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(54) **Title**: PROCESS FOR PRODUCING HYDROCARBON COMPONENTS

(57) **Abstract**: The invention relates to a process for producing hydrocarbon components, comprising: providing a crude turpentine feed;and subjecting the crude turpentine feed and hydro- gen gas feed to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst to produce hydrocarbon components. The hydrocarbon components obtained by the process are suitable as fuel composition as such or as an additive in fuel compositions.

PROCESS FOR PRODUCING HYDROCARBON COMPONENTS

FIELD OF THE INVENTION

[0001] The present invention relates to a process for producing hydrocarbon components. More particularly, the invention relates to a conversion of crude turpentine to hydrocarbon components which can be utilized as various fuel grade compositions as such, or as fuel blending components.

BACKGROUND OF THE INVENTION

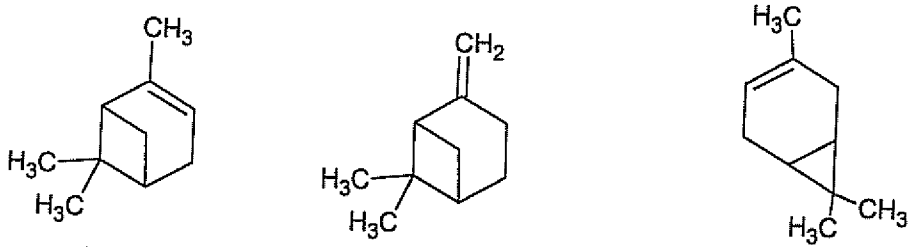
[0002] There is an increasing interest on the use of hydrocarbon components of biological origin from renewable sources in fuels to replace the fossil starting materials. The use thereof is highly desirable for environmental reasons. There is a lot of literature relating to production of fuel composition from biological starting materials like vegetable oils.

[0003] US 2004/0230085 A1 discloses a process for producing hydrocarbon components from wood-based tall oil by a two-step procedure in which a fatty acid fraction of tall oil (TOFA) is subjected to a hydrodeoxygenation step to hydrogenate TOFA in the presence of a desulphurization catalyst and then to an isomerization step to branch the hydrocarbon chain. The products obtained from the isomerization are predominantly i-paraffins which are suitable for use as components in diesel fuels. The hydrocarbon chain lengths suitable for diesel components are typically in the range of C_9–C_{20}.

[0004] US 2009/0020089 A1 discloses a fuel composition comprising at least a tetramethylcyclohexane and optionally an aromatic isoprenoid compound, and a monocyclic and acyclic hydrocarbon component. The fuel composition can be of petrol fuel grade, for example. The tetramethylcyclohexane is produced by hydrogenation of pinene in the presence of a hydrogenation catalyst. Pinene and the starting materials for the optional components included in the fuel composition are produced by microbiological methods using a host cell.

[0005] Tall oil is retrieved from the kraft pulping of coniferous wood as a by-product. From the same process, also crude turpentine is extracted as a by-product. Chemical compositions of said substances differ from each other to a significant extent. Tall oil is mainly composed of fatty acids and resin acids with a chain length varying between C_{12} to C_{18}, while the crude turpentine comprises an oil mixture of volatile unsaturated $C_{10}H_{16}$ terpene isomers derived

from pitch. The main components included in the crude turpentine are α-pinene, ß-pinene and Δ-3-carene.



α-pinene ß-pinene Δ-3-carene

[0006] The crude turpentine derived from wood processing also contains a relatively high amount of sulphur, up to 6%, as a contaminant. In order to be able to utilize the crude turpentine for further applications, sulphur has to be removed from it. In EP 0267833 A1 sulphur is removed from the terpenes included in the crude turpentine through hydrogenation in the presence of a catalyst of cobalt and molybdenum oxides on an inorganic support. It is desired that any chemical transformation of the terpenes is avoided during the hydrodesulphurization procedure.

[0007] At present, the crude turpentine is processed for use as a solvent or odorants in pharmaceutical and cosmetic industry. However, a wide range of utilization of the turpentine, for example for fuel application, is restricted because of the high level of sulphur, and no cost efficient processes for desulphurization and refining the crude turpentine are now present. Accordingly, a large amount of the crude turpentine is now burned without further processing.

