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(54) **Title:** USE OF METATHESIS PRODUCTS OF FISCHER-TROPSCH PROCESS PRODUCTS

(57) **Abstract:** The invention provides oxo-alcohols, alkyl benzenes, and drilling fluid compositions derived from hydrocarbons derived by metathesis of Fischer-Tropsch hydrocarbons.

WO 01/02328 A1

USE OF METATHESIS PRODUCTS OF FISCHER-TROPSCH PROCESS PRODUCTS

Field of the Invention

The invention relates to alkyl benzene (AB), drilling fluid and oxo-alcohols.

Background to the Invention

Conversion of lower olefins to higher olefins can be achieved by an isomerizing metathesis process, or metathetic oligomerisation. Conventional metathesis processes require an olefinic feedstock high in purity and linearity and produce highly linear products.

Various heterogeneous contact catalysts such as WO_3/SiO_2, Re_2O_7/Al_2O_3 and $Re_2O_7/Al_2O_3.SiO_2$, and also combinations of these catalysts with co-catalysts can be used for metathesis of unfunctionalized olefins. However, other catalyst and co-catalyst combinations, for example for homogeneous metathesis using WCl_6 and/or $ReCl_6$ and a co-catalyst, have been used successfully and the invention is not limited to any specific catalyst system, nor to homogeneous or hetergeneous metathesis.

Surprisingly, and contrary to conventional thinking, it has now been found that by using metathesis on Fischer-Tropsch process products i.e. using Fischer-Tropsch feedstock to the metathesis process, which feedstock includes both branched and unbranched olefins, as well as non-olefinic components, specific hydrocarbons having from 8 to 18 carbons can be obtained, which hydrocarbons may be used to derive AB, oxo-alcohols and drilling fluid.

By a Fischer-Tropsch process product or feedstock is meant a product obtained by subjecting a synthesis gas including carbon monoxide and hydrogen, to Fischer-Tropsch reaction conditions in the presence of typically an iron based catalyst, a cobalt based catalyst, and iron/cobalt based catalyst, or any other Fischer-Tropsch catalyst, under Fischer-Tropsch reaction conditions.

Summary of the Invention

This invention provides products in the 8 to 18 carbon range derived from 5 to 10 carbon Fischer-Tropsch process products, the products in the 8 to 18 carbon range having a desirable degree of branching or non-linearity.

Thus, according to a first aspect of the invention, there is provided an oxo-alcohol composition including oxo-alcohols having from 8 to 18 carbon atoms, the oxo-alcohols being derived from olefins obtained by metathesis of one or more of 5, 6, 7, 8, 9 and/or 10 carbon containing Fischer-Tropsch derived feedstock.

Between 10% and 99% of the oxo-alcohols of the composition may be branched oxo-alcohols, typically between 10% and 90%.

The oxo-alcohols of the composition may be predominantly linear, with between 10% and 49% branched oxo-alcohols in the composition.

The composition includes between 15% and 35% branched oxo-alcohols.

The composition includes 24% branched oxo-alcohols.

The branching on the branched oxo-alcohols is predominantly mono-methyl branching, however, some di-methyl branching may also be present.

Typically, the mono-methyl branching will be in excess of 90% of the branching, or even in excess of 95%.

The branching may be predominantly on the C4+ carbon, with some branching present on the C2 carbon.

The branching is typically over 70% on the C4+ carbons.

The branching may exceed 90% on the C4+ carbons.

Typically, the oxo-alcohols of the composition in the 8 to 10 carbon range are usable as plasticizer alcohols.

Typically, the oxo-alcohols of the composition in the 10 to 16 carbon range are usable as detergent alcohols.

A typical product make up from the metathesis of a 7 carbon Fischer-Tropsch derived feedstock and suitable for deriving oxo-alcohols therefrom is set out in Table 1 at the end of the specification.

This product of Table 1 may typically be hydroformylated using a Co-EP catalyst, or any other suitable catalyst, to form predominantly linear alcohols, the ratio of linear to branched alcohols being related to the ratio of linear to branched product of the metathesis of the 7 carbon Fischer-Tropsch derived feedstock.

Thus, according to a second aspect of the invention, there is provided an alkyl benzene (AB) composition including AB having from 10 to 14 carbon atoms on the alkyl chain, the AB being derived from olefins obtained by metathesis of one or more of a 6,7 and/or 8 carbon containing Fischer-Tropsch derived feedstock.

The AB composition may contain between 10% and 90% of branched alkyl chain AB.

The AB composition may contain predominantly linear alkyl chain AB, with between 10% and 49% branched alkyl chain AB in the composition.

The composition includes between 15% and 35% branched alkyl chain AB.

The composition includes about 24% branched alkyl chain AB.

The branching on the branched alkyl chain of the AB is predominantly mono-methyl branching, however, some di-methyl and/or ethy branching may also be present.

Typically, the mono-methyl branching will be in excess of 90% of the branching, or even in excess of 95%.

The branching may be predominantly on the C4+ carbon, with some branching present on the C2 carbon.

The branching is typically over 70% on the C4+ carbons.

The branching may exceed 90% on the C4+ carbons.

A typical AB product make up produced from the products of metathesis of a 9 carbon Fischer-Tropsch derived feedstock is set out in Table 3 at the end of the specification.

The AB may be sulfonated to give an alkyl benzene sulfonate which may be used as a detergent. However, the AB composition itself may have uses such as for drilling fluids.

The product of Tables 3 and 4 was fractionated and a 10 to 14 carbon alkyl chain AB fraction was obtained having the following composition (represented as the linear internal olefin only):

Decenes	:	16.53%
Undecenes	:	27.96%
Dodecenes	:	26.19%
Tridecenes	:	4.71%
Tetradecenes	:	0.91%

Methyl branched internal olefins in the 10 to 14 carbon range make up most of the remainder.

Thus, according to a third aspect of the invention, there is provided a drilling fluid composition including hydrocarbons having from 14 to 18 carbon atoms, the hydrocarbons being derived from olefins obtained by metathesis of one or more of a 8, 9 and/or 10 carbon containing Fischer-Tropsch derived feedstock.

