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**Datasheet for the decision
of 7 November 2023**

Case Number: T 0404/21 - 3.3.06

Application Number: 15168210.1

Publication Number: 2940111

IPC: C11B13/00, C10G3/00

Language of the proceedings: EN

Title of invention:
PROCESS FOR PRODUCING FUEL COMPONENTS

Patent Proprietor:
UPM-Kymmene Corporation

Opponents:
Sunpine AB
Neste Oyj

Headword:
PRODUCTION OF FUEL COMPONENTS /UPM-Kymmene

Relevant legal provisions:
EPC Art. 123(2), 83, 54, 56

Keyword:

Amendments - no added subject-matter

Sufficiency of disclosure - (yes)

Novelty - (yes) no implicit disclosure

Inventive step - (yes) no reason to combine prior art from
different technical fields

Decisions cited:

G 0001/03

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0404/21 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 7 November 2023

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Decision under appeal:

**Interlocutory decision of the Opposition
Division of the European Patent Office posted on
24 February 2021 concerning maintenance of the
European Patent No. 2940111 in amended form.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: P. Ammendola
 R. Cramer

Summary of Facts and Submissions

I. Both opponents and the patent proprietor appealed the interlocutory decision of the opposition division to maintain European patent No. **2 940 111** in amended form on the basis of claims 1 to 14 of auxiliary request 2 filed on 2 December 2020, with claims 1 and 8 reading:

"1. A process for producing fuel components from a material of biological origin, comprising the following steps

a) evaporating the material of biological origin for removing impurities from the material of biological origin to produce purified biological material,

b) hydroprocessing said purified biological material in the presence of hydrogen gas and at least one catalyst to form a mixture of hydrocarbon compounds,

c) separating gaseous compounds from said mixture of hydrocarbon compounds to obtain liquid hydrocarbon compounds,

d) fractionating said liquid hydrocarbon compounds to obtain fuel components,

characterized in that the material of biological origin is selected from the group consisting of fish oils such as Baltic herring oil, salmon oil, herring oil, tuna oil, anchovy oil, sardine oil, and mackerel oil; plant oils such as rapeseed oil, colza oil, canola oil, tall oil, crude tall oil, sunflower seed oil, soybean oil, corn oil, hemp oil, linen seed oil, olive oil, cottonseed oil, mustard oil, palm oil, peanut oil, castor oil, Jatropha seed oil, Pongamia pinnata seed oil, palm kernel oil, and coconut oil; and animal fats such as lard, tallow, rendered lard and rendered tallow, and waste and recycled food grade fats and oils, as well as fats, waxes and oils produced by

genetic engineering; animal waxes such as bee wax, Chinese wax insect wax, shellac wax, and lanoline (wool wax); plant waxes such as carnauba palm wax, Ouricouri palm wax, jojoba seed oil, candelilla wax, esparto wax, Japan wax, rice bran oil, terpenes, terpineols and triglycerides or mixtures thereof characterized in that:

(I) the evaporating is accomplished in two evaporation steps by feeding the material of biological origin to an evaporation unit comprising two evaporators, whereby in the first step of the evaporation water and light components are removed at a temperature of 50-250°C and a pressure of 5-100 mbar; and in the second step the fraction containing pitch is minimized by evaporating the liquid product of the first evaporation step at a temperature of 200-450°C and a pressure of 0-50 mbar; or

(II) the evaporating is accomplished in three evaporation steps by feeding the material of biological origin to an evaporation unit comprising three evaporators, whereby in the first step, water and light components are removed at a temperature of 50-250°C and a pressure of 5-100 mbar; and in the second step the liquid product of the first evaporation step is evaporated at a temperature of 180-350°C and a pressure of 0.1-40 mbar, whereby the distillate of the second step is recovered as purified material and the liquid fraction is directed to third evaporation step; and in the third step the fraction containing pitch is minimized by evaporating the liquid fraction of the second evaporation step at a temperature of 200-450°C and a pressure of 0-50 mbar, whereby the purified material recovered from the third step is combined with the purified material of the second step and used as feed material for hydroprocessing."

"8. The process according to any one of the preceding claims 1 to 7, characterized in that the hydroprocessing is accomplished in two steps and the catalyst in the first step is any catalyst containing metals from Group VIII and/or VIB of the Periodic System on a suitable support capable of converting hydrocarbons to n-paraffines and the catalyst in the second step is a catalyst which is selected from the group of Pt, Pd and NiW supported by Al₂O₃, zeolite, zeolite-Al₂O₃ or Al₂O₃-SiO₂."

Claims 2 to 7 and 9 to 14 define preferred embodiments of the process of claim 1.

