 840 kg/m³. The aniline point should be greater than 60°C, preferably greater than 65°C. The flash point should be greater than 61°C, preferably greater than 70°C.

ABSTRACT OF THE DISCLOSURE

An improved base oil for use in wellbore fluids during drilling, completion or production operations. The drilling fluid is one constituent of a drilling mud and can also contain emulsifiers, wetting agents, fluid loss control, water, lime, weighting agents and rheological control agents. The improved base oil is a blend of hydrocarbons in the range of C8-C24, preferably from C10-C18. The hydrocarbons consist of n-alkanes 10 to 80 % by wt, preferably <40% by wt, isoalkanes 20-90% by wt, preferably >50% by wt, and aromatics no greater than 20% by wt, preferably <10% by wt. The blended fluid has a preferred viscosity less than 2 cSt at 20°C and a pour point less than -30°C, preferably less than -40°C. The density should be less than 860 kg/m³ and preferably less than 840 kg/m³. The aniline point should be greater than 60°C, preferably greater than 65°C. The flash point should be greater than 61°C, preferably greater than 70°C.

DRILLING FLUID BASE OIL

BACKGROUND OF THE INVENTION

01 The oil and gas well drilling industry is constantly challenged by the desire to reduce environmental effects of its activities while providing an economic supply of oil and gas. One environmentally sensitive issue is the use of drilling fluids. These fluids are pumped into wells to drive downhole drill bits and to circulate fluids in the well. The fluids have to be selected carefully so that they do not harm the production formation, do not harm drilling equipment, may be economically disposed of after use and are not excessively expensive to produce.

02 A large number of drilling fluids have been used and proposed. Recently, United States patent no. 6,410,488 issued June 25, 2002 teaches how to formulate paraffin based drilling fluids with fluids made through sequential hydrocracking, hydroisomerization and hydrogenation reactions. These fluids are claimed to exhibit good biodegradability, low toxicity, low pour points, and rapid dispersion in cold water conditions. However, the product made in accordance with United States patent no. 6,410,488 is very expensive.

03 Various other drilling fluids have been used, such as synthetic drilling fluids, water based drilling fluids and various other hydrocarbon based drilling fluids such as diesel based drilling fluids. Diesel fluids have the advantage of low cost, but tend to have relatively high toxicity, making environmentally safe disposal difficult. This invention seeks to provide a low cost drilling fluid that retains many of the low toxicity advantages of more expensive drilling fluids.

SUMMARY OF THE INVENTION

04 Therefore, this invention provides an improved base oil for use in wellbore fluids during on shore drilling, completion or production operations. The drilling

fluid is one constituent of a drilling mud and can also contain emulsifiers, wetting agents, fluid loss control, water, lime, weighting agents and rheological control agents. The improved base oil is a blend of hydrocarbons consisting essentially of hydrocarbons in the range of C8-C24, preferably consisting essentially of C10-C18 hydrocarbons. The hydrocarbons may be non-, partially or fully hydrotreated and may comprise n-alkanes 10 to 80 % by wt, preferably <40% by wt, isoalkanes 20-90% by wt, preferably >50% by wt, and aromatics no greater than 20% by wt, preferably <10% by wt. The blended fluid has a preferred viscosity less than 2 cSt at 20°C and a pour point less than -30°C, preferably less than -40°C. The density should be less than 860 kg/m³ and preferably less than 840 kg/m³. The aniline point should be greater than 60°C, preferably greater than 65°C. The flash point should be greater than 61°C, preferably greater than 70°C.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

05 Predominantly in this patent document means greater than 50% by wt. Consists essentially of X means at least 90% by wt X. The word "comprising" in the claims is used in its inclusive sense and does not exclude other elements being present.

06 The drilling fluid according to the invention is preferably produced by blending a fluid made in accordance with the '488 patent with diesel or an equivalent high aromatic fluid. HT30N and HT40N are commercially available drilling fluids made in accordance with the '488 patent. These '488 products are made, as described in the '488 patent, by atmospheric and vacuum distillation of a feedstock that is a crude oil. The feedstock is first subjected to a hydrotreating step, in accordance with known principles in the art. The hydrotreated product is then hydroisomerized in accordance with known processing conditions. The resultant hydroisomerized product is then subjected to a hydrogenation step to eliminate any unstable molecules (for example olefins) produced during the hydroisomerization step. Hydrogenation procedures are also well known in the art. The hydrogenated product is fractionated,

such as using a vacuum or atmospheric distillation column, to produce a narrow cut such as a C12-C18 cut that is used in accordance with this invention.