The hydrocarbons derived from olefins obtained by metathesis of one or more of a 8, 9 and/or 10 carbon containing Fischer-Tropsch derived feedstock may be internal olefins.

The drilling fluid composition may include between 10% and 90% branched hydrocarbons.

The hydrocarbons of the drilling fluid composition may be predominantly linear, with between 10% and 49% branched hydrocarbons in the composition.

The composition includes between 15% and 35% branched hydrocarbons.

The composition includes about 24% branched hydrocarbons.

The branching on the branched hydrocarbons is predominantly mono-methyl branching, however, some di-methyl and/or ethyl branching may also be present.

The branching may be predominantly on the C4+ carbon, with some branching present on the C2 carbon.

The branching is typically over 70% on the C4+ carbons.

The branching may exceed 90% on the C4+ carbons.

Typically, the mono-methyl branching will be in excess of 90% of the branching, or even in excess of 95%.

A typical product make up from the metathesis of a 9 carbon Fischer-Tropsch derived feedstock and suitable for deriving the drilling fluid composition is set out in Table 2 at the end of the specification.

The product of Table 2 was fractionated and a 14 to 17 carbon fraction was obtained having the following approximate composition (represented as both methyl branched and linear internal olefins):

Tetradecenes :	23.03%
Pentadecenes:	38.40%
Hexadecenes :	36.22%
Heptadecene :	2.35%

Detailed Description of the Invention

Example 1 - Alkyl Benzene Example

An olefinic C_{11}/C_{12} and and a C_{13}/C_{14} olefininc metathesis product derived from metathesis of Fischer-Tropsch olefins, was used to alkylate benzene to produce alkyl benzenes (AB's) .

For the alkylation of benzene with the metathesis product, 1 mole of the metathesis olefins, 10 mole of benzene and 20 wt% based on the olefin mixture of a shape selective Beta - zeolite catalyst were added to a stainless steel autoclave. The autoclave was purged with N_2 and then charged to 1000 psig N_2. The mixture was stirred and heated to 170 - 190°C for 14 - 15 hours. It was then cooled and removed from the autoclave. The reaction mixture was filtered to remove the catalyst and the unreacted benzene was removed in vacuo using a rotary evaporator.

The product was sulfonated with an equivalent of chlorosulfonic acid using methylene chloride as solvent. The methylene chloride was distilled away. The sulfonated product was neutralized with sodium methoxide in methanol and the methanol was evaporated to give alkyl benzene sulfonate, sodium salt mixture.

The product mixture contained methyl and di-methyl branching on the alkyl chain portion of the AB. The phenyl group of the AB's was predominantly on the C2 carbon of the alkyl chain.

As shown in the accompanying Figures numbered I to XVI, the AB's obtained included:

I	1- methyldecyl benzene
II	1-pentylhexylbenzene
III	1-propyloctylbenzene
IV	1-butylheptyl benzene
V	1-ethylnonylbenzene
VI	1,1-dimethylnonylbenzene
VII	1,3- dimethylnonylbenzene
VIII	1,6,7-trimethyloctylbenzene

IX	1,4- dimethylnonylbenzene
X	1,5- dimethylnonylbenzene
XI	1,6- dimethylnonylbenzene
XII	1,7- dimethylnonylbenzene
XIII	1,8- dimethylnonylbenzene
XIV	1,1,3-trimethyloctylbenzene
XV	1,3,7-trimethyloctylbenzene
XVI	1,1,4-trimethyloctylbenzene

Example 2 - Hydroformylation Example

Three different carbon number cuts of a Fischer-Tropsch olefinic feed produced by metathesis i.e C_9/C_{10}, C_{11}/C_{12} and a C_{13}/C_{14} cuts, were batch hydroformylated to evaluate their suitability as detergent alcohol (DA) feed, on the basis of reaction rate and total olefin content. Compared to conventional Fischer-Tropsch olefinic feed, the metathesis feed generally exhibited a 25% greater hydroformylation rate and this together with the higher olefinic content (>90%) should lead to significant reductions in reactor size and distillation requirements. The linearity and n:iso ratio of the metathesis product is practically identical to that of the conventional olefinic feed derived product. Metathesis feedstock thus appears to be preferable to conventional olefininc feedstock for DA process.

Batch hydroformylation

100ml of, respectively, a C_9/C_{10}, a C_{11}/C_{12} and a C_{13}/C_{14} carbon number cut of metathesis product were exhaustively hydroformylated using a liganded cobalt catalyst. The reaction temperature was 170°C, the initial pressure 85 bar and the syngas $CO:H_2$ ratio was 2:1. In each case the pressure drop with time in the autoclave was measured (i) to calculate the initial hydroformylation rate and (ii) to calculate the gas consumption for complete olefin conversion (i.e. exhaustive hydroformylation). The cobalt-EP catalyst was used to catalyse the reaction as it results in rapid double-bond isomerisation enabling full utilisation of the internal double bonds in the metathesis feed.

The results of the batch experiments are summarised in Table 5 below.

Olefin content: The olefin content of the metathesis feed was derived from the total gas consumption during the exhaustive hydroformylation studies. The total olefinic content of the metathesis feed was greater than 90%. This is significantly higher than that of conventional olefinic feed which is about 50%.

Hydroformylation rate: The hydroformylation rate was calculated from the initial pressure drop with time. While the intrinsic rate (i.e. the rate constant) of metathesis feed hydroformylation is slower than that of conventional olefinic feed hydroformylation, this is more than compensated for by the significantly higher olefin content of the metathesis feed. For both the C_9/C_{10} and the C_{11}/C_{12} fractions the metathesis feed exhibited a 25% faster apparent hydroformylation rate than the conventional olefininc feed while the hydroformylation rate of the metathesis feed C_{13}/C_{14} was a little slower than that of a similar conventional olefinic feed. The slower intrinsic hydroformylation rate of the metathesis feed is most probably due to the greater number of internal olefins. Significant double bond isomerisation thus has to take place before hydroformylation can take place at the terminal position.

Linearity and n:iso ratio: The linearity and the n:iso ratio of the metathesis product was comparable to that of the conventional olefinic feed product. The supposed greater number of internal double bonds in the metathesis feed did not negatively affect the linearity of the alcohol product as hydroformylation at the terminal double-bond is favoured above internal double bond hydroformylation.