- II. In the contested decision the opposition division came to the conclusion that the subject-matter of claim 1 was novel over the prior art under Article 54(3) EPC disclosed in **D10** (EP 2 576 731 B1) or **D10a** (WO 2011/148045 A1, international application onto which D10 was based), even when considering common general knowledge apparent from **D5** ("*Tall Oil*", Ullmann's Encyclopedia of Industrial Chemistry, 2005). Moreover, the subject-matter of claim 1 was not obvious from the disclosure of **D1** (US 5 705 722 A) taken in combination with the teaching in either **D3** (WO 2009/125072 A1), **D4** (US 3,644,179), **D5**, **D9** ("*Tall Oil*", J. Drew et al., Pulp Chemicals Association, 1981) or **D12** (US 4,076,700 A).
- III. Opponent 1 withdrew its appeal on 23 June 2021.
- IV. With its grounds of appeal, opponent 2 disputed the above findings of the decision under appeal.

- V. The patent proprietor filed with its statement of grounds of appeal several sets of amended claims, including those labelled auxiliary requests 3 to 6.
- VI. During the oral proceedings on 7 November 2023, opponent 2 confirmed its requests filed in writing and the patent proprietor withdrew its appeal. The final requests of the parties were as follows:

Opponent 2 (now sole appellant) requested that the decision under appeal be set aside and that the patent be revoked

The patent proprietor (now respondent) requested that the appeal be dismissed (main request) or, auxiliary, that the patent be maintained on the basis of the claims of one of auxiliary requests 3, 4, 5 or 6, all filed with its statement of grounds of appeal.

Reasons for the Decision

Main Request

1. Allowability of amendments - Article 123(2) EPC
 - 1.1 The appellant argued that claim 1 as upheld by the opposition division extended beyond the content of the application as filed because of the absence of disclosure in the original patent application of a process characterised by the list of materials of biological origin recited e.g. in original claim 7 in combination with the multi-step evaporation sequences I/II only disclosed from page 7, line 20 to page 8, line 14, of the description of the original application (these passages are hereinafter referred to as **the I/II original description**).

It also argued that original claim 7 described a preferred embodiment of the invention (as apparent from the disclosure of a more general list of these materials e.g. in original claim 6), and thus, such preferred embodiment could not be assumed as combinable with the I/II original description, as the latter related to other preferred embodiments of the invention. Moreover:

a) The I/II original description would appear to the skilled person as exclusively pertaining to preferred embodiments in the processing of **crude tall oil** (hereinafter **CTO**), because this was the sole among the materials of biological origin considered in the application for which it was conventional to designate as "*pitch*" its non-evaporable impurities (i.e. those mostly made of compounds also referred to as "heavy neutral" or "unsaponifiables").

b) The list of materials of biological origin disclosed in original claim 7 would immediately appear to the skilled person as encompassing ingredients possibly not containing any substantial amounts of some or any of the "*impurities*" that can be removed in accordance with the I/II original disclosure.

c) Similarly, the list of original claim 7 also encompassed materials incapable to generate (all) the "purified product" fractions whose collection was also required in the multi-step evaporation sequences I/II. The appellant pointed specifically to the "*terpinols*" also listed in original claim 7, whose boiling points would be so low to render it apparent that these materials would all be collected at the latest as the evaporated fraction of the second step of II (hence

leaving nothing to be evaporated in the third step of II), or probably were already all collected as the first evaporated fraction in each of I and II (thereby leaving nothing to be evaporated in the second and final steps of I, as well as in the second and third steps of II).

Accordingly, not only would there be no implicit disclosure in the application as filed of the features of original claim 7 and of the I/II original description in combination, but these features were even incompatible, and so claim 1 at issue contravened Article 123(2) EPC.

1.2 As to the implicit disclosure in the application as filed of the features of original claim 7 and of those of the I/II original description, the board notes that, if only for the fact that original claim 7 is dependent on the preceding claims 1 (which undisputedly provides the broadest original definition of the invention disclosed in the application as filed) and 3 (which introduces the possibility of multi-step evaporation sequences), the list of materials of biological origin of original claim 7 also is directly and unambiguously disclosed in the application as filed as generally applicable in the context of the invention. Thus, it is also implied in the original disclosure that such list can be combined with the preferred multi-step evaporation sequences according to the I/II original description.

1.3 The respondent requested the board to disregard the three "incompatibilities" (a) to (c) above, in view of the lateness of their submission by the appellant. However, as the respondent also provided manifestly convincing reasons for doubting of their plausibility,

it has turned out unnecessary for the board to decide on their admissibility.

Indeed, all the three "incompatibilities" (a) to (c) appear either based on a manifestly erroneous construction of the wording of original claim 7 and/or of the I/II original description (and thus also of the corresponding wording in claim 1 at issue) or on unsupported allegations disputed by the respondent. In particular, the board's view is as follows:

a') A skilled person reading the I/II original description in the context of the whole application as filed would consider apparent that the term "*pitch*" has been used with a more general meaning (analogous to the conventional one, of describing the impurities of CTO that cannot be evaporated), i.e. as describing the impurities that cannot be evaporated when subjecting (any of) the materials of biological origin disclosed in the original application to evaporation sequences I or II and thus, as describing the residues of these evaporations. Reference can be made, for instance, to the mention of "*the residual fraction containing pitch*" and "*the pitch*" in the initial description of the evaporation step and its advantages, offered from page 3, line 11 to page 4, line 14, of the application as filed, wherein reference is also repeatedly made to "*the material of biological origin*" (and not specifically to CTO only). Hence, the appellant's reasoning in (a) above is found based on an erroneous construction of the I/II original description.