BRIEF DESCRIPTION OF THE INVENTION

[0008] It has now been found that crude turpentine that is retrieved as a by-product from processing of wood can be processed for utilization as fuel components in various fuel compositions. The components obtained in the process of the invention can be used as fuel as such or as fuel additives in the fuel compositions. Examples of the fuel compositions are diesel, gasoline, naphtha and jet fuels.

[0009] The unsaturated bicyclic terpenes included in the crude turpentine, having the formulas given above, are too reactive as such for use as fuel components. Also, the high sulphur content of the crude turpentine pre-

vents using it for fuel application. It has now surprisingly found that the above terpenes can be converted to suitable fuel components by using a conventional hydrodesulphurization (HDS) catalyst in a simple and effective manner. For example, hydrocarbon components having a carbon number typical for gasoline components, varying from C_4 to C_{10}, are received from the process of the invention. Also, hydrocarbon components having a carbon number typical for diesel components, varying from C_{10} to C_{28}, are received from the process of the invention. A part of the produced components can also be utilized in other products, such as in cosmetics or pharmaceutical products.

[0010] It is thus an object of the present invention to provide a process for producing hydrocarbon components which may be utilized as fuel components. The object of the invention is achieved by a process defined in the independent claim.

[0011] In a specific embodiment of the invention, crude sulphate turpentine retrieved as a by-product from kraft pulping process of coniferous trees is used as a feedstock. It is an advantage of the process of said embodiment that there is no need of any pretreatment procedure in order to remove sulphur from the crude turpentine prior to its further processing but sulphur can be removed in one and single step using no more than one catalyst. Simultaneously, the crude turpentine is converted to valuable products useful in a fuel application. The products obtained form the process are readily usable in a fuel application, no additional processing of the products for that purpose is needed. The invention thus provides a simple, efficient and economical process for the treatment of the crude turpentine for fuel applications.

[0012] Another object of the invention is to provide a use of the hydrocarbon components obtained by the process of the invention as fuel composition or fuel additives in the fuel compositions. The fuel composition can be gasoline, diesel, naphta or jet fuel.

[0013] A further object of the invention is to provide a fuel composition comprising hydrocarbon components produced by subjecting a crude turpentine feed and a hydrogen gas to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst.

[0014] A still further object of the invention is to provide an additive to be used in a fuel composition comprising hydrocarbon components produced by subjecting a crude turpentine feed and a hydrogen gas to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Figure 1 shows an embodiment of an apparatus of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] An object of the invention is to provide a process for producing hydrocarbon components, comprising:

[0017] providing a crude turpentine feed;

[0018] subjecting the crude turpentine feed and a hydrogen gas feed to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst to produce hydrocarbon components. In an embodiment of the invention, the hydrodesulphurized product obtained by the process of the invention is further subjected to a hydrogen sulphide removal step to remove any residual hydrogen sulphide remained in the hydrodesulphurized product.

[0019] In the present invention, the term 'crude turpentine' is to be understood to include both unpurified and purified or with any method treated crude turpentine of wood origin. Crude turpentine from any source of this origin is suitable for the purpose of the invention. In an embodiment of the invention, the crude turpentine is derived from kraft pulping process of wood in which delignification of wood is performed by means of sodium hydroxide and sodium sulphide. The crude turpentine of this origin is also referred to as crude sulphate turpentine (CST). Due to the process chemicals used, sulphur is included the crude turpentine as a contaminant, amounting typically up to 6% by weight.

[0020] In another embodiment of the invention, the crude turpentine is derived from mechanical pulping of wood, like from grinding and pressure grinding, thermomechanical pulping, or chemimechanical pulping. From these processes, turpentine can be retrieved in gaseous form, provided that the process is equipped with gas collecting means. Also from chipping of wood or saw mills turpentine can be recovered in gaseous form.

[0021] In a further embodiment, crude turpentine is meant to include distillation bottoms from turpentine distillation.

[0022] In a still further embodiment, crude turpentine is meant to include turpentine separated from crude tall oil which is retrieved from kraft pulping process of coniferous trees.

[0023] In a still further embodiment, crude turpentine is meant to include one or more volatile unsaturated terpenes, especially α-pinene, ß-pinene and Δ-3-carene, which is/are isolated from turpentine or any other source.