Table 5. Results of batch hydroformylation experiments

Feed source	Conventional	Metathesis	Metathesis	Metatesis
Carbon number cut	C_{11}/C_{12}	C_9/C_{10}	C_{11}/C_{12}	C_{13}/C_{14}
Olefin content* [mass% of feed]	50%	90%	97%	93%
Apparent hydroformylation rate [$mmol_{alcohol} \cdot hour^{-1}$]	80	105	91	58
Hydroformylation rate constant, $k_{lumbed} = \frac{r_{apparent}}{[olefin]}$	32	22	20	16
Linearity [mass%]	51%	68%	63%	58%
n:iso Ratio [mol:mol]	5.1	5.8	5.4	6.2

* calculated assuming 10% hydroformylation as for conventional oefininc feed

Example 3 – Drilling Fluids

C_{16} Fischer-Tropsch internal olefins were obtained by metathesis and were useable as a drilling fluid composition.

The drilling fluid composition included about 75% internal linear olefins and about 25% internal branched olefins, which internal branched olefins were predominantly mono-methyl, di-methyl and ethyl branched.

The drilling fluid compositions in accordance with the invention had the following physical properties:

The properties are for a typical C_{12}-C_{16} internal linear and branched combination of olefinic product made in accordance with the present invention:

Viscocity: 1-2 cSt @ 100'C
Flash point: >90'C
Linear:branch ratio 1:1 to 5:1
Pour Point: < 0'C

Examples of the internal olefins useful as drilling fluids include:

1) A drilling fluid including:

A linear component making up about 75.1% of the composition; and

A mono-methyl branched component making up about 24.9% of the drilling fluid composition.

2) A drilling fluid composition including:

A linear component of mainly hexadec-3-ene in amounts of between 2 and 40%, depending on process conditions; and

A mono-methyl branched component of between 60% and 98% of the drilling fluid composition.

Table 1: Mass and component balance of a batch reaction of water washed C7 cut

COMPONENT	FEED mass %	PRODUCT mass %
3-Me-1-hexene	1.0693	0.0000
5-Me-1-hexene	2.3655	0.0000
4-Me-1-hexene	3.8129	0.0000
2-Me-1-hexene	6.0078	0.2428
2-Methylhexane	1.6928	2.0457
3-Methylhexane	3.0273	3.3236
1-heptene	75.6871	0.9740
n-heptane	2.5700	2.3867
heptene (Z, E)	0.0000	0.0000
3-Heptene	0.9803	3.1209
diene or cyclic olefin	1.0121	0.0791
2-Heptene	0.0000	3.2820
Dienes or cyclic olefins	0.5094	0.0000
Ethylene		1.9997
Prophylene		3.4060
Butenes		3.6816
Pentenes		4.1432
Hexenes		7.2954
Methyl branced heptenes		1.3442
n-octenes		9.7463
n-Nonenes		7.4719
Methyl branced nonenes		1.4163
n-Decenes		9.2216
Methyl branced decenes		2.7138
n-undecenes		12.5128
Methyl branced undecenes		2.3198
n-dodecenes		12.0218
Methyl branced dodecenes		0.4282
tridecenes		2.9284
tetradecene		0.7476
pentadecene		0.1664
unknowns	1.2655	0.1664
Heavies		0.9803

Reaction Conditions in the above table:

MASS CATALYST (g)	51.81
MASS C7 FEED (g)	316.38
MASS PRODUCT (g)	280.55
mol me-hexenes + n-heptenes in	2.90
mol me-hexenes + n-heptenes out	0.26
heptene conversion	91.06
mol C10 – 14 formed	0.94
mol % yield	65.18
selectivity (%)	71.58

TABLE 2: Mass and component balance of the batch reaction acetonitrile washed .

COMPONENT	FEED mass %	PRODUCT Mass %
3-Me-1-octene	0.1407	0.0000
7+4-Me-1-octene	0.9809	0.0000
6-me-1-octene	0.9637	0.0000
2-Me-1-octene	0.8992	0.0000
4+2-Methyloctane	1.1467	1.4687
3-Methyloctane	1.5091	1.8279
n-nonenes	75.5614	15.3960
n-nonane	11.3149	13.3231
dienes/cyclic olefins	1.7378	1.1135
Ethylene		1.6064
Propylene		2.5809
Butenes		2.1397
Pentenes		1.3528
Hexenes		0.7844
Heptenes		1.4035
n-octenes		4.4380
n-Decenes		10.1435
n-undecenes		1.7770
n-dodecenes		1.5719
Tridecenes		3.5240
methyl branched C 13		0.0000
Tetradecene		7.5024
methyl branched C 14		0.6842
Pentadecene		12.9260
methyl branched C 15		0.7234
Hexadecene		12.8760
Heptadecene		0.8366
Unknowns	5.7457	0.8366

Reaction Conditions in the above table:

C9 : Re207	1000 : 1
MASS CATALYST (g)	0.75
MASS C9 FEED (g)	10.71
MASS PRODUCT (g)	9.99
mol me-octenes + n-nonenes in	0.07
mol me-octenes + n-nonenes out	0.01
nonene conversion	80.56
mol C14 – 18 formed	0.02
mol % yield	52.28
selectivity (%)	64.90