b') A skilled person reading original claim 7 in the context of the whole application as filed would consider implied therein the mandatory presence of substantial amounts of impurities in the listed

materials of biological origin. Indeed, already the fact that the aim of the evaporation step "a)" of the claimed process (as recited in original claim 1 onto which original claim 7 depends) is "*removing impurities*" from the starting material of biological origin, necessarily implies that the materials of biological origin listed in original claim 7 must comprise "*impurities*" that can and must be removed by evaporation step "a)". Moreover, as convincingly stressed by the respondent, it appears undisputable that the products listed in original claim 7 (as well as those even more broadly and generically described in original claim 6) are normally also obtained (from matter found in nature) in concentrated but still impure forms, containing substantial amounts of water and low boiling and non-volatile "*impurities*", due to their "*biological origin*". Hence, and also considering e.g. the original disclosure on pages 3 and 4 of the application already identified above, in which mention is also made of "*light components*" that evaporate first, the skilled person would reasonably equate the "*material of biological origin*" of original claim 1 and thus, also those of the more specific list thereof in original claim 7, to materials that must be in impure form, i.e. as (necessarily) encompassing substantial amounts of water and (possibly) other volatile "*impurities*" (that could also be separated as an evaporated fraction in step a)), and/or of non-volatile "*impurities*" (that cannot be evaporated and thus remain in the final residue of step a)). Hence, the appellant's reasoning in (b) above is found to be based on an erroneous construction of original claim 7.

c') In the absence of any supporting evidence, it appears unplausible that a skilled person aware of the common general knowledge and reading original claim 7

in the context of the whole original application, only upon considering the relatively low boiling points (at atmospheric pressure) of some of the listed materials of biological origin, and in particular those of "terpenols", would expect that these low boiling materials cannot be collected in the evaporated fractions of the evaporation sequences I or II that are designed for collecting the product that is subsequently hydroprocessed. In particular, if only in view of the complex nature of the impure materials that are to be purified, and of the explicit focus in the original application on very special evaporation conditions (as those rapidly occurring in a thin film evaporator or short path evaporator, also mentioned e.g. in the I/II original description), it may not be excluded that, for instance, some substantial fraction of certain components could also be evaporated, even under vacuum, at temperatures that are close to or even higher than the boiling points of these components. In any case, the appellant's submissions as to impossibility of collecting "terpenols" in the third or possibly even in the second evaporation steps of I/II, are based on a mere allegation (as to the possibility of predicting from the boiling points of terpenols in which of the evaporated fractions of the evaporation sequence I or II these compounds would be collected) whose validity has been disputed by the respondent and for which the appellant has provided no supporting evidence. Hence, the appellant's reasoning in (c) above is found not convincing if only for the reason that it is based on an unsupported allegation.

- 1.4 In view of the above considerations, the board concludes that claim 1 does not contain added subject-matter and thus, the patent as upheld by the opposition

division is also found not to be objectionable under Article 123(2) EPC.

2. Sufficiency of disclosure (Article 83 EPC)

2.1 The appellant argued that the definition that "*the catalyst in the first step is any catalyst containing metals from Group VIII and/or VIB of the Periodic System on a suitable support capable of converting hydrocarbons to n-paraffines*" in claim 8, would express an effect for which there would be a large number of conceivable alternatives for which the patent contains no information and thus, the claim would comprise a large number of non-workable embodiments.

In particular, the alleged large number of non-workable embodiments would be apparent when considering that the term "*hydrocarbons*" would "*include branched iso-paraffins, branched/cyclic paraffins (e.g. the polycyclic hydrocarbons formed from resin acids), and aromatics*" and thus, the definition would also embrace catalysts "*capable of converting branched iso-paraffins, branched/cyclic paraffins, and aromatics into n-paraffins, i.e. to straighten out and debranch these molecules so as to obtain a linear n-paraffin*" (point 5.3 of the grounds of appeal). As no catalysts are known to enable such reactions in combination, there would be a lack of reproducibility of many conceivable embodiments of the claimed invention. Thus, as established in reason 2.5.2 of G 1/03 (OJ EPO 2004, 413), claim 8 would contravene Article 83 EPC.

2.2 The board finds that this objection is based on an unrealistic evaluation of the "conceivable alternatives" for the catalyst defined in claim 8.

The appellant assumes as realistically relevant the possibility that the first-step catalyst of claim 8 might also encompass a large number of hypothetical catalysts, which in future could be discovered capable of promoting (combinations of) reactions that are not promoted by any catalyst known until now.