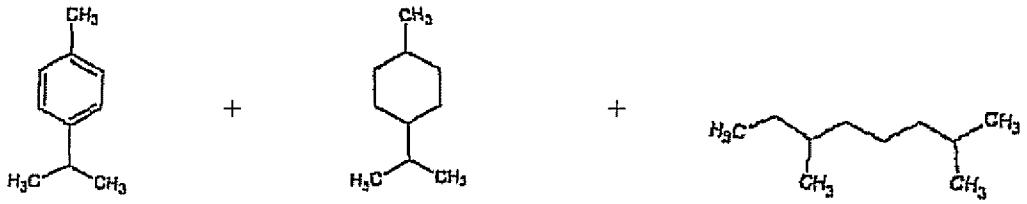
[0024] The crude turpentine can be used in purified or unpurified form.

[0025] In a further embodiment of the invention, also a mixture of various crude turpentines or terpenes can be used as a crude turpentine feed.

[0026] If necessary, an amount of sulphur is added to the mixture to maintain the catalytic activity of the HDS catalyst. The amount of added sulphur depends on the amount of sulphur in the turpentine. The H_2 feed/H_2S relation must be maintained over 0.0001. A suitable amount of sulphur can be easily determined by a man having ordinary skills in the art.

[0027] In the process of the invention, the crude turpentine feed is subjected to hydrodesulphurization together with a hydrogen gas feed. The amount of hydrogen needed to hydrogenate the olefinic bonds of terpene structure is determined by the amount of the crude turpentine feed. A suitable amount of hydrogen can be determined by a man having ordinary skills in the art. Typically, the relation H_2 feed/turpentine feed is in the range of 200 to 1000 Nl/l, for example 600 Nl/l (Nl = normal litre).

[0028] In the hydrodesulphurization step, hereinafter referred to as the HDS step, compounds having bicyclic terpene structure in the crude turpentine feed are decomposed and organically bound sulphur is converted to hydrogen sulphide. Sulphur removal is generally called hydrodesulphurization (HDS). Simultaneously, light gaseous hydrocarbons, like methane, are formed. Gaseous hydrogen sulfide and hydrocarbons can be easily removed from the process. In the HDS step, also olefinic bonds of the terpene compounds are hydrogenated, and at least one of the bicyclic rings is opened. The main components obtained in the process are the following compounds and their isomers:



1-isopropyl-4-methylbenzene + 1-isopropyl-4-methylcyclohexane + 2,6-dimethyloctane

[0029] If no ring opening takes place completely in the HDS step, bicyclic C10 compounds can also be formed, the structure of which corresponds to that of the starting compounds except that the olefinic bonds are reduced. It has been recognized that when operating at lower temperatures, ring opening of the initial compounds is reduced and the relative amount of the bicyclic compounds is increased. The temperature in the HDS step can vary from about 200 to about 425°C, preferably from about 275°C to about 400°C. When operating at higher temperatures, such as at 330°C, there is a tendency that the content of the aromatic hydrocarbon is increased. This effect has a benefit that the octane number of the product is increased and the content of the bicyclic compounds are reduced, respectively. The octane number of the product can thus be controlled by means of process conditions.

[0030] The proportions of the various hydrocarbon components produced in the process can be influenced by controlling the temperature through the catalytic bed. For example, the HDS step can be carried out by using a gradient temperature where the temperature of the catalytic bed in the inlet end is higher than the temperature in the outlet end of the bed. By controlling the temperature in the HDS step, the content of the aromatics in the reaction mixture can be raised up to 30% or more. This has a favourable effect on the octane number of the gasoline composition received by the process of the invention.

[0031] If desired, an octane enhancer such as ethanol can be added to the product obtained by the process of the invention.

[0032] The pressure in the HDS step can vary from 10–150 bar, preferably from 20 to 70 bar. More preferably, the process of the invention is performed at a pressure of about 50 bar.

[0033] The HDS step can be accomplished by using a conventional desulphurization catalyst known in the art. It is to be noted that any catalysts conventionally used for removal of heteroatoms from the organic compounds can be used in the process of the invention. Heteroatoms are typically sulphur, oxygen and nitrogen. Particularly, catalysts which are typically referred to as hydrodeoxygenation (HDO) catalysts in the art can be used in the process. HDO catalysts are especially intended for oxygen removal but are usable for sulphur removal as well.