Table 3: Mass % of Components in Alkyl Benzene Product

Component	Mass%
Branched C_{10} benzene	0.51
Branched C_{10} benzene	0.12
Branched C_{10} benzene	0.14
Branched C_{10} benzene	0.20
Branched C_{10} benzene	0.29
Branched C_{10} benzene	0.39
5-Decylbenzene	2.91
4-Decylbenzene	2.79
Branched C_{10} benzene	0.17
Branched C_{10} benzene	0.76
3-Decylbenzene	4.34
Branched C_{10} benzene	0.25
Branched C_{10} benzene	0.82
Branched C_{11} benzene	1.23
2-Decylbenzene	6.87
Branched C_{11} benzene	0.70
Branched C_{11} benzene	0.57
Branched C_{11} benzene	0.88
5+6-Decylbenzene	7.95
Branched C_{11} benzene	0.52
4-Undecylbenzene	4.59
Branched C_{11} benzene	1.78
3-Undecylbenzene	8.49
Branched C_{11} benzene	1.10
Branched C_{12} benzene	0.41
Branched C_{12} benzene	0.93
2-Undecylbenzene	10.22
Branched C_{12} benzene	0.59
Branched C_{12} benzene	0.94
6-Dodecylbenzene	4.57
5-Dodecylbenzene	3.83
Branched C_{12} benzene	0.71
4-Dodecylbenzene	3.85
Branched C_{12} benzene	0.49
Branched C_{12} benzene	0.54
Branched C_{12} benzene	0.82
3-Dodecylbenzene	5.96
Branched C_{12} benzene	0.66
Branched C_{13} benzene	0.74
2-Dodecylbenzene	7.92
5+6-Tridecylbenzene	1.04
4-Tridecylbenzene	0.73
3-Tridecylbenzene	1.42
2-Tridecylbenzene	1.38
Branched C_{14} Benzenes	0.46
Branched C_{14} Benzenes	1.45
5+6-Tetradecylbenzene	0.50
4-Tetradecylbenzene	0.21
3-Tetradecylbenzene	0.51
2-Tetradecylbenzene	0.77

Table 4: Linear and Branched Analysis of Alkyl Benzene Product

Component	%
C_{10}	
2-Decylbenzene	6.87
3-Decylbenzene	4.34
4-Decylbenzene	2.79
5-Decylbenzene	2.91
Total linear	16.90
Total branched	3.65
C_{11}	
2-Undecylbenzene	10.22
3-Undecylbenzene	8.49
4-Undecylbenzene	4.59
5+6-Undecylbenzene	7.95
Total linear	31.26
Total branched	6.78
C_{12}	
2-Dodecylbenzene	7.92
3-Dodecylbenzene	5.96
4-Dodecylbenzene	3.85
5-Dodecylbenzene	3.83
6-Dodecylbenzene	4.57
Total linear	26.13
Total branched	6.08
C_{13}	
2-Tridecylbenzene	1.38
3-Tridecylbenzene	1.42
4-Tridecylbenzene	0.73
5+6-Tridecylbenzene	1.04
Total linear	4.56
Total branched	0.74
C_{14}	
2-Tetradecylbenzene	0.77
3-Tetradecylbenzene	0.51
4-Tetradecylbenzene	0.21
5+6-Tetradecylbenzene	0.50
Total linear	1.98
Total branched	1.91

Claims:

1. An oxo-alcohol composition including oxo-alcohols having from 8 to 18 carbon atoms, the oxo-alcohols being derived from olefins obtained by metathesis of one or more Fischer-Tropsch derived hydrocarbons selected from hydrocarbons having 5, 6, 7, 8, 9 and/or 10 carbon atoms.

2. An oxo-alcohol composition as claimed in claim 1, wherein between 10% and 99% of the oxo-alcohols of the composition are branched oxo-alcohols.

3. An oxo-alcohol composition as claimed in claim 1 or claim 2, wherein the oxo-alcohols of the composition are predominantly linear, with between 10% and 49% branched oxo-alcohols in the composition.

4. An oxo-alcohol composition as claimed in claim 3, wherein between 15% and 35% of the oxo-alcohols in the composition are branched oxo-alcohols.

5. An oxo-alcohol composition as claimed in claim 3, wherein 24% of the oxo-alcohols in the composition are branched oxo-alcohols.

6. An oxo-alcohol composition as claimed in any one of claims 2 to 5, wherein the branching on the branched oxo-alcohols is predominantly mono-methyl branching.

7. An oxo-alcohol composition as claimed in any one of claims 2 to 6, wherein the branching on the branched oxo-alcohols iincludes some di-methyl branching.

8. An oxo-alcohol composition as claimed in any one of claims 2 to 7, wherein the mono-methyl branching is in excess of 90% of the branching.

9. An oxo-alcohol composition as claimed in any one of claims 2 to 8, wherein the mono-methyl branching is in excess of 95% of the branching.

10. An oxo-alcohol composition as claimed in any one of claims 2 to 9, wherein the branching is predominantly on the C4+ carbons.

11. An oxo-alcohol composition as claimed in any one of claims 2 to 10, wherein some branching is present on the C2 carbon.

12. An oxo-alcohol composition as claimed in any one of claims 10 or 11, wherein the branching is over 70% on the C4+ carbons.

13. An oxo-alcohol composition as claimed in any one of claims 10 to 12, wherein the branching is over 90% on the C4+ carbons.

14. A plasticizer alcohol derived from at least a fraction of the oxo-alcohol composition as claimed in any one of the preceding claims, wherein the fraction includes hydrocarbons in the 8 to 10 carbon range.

15. A detergent alcohol derived from at least a fraction of the oxo-alcohol composition as claimed in any one of the preceding claims, wherein the fraction includes hydrocarbons in the 10 to 16 carbon range.

16. An alkyl benzene (AB) composition including AB having from 10 to 14 carbon atoms on the alkyl chain, the AB being derived from olefins obtained by metathesis of one or more Fischer-Tropsch derived hydrocarbons selected from hydrocarbons having 6, 7 and/or 8 carbon atoms.

17. An alkyl benzene (AB) composition as claimed in claim 16, which AB composition includes between 10% and 90% of branched alkyl chain AB.

18. An alkyl benzene (AB) composition as claimed in claim 16 or claim 17, wherein the AB composition includes predominantly linear alkyl chain AB, with between 10% and 49% branched alkyl chain AB in the composition.

19. An alkyl benzene (AB) composition as claimed in claim 18, wherein the composition includes between 15% and 35% branched alkyl chain AB.

20. An alkyl benzene (AB) composition as claimed in claim 18 or 19, wherein the composition includes 24% branched alkyl chain AB.

21. An alkyl benzene (AB) composition as claimed in any one of claims 17 to 20, wherein the branching on the branched alkyl chain of the AB is predominantly mono-methyl branching.

22. An alkyl benzene (AB) composition as claimed in any one of claims 17 to 20, wherein the branching on the branched alkyl chain of the AB includes di-methyl and/or ethyl branching.