07 The fluid produced in accordance with the '488 patent is blended simply by mixing, without any additional processing, with diesel or an equivalent high aromatic fluid. Diesel is a fuel obtained from petroleum distillation that is used in diesel engines. Diesel has a relatively low ignition temperature (540°C) and is ignited by the heat of compression. Diesel varies in quality depending on the manner in which it is produced, and is typically a mixture of a number of refinery blendstocks with similar boiling ranges. Blendstock quality depends on the source of the feedstock and the process used for its production. Low sulphur content and high cetane value is desirable in a diesel. Straight-run materials produced by distillation from crude oil generally have excellent cetane value, and therefore, they require little more than hydrotreating to control sulfur levels. Gasoline production often occurs in large fluid catalytic cracking (FCC) units, which produce light-cycle oil (LCO). LCO is a high aromatic fluid and tends to be high in sulphur, with considerable polyaromatic hydrocarbon content. LCO is used as a component part of diesel, but it is preferred not to have high LCO content in the diesel. Blendstocks, such as LCO and coker gasoil, produced by carbon rejection processes are generally high in aromatics and low in cetane value and make poor diesel. On the other hand, blendstocks produced by hydrocracking have excellent cetane value, are low in sulfur, and make excellent diesel. Poor diesel fuel requires additives such as cetane, lubricity, conductivity, deicers and ignition enhancers.

08 Depending on what type of refinery process is used dictates the level of aromatics present in the diesel. An exemplary diesel is Suncor™ diesel available from Suncor, Calgary, Alberta, Canada. Suncor™ diesel is low in sulfur, and has a low level of aromatics in the fuel. Low sulphur, low aromatic diesel is preferred.

09 The blend of diesel and low toxicity fluid is preferably 25-75% low sulfur diesel and 75-25% HT40N, Envirodrill™ or HT30N. Envirodrill™ is an oil made by Shell Oil of Ontario, Canada. It is a mineral oil that has been hydrotreated a number of times and is sold as a drilling oil with a very low aromatic content.

10 Exemplary fluid blends are given in the following table.

Properties of Base oils

Properties	Diesel	HT30N	HT40N
Density at 150c	839	820	840
Flashpoint oC (PMCC)	58	120	126
Aniline point oC	57	79	77
Viscosity at 40oC	1.7	2	3.4
Pour point	-35	-22	-30
Aromatics	20%	0.1	2.2
BETX mass %	0.82	0	0

Properties of Blended oils

Properties	1	2	3
Density at 15oC	835	842.6	835
Flashpoint oC (PMCC)	65	67	66
Aniline point oC	63	64	62
Viscosity at 40oC	1.72	2.45	2.038
Pour point	-42	-57	-54
Aromatics	17%	15.2	20.5
BETX mass %	0.61	0.5	0.5

1= 75%diesel + 25% HT30N

2= 70% diesel + 30% HT40N

3= 70% diesel + 30% Envirodrill

11 The drilling fluid thus produced should only be used for on shore drilling operations. Immaterial modifications may be made to the blended fluid described here without departing from the invention.

WHAT IS CLAIMED IS:

1. A drilling fluid, comprising:
a blended fluid of diesel and a fluid produced by sequential hydrotreating, hydroisomerization and hydrogenation of a crude oil feedstock; and
the blended fluid consisting essentially of C8-C24 hydrocarbons, and having 10-80% by wt n-alkanes, 20-90% by wt isoalkanes, less than 20% by wt aromatics, viscosity less than 2 cSt at 20°C, a pour point less than -30°C, density less than 860 kg/m³, aniline point greater than 60°C, and flash point greater than 61°C.
2. The drilling fluid of claim 1 in which the blended fluid consists essentially of C10-C18 hydrocarbons.
3. The drilling fluid of claim 1 in which the hydrocarbons comprise <40% by wt n-alkanes.
4. The drilling fluid of claim 1 in which the hydrocarbons comprise >50% by wt isoalkanes.
5. The drilling fluid of claim 1 in which the blended fluid comprises <10% by wt aromatics.
6. The drilling fluid of claim 1 having a pour point less than -40°C.
7. The drilling fluid of claim 1 having a density less than 840 kg/m³.
8. The drilling fluid of claim 1 having an aniline point greater than 65°C.

9. The drilling fluid of claim 1 having a flash point greater than 70°C.
10. The drilling fluid of claim 1 in which diesel comprises 25-75% by wt of the blended fluid.