[0034] It is characteristic of the catalyst that sulphur has to be present to maintain the catalytic activity of the catalyst. In an embodiment of the invention, a mixture of CoO and MoO_3 on the Al_2O_3 support is used as a catalyst. In a specific embodiment of the invention, a mixture of NiO and MoO_3 on the Al_2O_3 support is used as a catalyst.

[0035] After the HDS step, the sulphur is retrieved in the form of gaseous hydrogen sulphide which easily evaporates from the product. The sulphur content of the product mixture can be reduced to a level of 10 ppm at most, the level being within the range stipulated for gasoline fuels. However, in some cases it may be necessary to remove the residual hydrogen sulphide from the product received in the HDS step in order to achieve the above sulphur level. This can be accomplished by various methods, like stripping, flashing or bubbling with inert gas, for example nitrogen gas.

[0036] The process of the invention produces a mixture of hydrocarbon components. In order to be able to utilize the obtained hydrocarbon mixture in an optimum manner, the mixture is further subjected to separation to separate the mixture into various fuel grade hydrocarbon fractions. Separation can be realized conveniently by distillation. Specifically, product streams having distillation curves conforming to those of standardized diesel, gasoline, naphtha and jet fuels are achieved. As a general, hydrocarbons distilling at a temperate range from 180 to 370°C are obtained as a middle distillate conforming to diesel fuel quality standard EN 590. Hydrocarbons distilling at temperatures ranging from 150°C to 210°C are useful as high quality gasoline fuel. They conform to the standard EN 228. Hydrocarbons having a distillation temperature between 160°C and 300°C are useful as aviation applications, generally referred to as jet fuel. The jet fuel conforms to standard ASTM D-1655. Hydrocarbons having a distillation temperature above 370°C is useful as heavy fuel oil. The composition of the products obtained with the process of the present invention depends on the feed material used as well as on the operation conditions of the process.

[0037] The process of the invention provides high quality hydrocarbon components that are useful as fuel or as a fuel additive in the conventional fuel compositions. The invention thus further provides a use of the hydrocarbon components prepared by the process of the invention as fuel composition or as an additive in the fuel compositions. The fuel composition can be gasoline, diesel, naphtha or jet fuel. The properties of fuel composition conform to

those of the desired standards, especially to EN590, EN228 and ASTM D-1655. Preferably, the process of the invention produces hydrocarbon components suitable as gasoline fuel.

[0038] A further object of the invention is to provide a fuel composition comprising hydrocarbon components produced by subjecting a crude turpentine feed and a hydrogen gas to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst.

[0039] A still further object of the invention is to provide an additive to be used in a fuel composition comprising hydrocarbon components produced by subjecting a crude turpentine feed and a hydrogen gas to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst.

[0040] An object of the invention is to provide an apparatus for producing hydrocarbon components. The apparatus is adapted to realize an embodiment of the process of the invention. The apparatus comprises

– a first reactor 1 for catalytic hydrodesulphurization step

– a catalytic bed 3 arranged in the first reactor 1

– a second reactor 2 for hydrogen sulphide removal

– a pipe 4 for feeding a hydrodesulphurized product from the first reactor 1 to the second reactor 2.

[0041] With reference to Fig. 1, the crude turpentine and H_2 are fed to a first reactor 1 including a catalyst bed 3 for hydrodesulphurization of the crude turpentine. The first reactor is for example in a form of a separate tank or a tubular reactor. H_2 feed can be supplied to the reactor 1 either downstream or upstream with the turpentine feed. The unbroken line denotes the downstream procedure, and the dashed line denotes the upstream procedure. The product received from the catalytic hydrodesulphurization reaction of the crude turpentine in a liquid form is fed from the reactor 1 via pipe 4 to a reactor 2. In the reactor 2, any residual hydrogen sulphide is removed from the product. This can be accomplished for example by stripping, flashing or bubbling with inert gas, such as nitrogen.