23. An alkyl benzene (AB) composition as claimed in claim 21 or claim 22, wherein the mono-methyl branching is in excess of 90% of the branching.

24. An alkyl benzene (AB) composition as claimed in claim 21 or claim 22, wherein the mono-methyl branching is in excess of 95% of the branching.

25. An alkyl benzene (AB) composition as claimed in any one of claims 17 to 24, wherein the branching is predominantly on the C4+ carbons of the alkyl chain of the AB.

26. An alkyl benzene (AB) composition as claimed in any one of claims 17 to 25, wherein some of the branching is on the C2 carbon of the alkyl chain of the AB.

27. An alkyl benzene (AB) composition as claimed in any one of claims 17 to 26, wherein the branching is in excess of 70% on the C4+ carbons of the alkyl chain of the AB.

28. An alkyl benzene (AB) composition as claimed in any one of claims 17 to 26, wherein the branching is in excess of 90% on the C4+ carbons of the alkyl chain of the AB.

29. A detergent composition including a sulfonated alkyl benzene as claimed in any one of claims 16 to 28.

30. A drilling fluid composition including an AB composition as claimed in any one of claims 16 to 28.

31. A drilling fluid composition including hydrocarbons having from 14 to 18 carbon atoms, the hydrocarbons being derived from olefins obtained by metathesis of one or more Fischer-Tropsch derived hydrocarbons selected from hydrocarbons having 8, 9 and/or 10 carbon atoms.

32. A drilling fluid composition as claimed in claim 31, wherein the hydrocarbons are internal olefins.

33. A drilling fluid composition as claimed in claim 31 or 32, which includes between 10% and 90% branched hydrocarbons.

34. A drilling fluid composition as claimed in any one of claims 31 to 33, wherein the hydrocarbons are predominantly linear.

35. A drilling fluid composition as claimed in claim 33 or 34, which composition includes between 10% and 49% branched hydrocarbons.

36. A drilling fluid composition as claimed in claim 33 or 34, which composition includes between 15% and 35% branched hydrocarbons.

37. A drilling fluid composition as claimed in claim 33 or 34, which composition includes 24% branched hydrocarbons.

38. A drilling fluid composition as claimed in any one of claims 33 to 37, wherein the branching on the branched hydrocarbons is predominantly mono-methyl branching.

39. A drilling fluid composition as claimed in any one of claims 33 to 38, which includes some di-methyl and/or ethyl branching.

40. A drilling fluid composition as claimed in any one of claims 33 to 39, wherein the branching is predominantly on the C4+ carbons of the alkyl chain of the AB.

41. A drilling fluid composition as claimed in any one of claims 33 to 40, which includes branching on the C2 carbon of the alkyl chain of the AB.

42. A drilling fluid composition as claimed in any one of claims 33 to 41, wherein the branching is in excess of 70% on the C4+ carbons of the alkyl chain of the AB.

43. A drilling fluid composition as claimed in any one of claims 33 to 42, wherein the branching is in excess of 90% on the C4+ carbons of the alkyl chain of the AB.

44. A drilling fluid composition as claimed in any one of claims 38 to 43, wherein the mono-methyl branching is in excess of 90% of the branching.

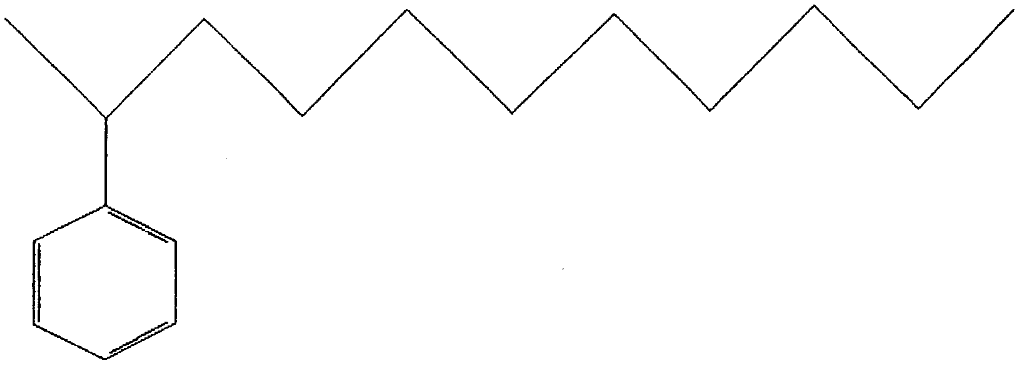
45. A drilling fluid composition as claimed in any one of claims 38 to 44, wherein the mono-methyl branching is in excess of 95% of the branching.

46. An oxo-alcohol composition, substantially as herein described and illustrated.

47. An alkyl benzene composition, substantially as herein described and illustrated.

48. A drilling fluid composition, substantially as herein described and illustrated.

49. A new oxo-alcohol composition, a new alkyl benzene composition, or a new drilling fluid composition substantially as herein described.



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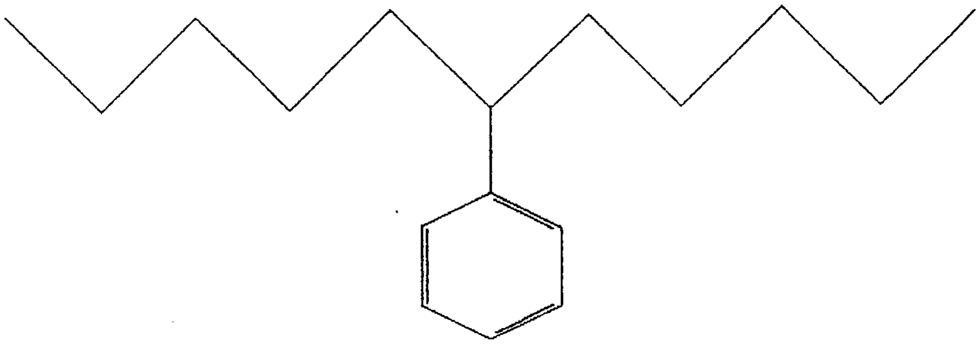