In the board's view, however, the possible existence of any such hypothetical new catalysts, not to mention of a large number thereof, even if it cannot be excluded completely for theoretical reasons, would appear unrealistic to the skilled person, if only in view of the complexities associated with the conversion of aromatics or branched/cyclo paraffins into n-paraffins. In other words, this allegedly large number of hypothetical non-workable embodiments of the catalyst definition in claim 8, would not appear as "conceivable alternatives" to the skilled person, but rather merely theoretical, essentially unrealistic possibilities. The board stresses that the merely theoretical value of the appellant's assumption is rendered even more evident, when considering that it regards as realistic not just the possible existence of many future catalysts (capable of promoting reactions, or even combinations of reactions, for which there are no known catalysts), but also additionally expects that such new catalysts should as well contain "*metals from Group VIII and /or VIB of the Periodic System on a suitable support*". However, in the board's view, the skilled reader of claim 8 would consider that these hypothetical catalysts cannot be expected to exist, and thus, do not realistically constitute "conceivable alternatives" for the first-step catalyst (not to mention to constitute a "large number" of such conceivable alternatives).

The board concurs instead with the opposition division's conclusion in reason 25.3 of the appealed decision, namely that "[t]he person skilled in the art would understand that claim 8 of the opposed patent is about a process wherein hydrocarbons can be converted into n-paraffins, i.e. alkyne or alkenes, and are thereby subjected to a hydrogenation reaction with the catalysts comprising metals of the Group VIII and VIB of the Periodic Table", which appears to at most imply that the "conceivable alternatives" for catalysts to be used in the first step are essentially those (already known or still to be found) which contain "metals from Group VIII and /or VIB of the Periodic System on a suitable support" and that were already known to promote the hydrogenation of alkenes and alkynes at the filing date of the patent in suit, as well as any hypothetical similar catalysts for the same reaction (that might be discovered during the limited time span in which the patent can remain valid).

The board also stresses that further information and/or an implicit reference to common general knowledge as to the specific function of such catalysts is provided in the first two sentences in paragraphs [0041] and [0062] of the patent, wherein the "conversion to paraffins" in the first step is implicitly, but nevertheless clearly described as different from "isomerisation and/or cracking" that takes place in the second step. Hence, it is apparent to the skilled reader of claim 8, that the (reasonably) "conceivable alternatives" may at most encompass new catalysts for the hydrogenation of unsaturated hydrocarbons that, being also required to have a similar structure to the ones already known to promote such reaction, would also benefit to some extent of the common general knowledge (e.g. as to the

preparation and the functioning conditions) relative to the already known catalysts for this reaction.

2.2.1 Hence, in the board's view, the skilled person is certainly able to identify several known catalysts to be used for carrying out the first step of the preferred embodiment of the process of the invention defined in claim 8, and there is no reason to presume the new alternatives possibly (realistically) conceivable for the described catalyst, to be unworkable and present in a large number (as instead implied in the appellant's attempt to consider relevant for the present case reason 2.5.2 of G 1/03).

2.3 For these reasons, it is concluded that claim 8 does not contain insufficiently disclosed subject-matter and thus, the patent in the amended form is also found by the board not to be objectionable under Article 83 EPC.

3. Novelty (Article 54 EPC)

The appellant argued that the subject-matter of claim 1 was anticipated by the prior art under Article 54(3) EPC identically disclosed in D10 and D10a (hereinafter only the relevant passages of D10a are identified).

3.1 It is undisputed that D10/D10a explicitly disclose the application to *inter alia*, "prepurified tall oil" of processing steps that correspond to the sequence "(a)" to "(d)" of the process of claim 1 under consideration, but not the specific evaporation sequences I/II.

3.2 Nevertheless, in the appellant's opinion, the teachings on page 5, lines 15 to 24 of D10a (in particular the passages reading: "*Further, turpentine separated from crude tall oil which is retrieved from kraft pulping*")

process... The feed of biological origin can be purified ... before it is fed to the hydroprocessing step. The purification of the feed of biological origin can be done by standard methods employed usually in edible oil processing... If the feed contains tall oil, depitching the crude tall oil can be used to remove unsaponifiables and ash in the tall oil. All these purification methods are well known in the art ..." emphasis added by the board) would implicitly teach to purify CTO by evaporating light components and by depitching, in accordance with standard purification methods for the processing of edible oils and CTO. The skilled person who wanted to put into practice such teaching would therefore have purified the CTO by means of evaporation at the temperature and pressure ranges respectively reported in particular for "dehydration" and "depitching" of CTO in D5 (see sections 3.2.1 and 3.2.3 on page 9), i.e. in the chapter devoted to tall oil of a technical encyclopedia which would be generally acknowledged as the benchmark reference in all areas of industrial chemistry. Since the very broad temperature and pressure ranges of claim 1 under dispute indisputably encompass all potential variations of the temperature and pressure ranges that could be carried out by the skilled person within the confinement of these well-known dehydration and depitching processes (i.e. those described in D5), D10/ D10a would implicitly disclose the subject-matter of that claim.

3.3 In the board's view, it is however apparent that the ranges of temperature and pressure for dehydration and depitching of CTO mentioned in D5 are not explicitly or implicitly presented therein as necessarily covering all potential variations of the temperature and pressure that could be conceived by the skilled person

within the confinement of the well-known dehydration and depitching process.