[0042] The crude turpentine is pumped to the reactor 1 at a desired speed, e.g. at 10g/h. Pumping speed WHSV (weight hourly spatial velocity) of the turpentine feed is proportional to an amount of the catalyst and is calculated according to the following equation:

$$WHSV\left[h^{-1}\right]=\frac{V_{feed[g/h]}}{m_{catalyst[g]}}$$

wherein $V_{feed[g/h]}$ means a pumping velocity of the crude turpentine feed, and $m_{catalyst[g]}$ means an amount of the catalyst;

[0043] WHSV is typically in the range of 0.5 to 6, preferably in the range of 1 to 4. In an embodiment of the invention, WHSV is about 1 to 1.5.

[0044] Hydrogen is fed to the pipe 1 with the turpentine feed for example at a flow of 15L/h. The amount of hydrogen feed is proportional to the amount of the turpentine feed. Typically, the relation H_2 feed/turpentine feed is in the range of 200 to 1500 Nl/l, for example 250 to 750 Nl/l (Nl = normal litre).

[0045] Catalytic hydrodesulphurization reaction and other reactions, i.e. ring opening and saturation of olefinic bonds, are carried out in a catalyst bed 3 packed in the reaction pipe 1. Gaseous compounds composing predominantly of hydrogen sulphide and methane are led to the gas treatment system (not shown in Fig.1). Unreacted hydrogen is cleaned from hydrogen sulphide and methane by means of membrane technique, for example. The cleaned hydrogen is pressurized and can be recycled into the reactor. Hydrogen sulphide and methane are utilized e.g. as energy by burning. Purified hydrogen sulphide can be recycled back to the reactor if additional sulphur is required. The final fuel grade product is recovered via outlet 5.

[0046] The following examples are presented for further illustration of the invention without limiting the invention thereto.

EXAMPLE 1

[0047] Crude turpentine obtained from kraft pulping process, i.e. CST, was used as a crude turpentine feed. The crude turpentine comprised 50-60% α-pinene, 20-30% of Δ-carene, the rest being other terpenes. The sulphur content was about 1.5%.

[0048] In this Example, it was an aim to reach a level of 15% of aromatics in the product. The process parameters are summarized in Table 1 below.

TABLE 1

Feed	CST
Sulphur content (%)	about 1.5
Pumping of feed (V_{feed}) (g/h)	10
Catalyst	NiMo
Amount of catalyst (g)	10
Reaction pressure (bar)	50
H_2 (l/h)	15
WHSV (h^{-1})	about 1
Temperature of bed (°C)	300
H_2 feed/turpentine feed (Nl/l)	1250

[0049] The composition of the product obtained was measured for two samples. For the first sample, no hydrogen sulphide was removed from the product sample. This is denoted by sample number 1 in Table 2 below. For the second sample, hydrogen sulphide was removed from the product sample by bubbling it with gas. This is denoted by sample number 2. The results from the two analyses are summarized in Table 2.

TABLE 2

Sample number	1	2
Sulphur (ppm)	60	10
Density at 15 ºC (g/mL)	0.8124	0.8124
Vapour pressure (DVPE)	<1	<1
MON	75	75
RON	75	75
Benzene content	<0.1	<0.1
Oxidation stability	>720	>720
Hydrocarbon type content		
Olefins	3.2	3.2
Aromatics	13.6	13.6
Unsaturated hydrocarbons (non terpenes)	n.d.	n.d.
Terpenes (%)	n.d.	n.d.
Acyclic hydrocarbons (%)	14	14
Polycyclic hydrocarbons (%)	16	16
Monocyclic hydrocarbons (%)	52	52
Aromatic hydrocarbons (%)	15	15
Others (%)	3	3

n.d.: not detected
MON = Motor Octane Number
RON = Research Octane Number

[0050] The results indicate that the terpene structure is decomposed and the olefinic bonds are hydrogenated so as to provide components that are suitable for use as gasoline components.

EXAMPLE 2

[0051] The same turpentine feed as in Example 1 was used in this Example. It was an aid to reach a level of 30% aromatics in the product. The process parameters are summarized in Table 3 below.

TABLE 3

Feed	CST
Sulphur content (%)	about 1.5
Pumping of feed (V_{feed}) (g/h)	40
Catalyst	NiMo
Amount of catalyst (g)	30
Reaction pressure (bar)	50
H_2 (l/h)	30
WHSV (h^{-1})	about 1.3
Temperature of bed (°C)	340
H_2 feed/turpentine feed (Nl/l)	640

[0052] As in Example 1, the composition of the product obtained was measured for two samples. The sample numbers have the same meanings as in Example 1.