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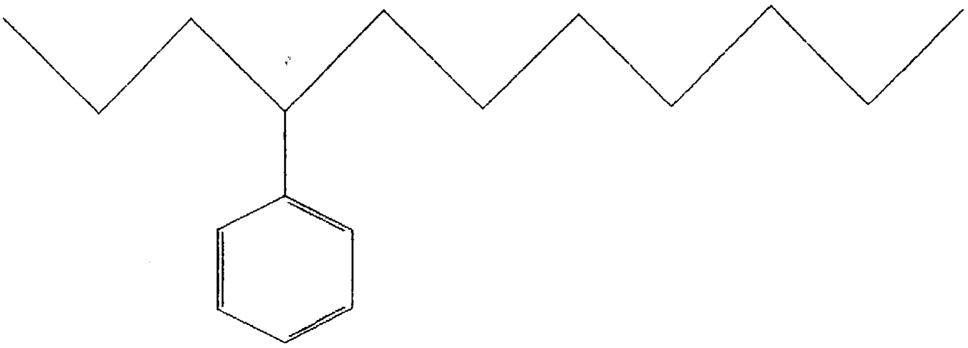

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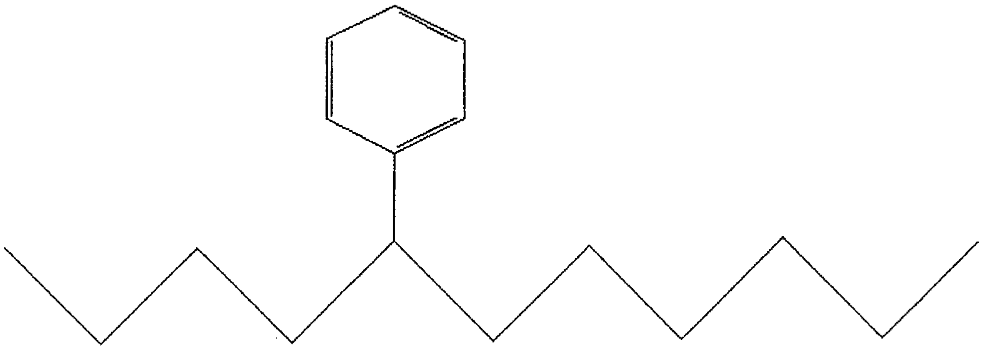

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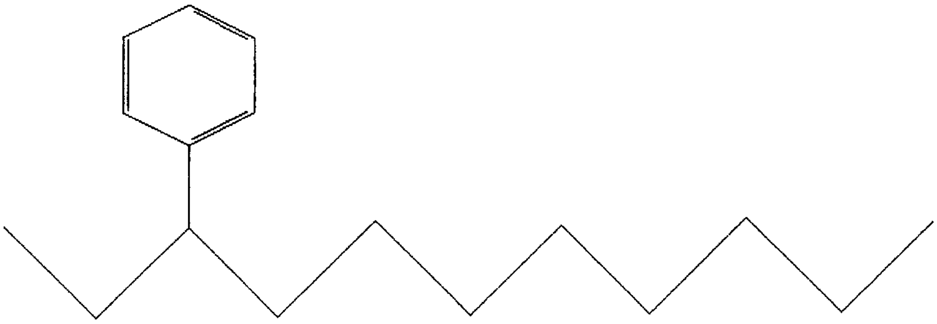

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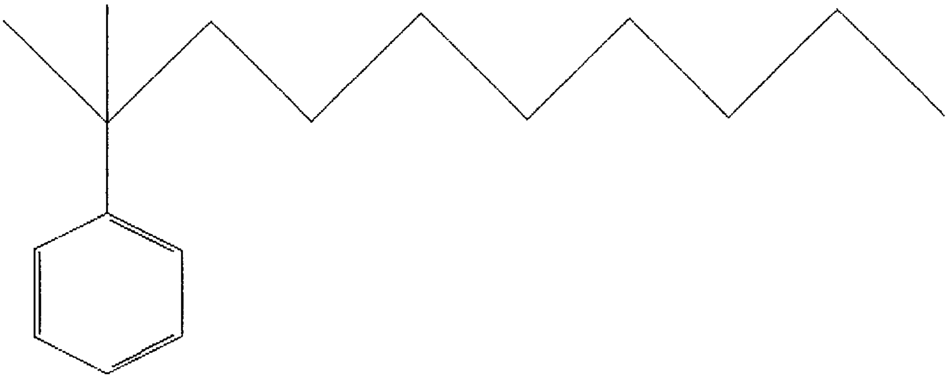

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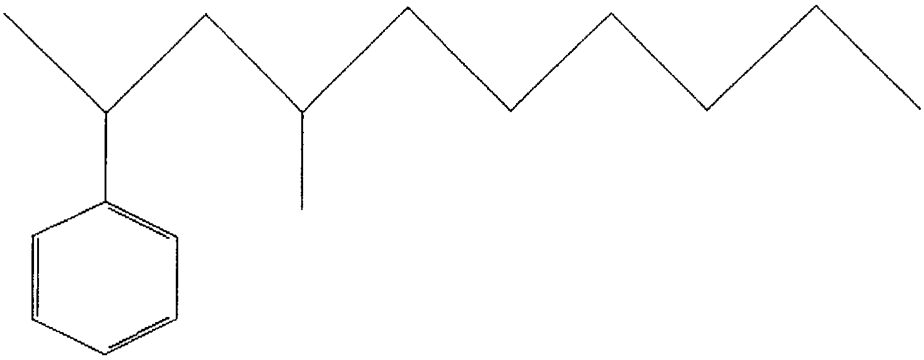