In particular, it appears at least equally possible (if not more likely) that the evaporation conditions reported in the second sentence of section 3.2.2 in D5 (in particular the passage reading: "*[t]he ... separation of the fatty and rosin acids from native pitch compounds in CTO and from pitch formed by heating, require a high temperature (270-275 °C), even at low pressure (800-1300 Pa)*" emphasis added by the board) only exemplify how "high" it is necessary to set the temperature, even when using pressures that are "low", thereby implying the possibility to use other pressures (and corresponding other temperatures). Moreover, the comparison of this second sentence of section 3.2.2 on page 9 of D5 with the subsequent teachings in the same section (in particular the passage reading: "*[t]he optimal depitching conditions for obtaining maximum yields and purity of rosin and fatty acid fractions are, however, of delicate nature. At elevated temperature undesirable reactions can occur... Too high a depitching temperature also leads to decomposition and vaporization of high-boiling compounds (neutrals, fatty acids) that affect the quality of rosin and fatty acid fractions negatively*" emphasis added by the board) renders even more likely that the temperature and pressure conditions recited in the second sentence may not coincide with the "optimal depitching conditions" (and thus may possibly imply, for instance, that depitching of CTO at pressures different from "800 - 1300 Pa" and/or at temperatures different from "270-275°C" might also have become well-known).

Hence, the ranges of temperature and pressure described in 3.2.2 of D5 for depitching CTO are not necessarily (implicitly) covering the conditions occurring in any conventional depitching.

Thus, even assuming for the sake of argument in favour of the appellant, that a skilled person reading D10/D10a would be reminded of the common general knowledge presented in D5, the awareness of such knowledge would not justify the conclusion that any reasonable reduction into practice of the teachings in D10/D10a to purify CTO from light compounds and pitch according to methods well-known in the art, would inevitably lead to use of temperatures and pressures encompassed in the ranges recited in 3.2.2 of D5.

Accordingly, the teachings in D5 cannot justify the appellant's conclusion that the prior art disclosed in D10/D10a also necessarily implies the direct and unambiguous disclosure of a method encompassing the evaporation sequences I/II of the invention.

3.4 For these reasons, it is concluded that the subject-matter of claim 1 is novel over D10/D10a and thus the patent in the amended form as upheld by the opposition division is also found by the board not to be objectionable under Article 54 EPC.

4. Inventive step (Article 56 EPC)

The appellant argued that the subject-matter of claim 1 at issue was obvious in view of the prior art.

4.1 At the oral proceedings the appellant argued that the closest prior art would be the process for producing fuel components disclosed in D1, which starts from a

"depitched tall oil", the latter being obtained by subjecting CTO to evaporation ("depitching"), under the conditions disclosed in D1, Example 1 in combination with column 3, lines 26 to 43.

In its written submissions, however, the appellant argued that also the prior art disclosed in D11 could be considered as a suitable starting point for the assessment of inventive step.

- 4.1.1 The board notes the undisputed findings of the opposition (point 27.3 of the appealed decision) that, while D11 discloses no purification by evaporation of the starting renewable feedstock (so as to separate the fraction to be further processed from the heavy fraction), i.e. does not involve any "*evaporating the material of biological origin for removing impurities*" in accordance with the claimed process, D1 at least discloses "depitching" the starting CTO in a thin-film evaporator operating at low pressure (5-10 mmHg corresponding to 6.7 to 13.3 mbar) and at temperatures between 300-320°C.

Therefore, and considering that the contested patent clearly focuses on the technical advantages of purifying the starting feed by evaporation (these are inter alia presented in paragraphs [0008] to [0012], wherein in particular paragraph [0012] clearly identifies the technical advantages of the invention in that "*the material of biological origin purified according to the present invention is ready to be fed to hydroprocessing and the hydroprocessing is able to produce fuel components with excellent yield*" and also that "*pitch can be avoided in the product fractions*"), the board concludes that the prior art disclosed in D11

is manifestly more distant from the subject-matter of claim 1 than that disclosed in D1.

4.1.2 If only for this reason, the board concludes that the prior art disclosed in D1 represents the closest prior art for assessing inventive step of claim 1.

4.2 The claimed subject-matter thus differs from the prior art disclosed in D1 by the multi-step evaporation sequence I or II.

The appellant's attempt to equate the "depitching" step described in column 3, lines 26 to 59 of D1 with the second step of the evaporation sequence I (and thus to identify the difference between the claimed process and the prior art only in the first step of the evaporation sequence I) is found unjustified, because for any given starting material of biological origin, the second step of the evaporation sequence I implies the evaporation of a product that contains water and light impurities in lower amounts in comparison to the CTO of departure (due to the preceding evaporation of these impurities in the first step of the same sequence), whereas in the "depitching" of CTO described in column 3 of D1, the starting material still contains these volatile impurities in their initial amounts.

4.3 Technical problem solved

4.3.1 According to paragraph [0005] of the patent, the prior art disclosed in D1 has the disadvantage "*that in depitching a huge amount of valuable raw material for hydrogenation is lost as residue, i.e. pitch*".