TABLE 4

Sample number	1	2
Sulphur (ppm)	60	6
Density at 15 ºC (g/mL)	0.8202	0.8202
Vapour pressure (DVPE)	<1	<1
MON	87	87
RON	96	96
Benzene content	<0.1	<0.1
Oxidation stability	>1576	>1576
Hydrocarbon type content		
Olefins	1.7	1.7
Aromatics	28.6	28.6
Unsaturated hydrocarbons (non terpenes)	n.d.	n.d.
Terpenes (%)	n.d.	n.d.
Acyclic hydrocarbons (%)	10	10
Polycyclic hydrocarbons (%)	10	10
Monocyclic hydrocarbons (%)	40	40
Aromatic hydrocarbons (%)	30	30
Others (%)	10	10

[0053] The quantities in both of the examples were measured in accordance with the following standards:

Sulphur: EN ISO 20846
Density at 15°C (g/mL): EN ISO 12185
Vapour pressure (DVPE): EN 13016-1
Benzene content: EN 238
Oxidation stability: EN ISO 7536
Hydrocarbon type content: EN 15553

[0054] The test results clearly show that it is possible to influence on the shares of product components. By increasing the content of the aromatic compounds one can increase the octane number of the gasoline components produced from CST.

EXAMPLE 3

[0055] The products obtained in Examples 1 and 2, from which hydrogen sulphide was removed by bubbling with inert gas, were blended with a standard 95E gasoline in various mixing ratios. The mixing ratios were as follows:

Sample 1: 95E gasoline blended with 5% of sample number 2 of Example 1.
Sample 2: 95E gasoline blended with 10% of sample number 2 of Example 1.
Sample 3: 95E gasoline blended with 5% of sample number 2 of Example 2.
Sample 4: 95E gasoline blended with 10% of sample number 2 of Example 2.

TABLE 5

	95E gasoline	Sample 1	Sample 2	Sample 3	Sample 4
MON	85.4	85.3	84.9	85.2	85.0
RON	95.8	95.3	94.5	95.6	95.1

[0056] The test results show that when using the product obtained by the process of the invention as an additive in a standard 95E gasoline, no significant change in the octane numbers was observed.

[0057] It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

CLAIMS

1. A process of for producing hydrocarbon components, comprising:

providing a crude turpentine feed; and

subjecting the crude turpentine feed and hydrogen gas feed to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst to produce hydrocarbon components.

2. The process of claim 1, wherein the crude turpentine feed is selected from a group consisting of crude sulphate turpentine derived from kraft pulping process of wood (CST), crude turpentine derived from mechanical pulping of wood, distillation bottoms from turpentine distillation, turpentine evaporated from crude tall oil, one or more volatile unsaturated terpenes, especially α-pinene, ß-pinene and Δ-3-carene, which is/are isolated from turpentine or any other source, and a mixture thereof, in purified or unpurified form.

3. The process of claim 1 or 2, wherein the hydrodesulphurization catalyst is NiO/MoO_3 on the Al_2O_3 support.

4. The process of any of the preceding claims, wherein the hydrodesulphurization step is carried out at a temperature range from about 200°C to about 425°C, preferably from about 275°C to about 400°C.

5. The process of any of the preceding claims, wherein the hydrodesulphurization step is carried out at a pressure of 10 to 150 bar, preferably at a pressure of 20 to 70 bar, more preferably at about 50 bar.

6. The process of any of the preceding claims, wherein the ratio of H_2 feed to hydrogen sulphide formed in the hydrodesulphurization step is maintained over 0.0001.

7. The process of any of the preceding claims, wherein the ratio of H_2 feed to the turpentine feed is in the range of 200 to 1500 Nl/l, preferably in the range of 250 to 750 Nl/l.

8. The process of any of the preceding claims, wherein the pumping speed of the crude turpentine feed WHSV, measured in accordance with the following equation:

$$WHSV\left[h^{-1}\right] = \frac{V_{feed[g/h]}}{m_{catalyst[g]}}$$

wherein $V_{feed[g/h]}$ means a pumping velocity of the crude turpentine feed, and $m_{catalyst[g]}$ means an amount of the catalyst;

is in the range of 0.5 to 6, preferably in the range of 1 to 4.