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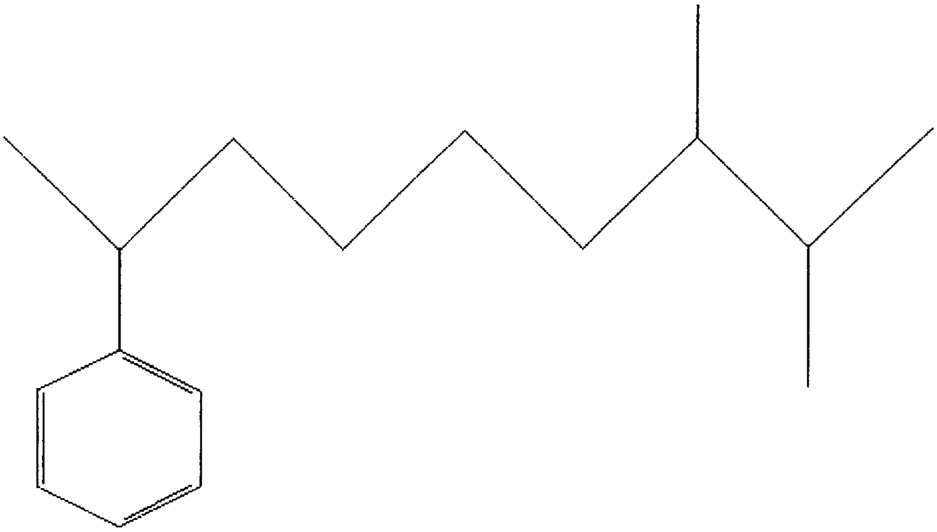

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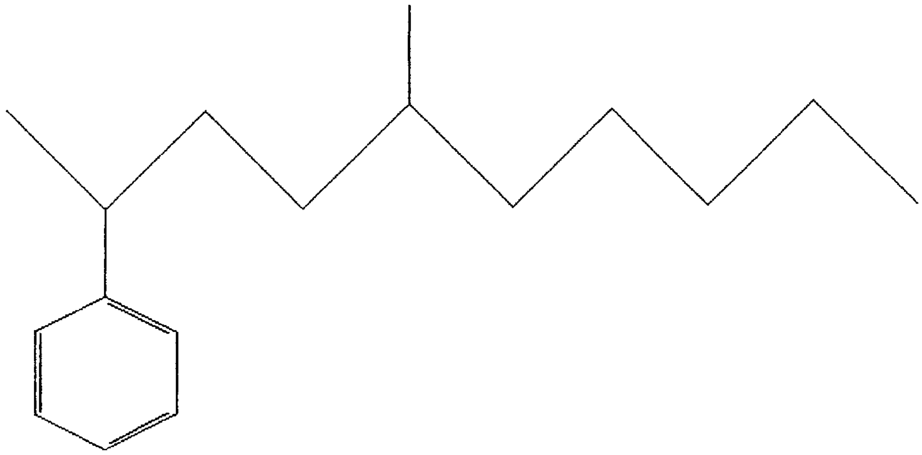

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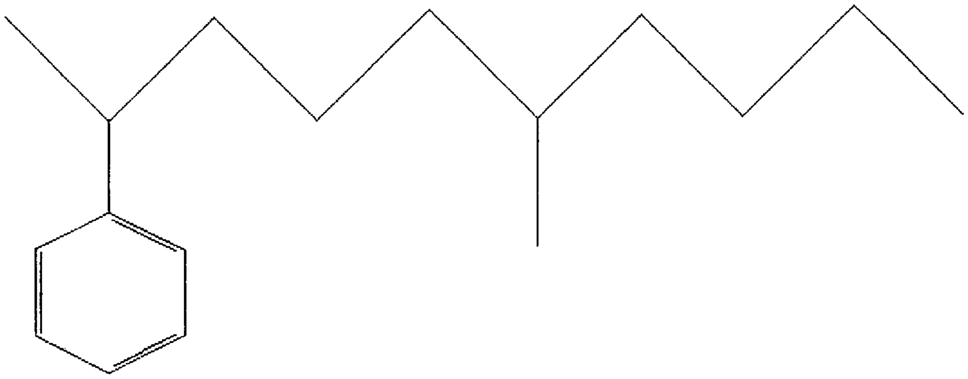

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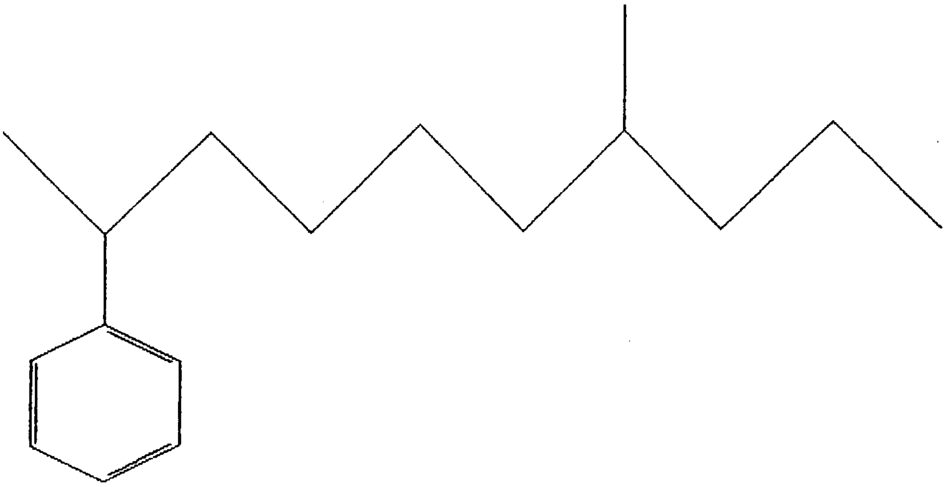

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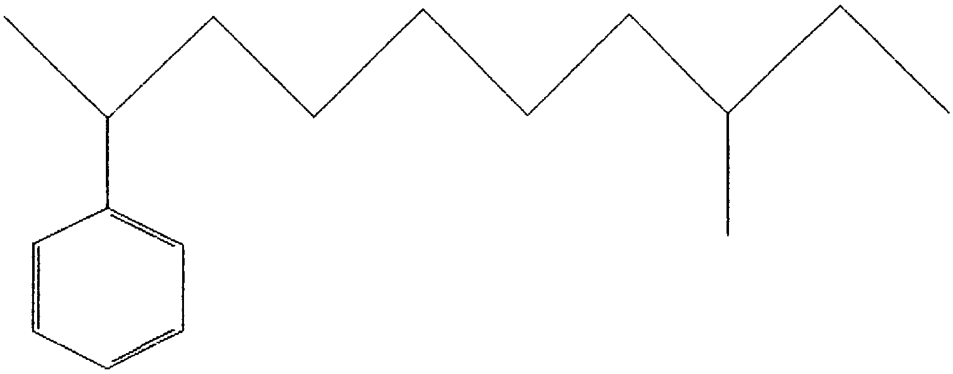