Instead, the process of the invention is described as being able to produce fuel components with excellent

yield while avoiding pitch in the product fractions (see the passages of paragraph [0012] cited above).

This technical advantage over D1 is also implied by the wording in the passages in paragraph [0010] reading "*If the evaporation is accomplished in two steps, i.e. the evaporation unit comprises two evaporators, water and light components are first evaporated from the material of biological origin in order to make the second evaporation step more efficient*", and in paragraph [0029] reading: "*[i]n the depitching according to prior art, the amount of pitch from evaporation is from 20 to 30% from the feed. In the process of the invention the process conditions (temperature, pressure) of the evaporation are controlled in such a way that the heavy neutral components in the feed are withdrawn with the condensate, and not taken out with the heavy fraction as in prior art depitching*".

Moreover, Examples 1 and 2 (paragraphs [0094] to [0097]) of the opposed patent confirm the very low amount of residue remaining from respectively the multi-step evaporation I and II. Even though only the purified product of Example 2 is further subject to hydroprocessing in the subsequent patent example, and even though the CTOs used in Examples 1 and 2 cannot be presumed to necessarily be identical, the fraction (about 92%) of the initial CTO collected as purified product in Example 1, is very high and at least comparable to that collected in Example 2 (about 91.5%), and thus appears likely to also ensure an excellent yield in the subsequent hydroprocessing step. In other words, the high fraction of purified tall oil collected in Example 1 is at least consistent with (if not necessarily demonstrative of) a superior yield of

the process of the invention in comparison to the one in D1, also when using the evaporation sequence I.

The board also stresses that there is no experimental evidence on file questioning the plausibility of the statement in paragraph [0005] of the patent as to the advantage of the invention over D1.

On the contrary, the respondent has derived (see its reply of 19 November 2021, last paragraph on page 12 and first paragraph on page 13) from the compositions of CTO and of depitched tall oil in the Table in column 3 of D1 a plausible evaluation of the fraction of CTO that is removed as pitch in the prior art; according to such evaluation the depitching carried out in D1 loses at least 25% of the starting CTO.

Thus, the board concludes that the patent in suit aims at rendering available a process for producing fuel components from a material of biological origin having improved yield in comparison to the prior art, and that the whole patent disclosure relating to the beneficial effects of the evaporation sequences I and II and to the large amounts of CTO lost in depitching this material in accordance with D1, and the disclosure of D1, render it plausible that the subject-matter of claim 1 actually solves such problem over the prior art of departure.

4.3.2 The appellant however argued that it would not be plausible that the subject-matter of claim 1 actually solved such problem across the broad scope of the claim, for essentially four reasons.

i) The wording of claim 1 would not exclude to start from material of biological origin which contains no or

extremely low amounts of water or light impurities (to be separated in the first evaporation step of the evaporation sequences I/II) and/or of heavy impurities (that would remain in the final residue of these sequences). Thus, no substantial increment in yield of the claimed process could possibly be due to the purification of these materials by means of evaporation sequences I/II.

For the board, this argument fails for substantially the same reasons already given above in 1.3 (b'), in the discussion in view of Article 123(2) EPC (of possible incompatibilities between the presence of materials not containing substantial amounts of water, light and/or heavy impurities in original claim 7 and the I/II original description). Indeed, also the above argument is based on the construction of the biological materials (also disclosed in original claim 7 and listed in claim 1 at issue, as possibly not containing substantial amounts of impurities, i.e. a construction that is erroneous in view of the preceding definition of step "(a)" in the same claim and at odds with the undisputable fact that the listed materials are normally also obtained (from matter found in nature) in concentrated but nevertheless still impure forms (such as CTO), inevitably containing substantial amounts of water and other low boiling and non-volatile "impurities", due to their "biological origin".

ii) If the "*animal fats ... such as tallow*" listed in claim 1 is implied to necessarily be non-purified, then the same would apply to the "animal tallow" which was directly hydroprocessed in Example 5 of D1. Thus, the (allegedly) very high yields in bio-fuel components achieved in this prior art example without removing any impurity, would prove that purification by the

evaporation sequences I/II would inevitably result in lower yield in biofuel components, for at least some of the starting materials of biological origin listed in claim 1.

However, as correctly pointed out by the respondent, this line of argument has been expressed for the first time in the letter of 17 February 2022 (i.e. about seven months after the statement of grounds of appeal). The appellant pointed to the fact that Example 5 of D1 with animal tallow was already referred to in the statement of grounds of appeal, as a prior art for which no comparative experiments were available. However, such argument is manifestly different from that in letter of 17 February 2022, in which it was for the first time alleged that the yield in bio-fuel components achieved by the process of claim 1 when starting from animal tallow was necessarily lower than that of Example 5 of D1. Additionally, the board notes that the respondent not only rebutted the relevance of this new line of argument in the absence of supporting evidence, but also raised further issues to be debated (as to the possible absence of any impurities in the commercial animal tallow used as starting material in Example 5 of D1, and the plausibility of the alleged inevitability of a lower yield with the claimed process).