9. The process of any of the preceding claims, wherein the residual hydrogen sulphide is removed from the hydrocarbon components obtained by the process in a hydrogen sulphide removal step by stripping, flashing or bubbling with inert gas.

10. The process of any of the preceding claims, wherein a mixture of 1-isopropyl-4-methylbenzene, 1-isopropyl-4-methylcyclohexane and 2,6-dimetyloctane or isomers thereof are formed.

11. The process of any of the preceding claims wherein the hydrocarbon components are subjected to separation to separate gasoline, diesel, naphtha and jet range hydrocarbon fractions.

12. A use of the hydrocarbon components prepared by the process of claim 11 as a fuel composition or as an additive in fuel compositions.

13. The use of claim 12, wherein the fuel composition is gasoline, diesel, naphtha or jet fuel.

14. A use of the hydrocarbon components prepared by the process of any of claims 1 to 10 in cosmetics or pharmaceutical products.

15. A fuel composition comprising hydrocarbon components produced by subjecting a crude turpentine feed and a hydrogen gas to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst.

16. The fuel composition of claim 15, wherein the fuel composition is selected from a group consisting of gasoline, diesel, naphtha and jet fuel.

17. An additive to be used in a fuel composition comprising hydrocarbon components produced by subjecting a crude turpentine feed and a hydrogen gas to a hydrodesulphurization step in the presence of a hydrodesulphurization catalyst.

18. The additive for a fuel composition of claim 17, wherein the fuel composition is selected from a group consisting of gasoline, diesel, naphtha and jet fuel.

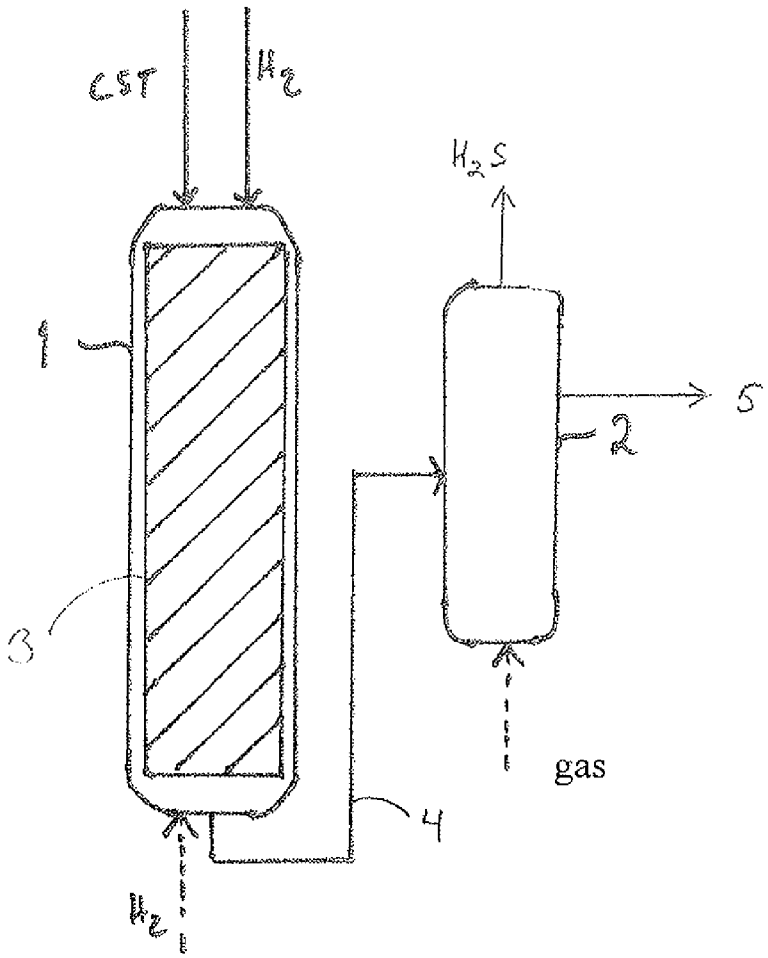


Figure 1