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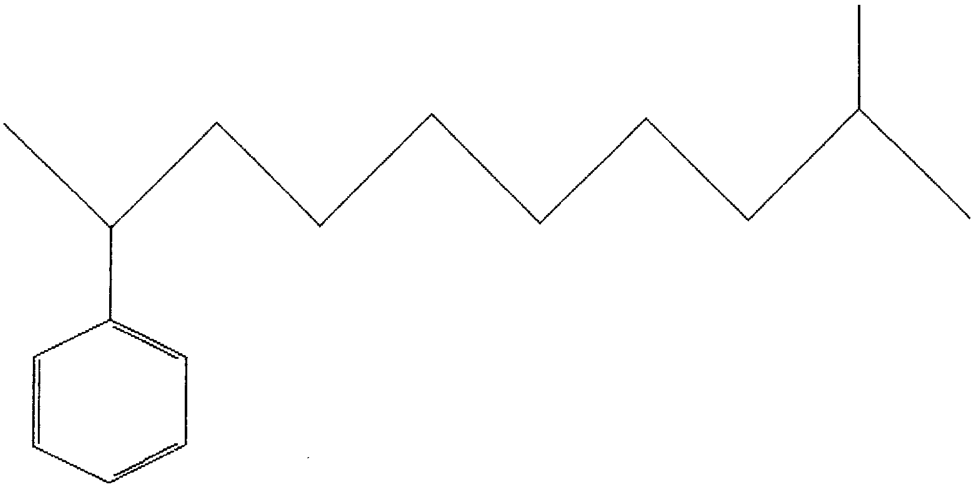

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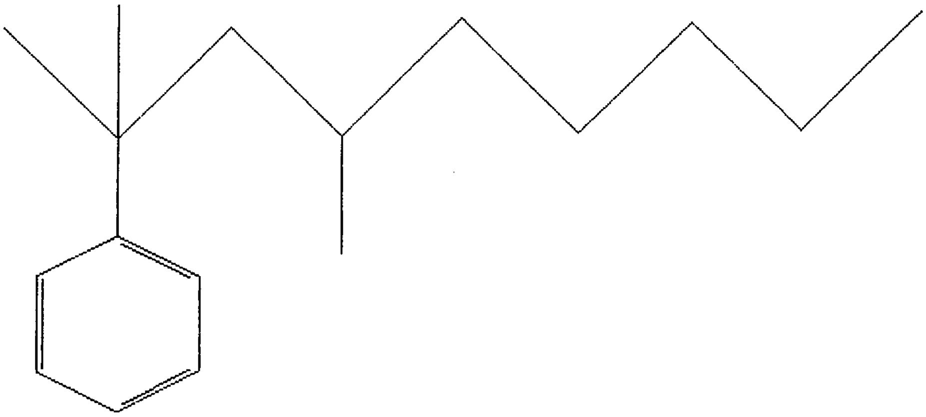

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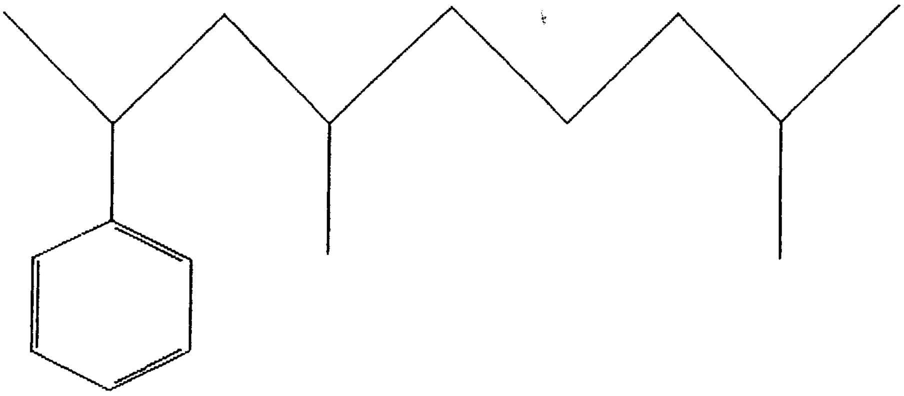

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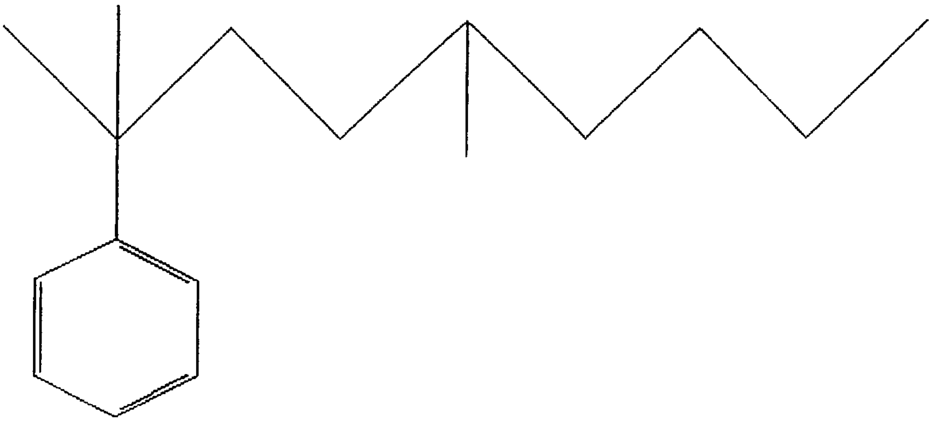

XVI

INTERNATIONAL SEARCH REPORT

International Application No
PCT/ZA 00/00123

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C07C29/16 C07C15/107 C09K7/06 C11D1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C07C C09K C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	GB 2 258 258 A (DAVID BRANKLING) 3 February 1993 (1993-02-03) the whole document ---	16,30,31
E	EP 1 024 123 A (INST FRANCAIS DU PETROL) 2 August 2000 (2000-08-02) paragraph '0002! -----	16

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search 23 November 2000	Date of mailing of the international search report 04/12/2000
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer English, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
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