Hence, the filing of this new argument for the first time with letter of 17 February 2022 has not been accompanied by any justification and is an amendment to the appeal case detrimental to procedural economy. Thus, the board decided not to admit the argument under the provisions of Article 13(1) RPBA.

iii) No improvement in yield would possibly be caused by the evaporation sequence I (or II) for all materials

of biological origin listed in claim 1 with low boiling points, such as the "terpenols", because their low boiling point would render apparent that these materials of biological origin would be lost completely, or to at least to some substantial amount, in the first evaporated fraction (the one containing water and light impurities) in each of the evaporation sequences I/II.

For the board this argument fails for substantially the same reason already given *supra* in 1.3 (c'), in the discussion in view of Article 123(2) EPC (of the possible incompatibilities between the presence of "terpenols" in original claim 7 and the I/II original description). Indeed, also the above argument is based on a qualitative prediction (of the fractions separated in the evaporation sequences I or II, into which terpenols would be found, prediction based on the boiling points of these compounds) whose plausibility has been convincingly disputed by the respondent and that has not been supported by any evidence. Thus, even though the respondent also objected to the admittance into the appeal proceedings of this argument due its alleged lateness, the board did not find it necessary to arrive at a decision on the admittance of such a clearly unconvincing argument.

iv) A superior yield was only demonstrated in the patent examples in connection with the use of a specific catalyst. However, claim 1 was not limited to such catalyst, but rather embraced hydroprocessing steps based on catalysts that the patent examples proved to result in worse yields.

As stressed by the respondent, and undisputed by the appellant, this argument was presented for the first

time at the hearing before the board, without any justification for its late submission.

Additionally, the board notes that the respondent not only rebutted the relevance of this new argument, but also raised further issues to be debated (e.g. if the yield in the worse patent examples would or not still be superior to that achieved in D1) and thus, the admission of this argument would also be detrimental to procedural economy.

Nor can the board see any exceptional circumstances justified with cogent reasons by the appellant, for the very late submission of this argument. Therefore the board decided not to take this new line of argument into account, under the provisions of Article 13(2) RPBA.

- 4.3.3 It follows from the above considerations that the technical problem solved over the closest prior art is that identified above, namely the provision of a process for producing fuel components from a material of biological origin, having improved yield.
- 4.4 The solution to the posed technical problem offered in claim 1 under consideration is a process for producing fuel components from some materials of biological origin that uses the multi-step evaporation sequences I/II to purify the material prior to its hydroprocessing.
- 4.5 Hence, the assessment of inventive step in the present case boils down to the question of whether or not a skilled person starting from Example 1 of D1 and aiming at improving the yield in biofuel products of this prior art process, would have found in the common

general knowledge or in other documents, any teaching rendering it obvious to solve the posed problem by using the multi-step evaporation sequences I/II of claim 1, to purify the CTO prior to hydroprocessing it in accordance with Example 1 of D1, i.e. to solve the posed problem by using the multi-step evaporation sequences I/II instead of the "depitching" described in column 3 of D1.

4.5.1 According to the appellant the motivation to solve the posed technical problem by replacing (in the process disclosed in D1) the depitching of CTO with the multi-step evaporation sequence I would be offered by the common general knowledge, as apparent from D1, D3 to D5 and D9, or by the teachings in D12.

4.5.2 Combination of D1 with common general knowledge

a) In the appellant's view, the skilled reader of column 3, lines 26 to 33, of D1 (reading "[t]he depitched tall oil used in the process of this invention is obtained by treating a crude tall oil. Unsaponifiables are normally removed by evaporation, e.g. by means of a thin-film evaporator (TFE). This system operates with a short contact time (5 to 10 seconds), low pressure (5 to 10 mmHg vacuum) and moderate temperature (300° to 320° C.), which minimizes damage to thermally sensitive tall oil components") would be reminded that the "depitching" of CTO, (normally used to remove unsaponifiables) needs to be carried out so as to minimise damage to thermally sensitive tall oil components. Hence, the skilled person would take into account also the common general knowledge (presented in D5 and D9 and also allegedly reflected in general statements as to the prior art or in specific teachings in the patent documents D1, D3

and D4) as to the importance of removing water and low boiling compounds from the CTO, prior to its depitching, in order to obtain the fine control of the conditions of the latter purification step, i.e. the fine control that is known to be necessary to avoid, in particular, the decomposition or other damages to the thermally sensitive components of tall oil.

b) The board notes that the opposition division rebutted the possibility for the skilled person to combine D1 with this common general knowledge, as the latter belongs to a different technical field (see in points 27.14 and 27.16 of the appealed decision in particular the passages "*the processes of D4-D5 and D12 are aimed at obtaining fatty acids and rosin acids as raw materials...Hence it is considered that the person skilled in the art would not apply the disclosure of D4, D5 or D12 to a process for obtaining fuel components*" and "*[i]n summary, D3-D5, D9, D12... cited by the Opponents are not aimed at improving the yield of fuels from materials of biological origin but are aimed at the separation of high value materials such as fatty acids and rosin acid derivatives from the material of biological origin. In the Opposition Division's opinion, none of these documents would have [been] considered by the person skilled in the art with the aim of reducing the pitch content and increasing the yield of fuels from materials of biological origins*").

c) The board notes further that the essence of the prior art of departure lies indisputably in the finding that also some of the unsaponifiables present in CTO can be hydroprocessed to biofuel (see in column 2 of D1 the passage on lines 23 to 29, reading "*[i]t has surprisingly been found that it is not only the*

unsaturated fatty acids in tall oil that can be converted to cetane improvers, but the diterpenic acids and unsaponifiabiles can also be converted to cetane products"), and thus proposes hydroprocessing biomass feedstock comprising (partially purified) tall oils with an amount of unsaponifiabiles of up to 20% (see e.g. claim 1 of D1). Accordingly, a skilled reader of D1 would consider the acknowledgement in column 3, lines 26 to 33, that "depitching" by evaporation normally removes unsaponifiabiles, in the context of the above-identified essence of the prior art of departure, and also of the mention in the table in column 3 of D1, of a content of (only) 12-16% unsaponifiabiles in the depitched tall oil (obtained from a CTO with 20-30% unsaponifiabiles) that is hydroprocessed in the subsequent Example 1.

Consequently, the skilled person searching for means to improve the yield of the process described in Example 1 of D1, would rather look for measures (such as, for instance, an optimisation of the "depitching" conditions only described in general in D1) that would maximise (e.g. to increase it to about 20%) the amount of unsaponifiabiles in the depitched tall oil that is hydroprocessed in accordance with Example 1, namely measures that enable to collect together with the fatty acids and the other components of tall oil that can be hydroprocessed to bio-fuel components, also most of the 20-30% unsaponifiabiles originally present in the CTO.

Thus, D1 itself points the skilled person to look in a different direction than the technical field of isolating in pure form the valuable components from CTO resumed above (and for which the common general knowledge is possibly described in D5 and D9, and reflected in the patent documents D3 and D4).

Indeed, the aim of the purification carried out by evaporation of CTO in this other technical field is expressed e.g. in the paragraph bridging pages 89 and 90 of D9 as follows: "*The objective of a simple distillation procedure may be to remove most of the pitch (depitching) or to remove some of the more volatile unsaponifiable components as well" (emphasis added by the board). Consistently, also section of 3.2.2 on page 9 of D5 describes the "optimal depitching conditions" as those "for obtaining maximum yields and purity of rosin and fatty acid fractions" (emphasis added by the board).*

d) Accordingly, the overall disclosure in D1 renders the mention in the above-cited passage of column 3 of D1 (that depitching is normally carried under mild conditions so as to ensure that the unsaponifiables remain in the "pitch") manifestly insufficient to motivate a person skilled in the production of bio-fuel components, and aiming at increasing the yield (i.e. at increasing the amount of the initial CTO, inclusive of part of the unsaponifiables, that is finally converted into biofuel) of the process of Example 1 of D1, to take into account measures that are generally used in the different technical field of isolating the valuable components (such as fatty acids and rosin acids) from CTO, and in which the other components of CTO (e.g. the heavy unsaponifiables that are difficult to evaporate as well as the light unsaponifiables) are regarded instead as impurities to be removed from the fatty acids and rosin acids (rather than as useful materials to be collected and further processed together with the fatty acids and rosin acids). Hence, if only for this reason, the board concludes that a skilled person searching for a modification of the method of Example 1 of D1 that would improve the yield in biofuel, would

have no motivation to take into consideration the common general knowledge in the substantially different technical field to which D1, D3 to D5 and D9 belong.

Accordingly, the objection of lack of inventive step of claim 1 based on the combination of D1 with this common general knowledge is found unconvincing for substantially the same reasons indicated in the decision under appeal for rejecting *inter alia* the combination of D1 with D3-D5 and D9.

4.5.3 Combination of D1 with D12

In the appellant's view, the skilled person starting from the prior art process disclosed in column 3, lines 26 to 33, and Example 1 of D1, and aiming at an improvement in yield, would take into consideration the explicit mention in D12 column 12, lines 18 to 30, of a two-step evaporation sequence for depitching tall oil, that would be in accordance with the evaporation sequence I of claim 1 under dispute.

However, in the board's view, also this line of argument fails for the reasons given in points 27.14 and 27.16 of the appealed decision, found convincing by the board as explained in 4.5.2 b)-d) above. Indeed, it is undisputable that also the prior art disclosed in D12 belongs to the different technical field of isolating the valuable components of tall oil, which a skilled person starting from D1 and aiming at improving the yield of the process described in Example 1 would have no motivation to take into consideration.

4.5.4 The appellant's objections of lack of inventive step are therefore found not convincing.

4.6 For these reasons, it is concluded that the subject-matter of claim 1 is not obvious in view of the prior art, and thus the patent in the amended form as upheld by the opposition division is found not to be objectionable under Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated