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**Datasheet for the decision  
of 3 August 2021**

**Case Number:** T 1498/18 - 3.3.06

**Application Number:** 05014426.0

**Publication Number:** 1741767

**IPC:** C10G3/00, C10G45/02, C10G45/58

**Language of the proceedings:** EN

**Title of invention:**  
Process for the manufacture of diesel range hydrocarbons

**Patent Proprietor:**  
Neste Oyj

**Opponents:**  
Haldor Topsoe A/S  
UPM-Kymmene Corporation

**Headword:**  
Manufacture of diesel range hydrocarbons / NESTE OYI

**Relevant legal provisions:**  
EPC Art. 56, 84  
RPBA Art. 12(4)

**Keyword:**

Admittance of auxiliary request 5a - (yes)  
Clarity objection - to be disregarded  
Inventive step - (yes)

**Decisions cited:**

G 0003/14

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 1498/18 - 3.3.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.06**  
**of 3 August 2021**

**Appellant:**  
(Patent Proprietor)

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**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 30 April 2018  
revoking European patent No. 1741767 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman**            J.-M. Schwaller  
**Members:**            L. Li Voti  
                              J. Hoppe

## Summary of Facts and Submissions

I. The patent proprietor's appeal is against the decision of the Opposition Division to revoke European patent no. 1 741 767.

II. With its statement of grounds the appellant defended the patent in the granted version and filed eight sets of amended claims as auxiliary requests 1 to 5, 5a and 6 to 7.

III. With their replies opponents 1 and 2 (in the following the respondents) raised in particular objections under Articles 54 and 56 EPC and cited the documents:

**D1:** US 4,992,605

**D2:** US 5,705,722 A

**D3:** EP 1 396 531 A2

**D7:** E. Laurent et al. "*Study of the hydrodeoxygenation of carbonyl, carboxylic and guaiacyl groups over sulfided CoMo/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> and NiMo/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalyst. II. Influence of water, ammonia and hydrogen sulfide*", Applied Catalysis A: General 109 (1994) 97-115

**D11:** Fangrui Ma et al. "*Biodiesel production: a review*" Bioresource Technology 70 (1999) 1-15

**D20:** G.N. Da Rocha Filho et al. "*Catalytic Conversion of Hevea brasiliensis and Virola sebifera Oils to Hydrocarbon Fuels*" JAOCS, Vol. 69, no.3 (March 1992) pages 266-271

**D21:** John Magee et al. "*Petroleum catalysis in Nontechnical language*", 1998, pages v-ix and 95-106.

The respondents also contested the admittance of auxiliary requests 2 to 7 into the appeal proceedings.

- IV. In response to the board's preliminary opinion, the appellant and respondent 2 submitted further arguments.
- V. During the oral proceedings held on 3 August 2021 the appellant withdrew its main request and auxiliary requests 1 to 5 and made auxiliary request 5a to its main request.

Against the new main request the respondents maintained their objections as to the admittance of the request into the proceedings and of lack of inventive step. Respondent 1 moreover raised a clarity objection and withdrew its request for remittal of the case to the opposition division.

The final requests of the parties were the following:

The appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the claims of auxiliary request 5a, or auxiliary, of one of auxiliary requests 6 or 7, all filed with the grounds of appeal.

Respondents 1 and 2 requested that the appeal be dismissed and that the remaining requests be not admitted into the proceedings.

- VI. Claim 1 according to auxiliary request 5a (new main request) reads as follows:

"1. Process for the manufacture of diesel range hydrocarbons wherein a feed is hydrotreated in a hydrotreating step and isomerised in an isomerisation step, where in the hydrotreatment step a catalyst bed system is used comprising one or more catalyst beds, the hydrotreatment is carried out in the presence of a hydrogenation catalyst, said hydrogenation catalyst containing a metal from the Group VIII and/or VIB of the Periodic System, where the pressure varies in the range of 2-15 MPa and the temperature varying between 200 and 400°C, where in the isomerisation step the pressure varies in the range of 2-15 MPa and the temperature varying between 200 and 500°C, characterized in that the feed comprises fresh feed containing at least 20% by weight of triglyceride C<sub>12</sub>-C<sub>16</sub> fatty acids or C<sub>12</sub>-C<sub>16</sub> fatty acid esters or C<sub>12</sub>-C<sub>16</sub> fatty acids or combinations of thereof and the total feed contains 2000-5000 w-ppm sulphur calculated as elemental sulphur; wherein the fresh feed is of biological origin selected from plant oils/fats, animal fats/oils, fish fats/oils, fats contained in plants bred by means of gene manipulation, recycled fats of the food industry and mixtures thereof."

Dependent claims 2 to 15 relate to particular embodiments of the claimed process.

## **Reasons for the Decision**

Admittance of auxiliary request 5a

1. This request, filed with the proprietor's statement of grounds, is a new one which was not filed before the opposition division. In accordance with the provisions of Article 12(4) RPBA 2007 (applicable according to Article 25(2) RPBA 2020) such a request may be excluded

from the proceedings at the discretion of the board if it could and should have been filed before the department of first instance.

- 1.1 In the present case, it is not in dispute that during opposition proceedings the patent proprietor was confronted with a novelty objection based on a document D20 filed about two months before oral proceedings, and in said oral proceedings, D20 was chosen for the first time as closest prior art in the discussion of inventive step. From the minutes, it can further be inferred that after the opposition division announced that all the requests then on file lacked novelty or inventive step over D20 or infringed Article 123(2) EPC, the proprietor filed an auxiliary request 5 - corresponding to the one filed with the statement of grounds of appeal - with an attempt to overcome all the then pending objections. This request was admitted but found not allowable under Articles 123(2) and 84 EPC. Thereafter the opposition division did not allow the filing of any further request (see minutes point 19.4).
- 1.2 For the board it is directly apparent that during the oral proceedings before the opposition division, the proprietor could not react to the new objections raised against auxiliary request 5, and it could thus file an amended set of claims taking into account these objections only with its grounds of appeal. Therefore the filing of auxiliary request 5a - which overcomes the pending objections raised under Articles 123(2) and 84 EPC and addresses the inventive step - is a direct reaction to the decision of the opposition division, in particular not to allow the filing of further requests.
- 1.3 Given the particular circumstances of the case, the board has therefore decided under Article 12(4) RPBA



2007 not to exclude auxiliary request 5a from the appeal proceedings.

Allowability of auxiliary request 5a

2. *Clarity (Article 84 EPC)*

Claim 1 of auxiliary request 5a is a combination of the features of granted claims 1, 7, 10, 11, 12 and 13. Therefore the clarity objection raised by respondent 1 during oral proceedings concerning the unclear distinction between the hydrotreating and the isomerisation step is to be disregarded (see G 3/14, OJ 2015, 102, catchword).

3. *Inventive step (Article 56 EPC)*

3.1 According to paragraphs [0021] to [0023] of the patent, the purpose of the invention is the provision of an improved process for the manufacturing of diesel range hydrocarbons from bio oils and fats with reduced hydrogen consumption and high selectivity, which process yields a product with improved cold flow properties without decreasing diesel yield during isomerisation, thus maintaining high diesel yield.

3.2 With regard to auxiliary request 5a, the respondents cited documents D2, D3 and D20 as possible starting points for the evaluation of inventive step.

3.2.1 According to established jurisprudence (Case Law of the Boards of appeal of the EPO, 9th edition 2019, I.D.3.1) the closest prior art is normally a prior art disclosing subject-matter conceived for the same purpose or aiming at the same objective or dealing with

a similar technical problem as the claimed invention and having the most relevant features in common.

- 3.2.2 As regards **D2**, this document concerns (column 1, lines 11-13 and 58-60) a process for producing, from a biomass feedstock, additives for diesel fuels having high cetane numbers and serving as fuel ignition improvers. The process does not include explicitly an isomerisation step and does not aim at the same objective as the claimed invention, as it deals with the production of additives for diesel fuels.
- 3.2.3 **D3** (paragraphs [0001], [0011] to [0014], [0032]) concerns an improved process for producing hydrocarbon components from biological raw material suitable as high quality diesel fuel, wherein the process combines a hydrodeoxygenation step (HDO), i.e. a hydrotreating step, and an isomerisation step. The obtained product has improved paraffin performance at low temperature (paragraph [0016]) and the yield of the final product is also improved (paragraph [0062]), in particular over D2. The technical problem dealt with in D3 thus aims at least in part at the same objective as the claimed invention.
- 3.2.4 **D20** (page 266, left column, first full paragraph) being a scientific study on the chemical composition of the liquid resulting from the catalytic conversion by hydrocracking of some vegetable oils to hydrocarbon fuels, it does not aim at the same objective as the claimed invention.
- 3.2.5 It follows that, as already indicated in the board's preliminary opinion, the only document dealing with a similar objective as the claimed invention is document D3, which is also the only document explicitly

disclosing a hydrotreating step followed by an isomerisation step. Therefore it represents the most suitable starting point for the evaluation of inventive step.

It is noted that document D3 discloses in particular (claims 1, 4, 7, 9, 15, 21) a process wherein palm oil (a fresh feed containing at least 20 % by weight of triglyceride C<sub>12</sub>-C<sub>16</sub> fatty acids/esters: see D11, page 2, Table 2) is subjected to an HDO using a catalyst bed system in the presence of a hydrogenation catalyst containing a metal from the Group VIII and/or VI of the Periodic System, such as NiMo or CoMo, on alumina and under the same conditions of temperature and pressure of claim 1 at issue, and thereafter to an isomerisation step under the same conditions of temperature and pressure of claim 1 at issue. This specific embodiment of D3, which thus represents **the closest prior art**, differs from the process of claim 1 according to auxiliary request 5a only in that the total feed does not contain 2000-5000 w-ppm sulphur calculated as elemental sulphur.

- 3.3 It is noted that the patent, despite acknowledging D3 as background art, does not contain any comparison with this closest prior art. In particular, the process exemplified in the patent does not comprise an isomerisation step operated using the counter-current flow principle required by the claims of D3, which step allows to eliminate substantially the impurities and to improve the quality of the resulting diesel range hydrocarbons (see D3, paragraphs [0026] - [0028]).

It can thus not be derived from the examples of the patent whether or not the claimed process can be considered to represent an improvement over that known

from D3. Therefore the technical problem underlying the invention, seen in the light of the closest prior art, has to be formulated, as suggested by the appellant during oral proceedings, as the provision of an alternative process for the manufacturing of diesel range hydrocarbons from bio oils and fats.

The examples of the patent clearly show that a process as claimed leads convincingly to the manufacturing of diesel range hydrocarbons from bio oils and fats. Evidence that this would not be possible across the whole ambit of the claims has not been brought by the respondents. Therefore, for the board it is plausible that the claimed process provides a solution to the above technical problem.

3.4 It is thus still to be evaluated if the skilled person, starting from this closest prior art and faced with the technical problem above, would have obviously modified the process of D3 in order to arrive at a process as claimed, namely whether it would have added a sufficient amount of sulphur compounds to the feed to arrive at a total content of 2000-5000 w-ppm sulphur calculated as elemental sulphur.

3.5 The board notes in this respect that D3 clearly teaches (paragraphs [0006] and [0007]) that sulphur compounds are known poisons which reduce the service life of the catalyst and thus impair the quality of the resulting diesel product. This problem is solved in D3 (see paragraphs [0037], [0047], [0051] and [0056]) by eliminating the poisons like sulphur compounds existing in the feed of departure inter alia by operating the isomerisation step using the counter-current flow principle.

It is further noted that D3 does not suggest to add additional sulphur compounds to the fresh feed which, as stated by the appellant and not convincingly disputed by the respondents during oral proceedings, can only contain sulphur impurities corresponding to a level much lower than the minimum concentration of 2000 w-ppm required in claim 1 at issue. To the contrary, D3 teaches away from adding sulphur to the feed since it is directed to eliminate such catalyst poisons.

- 3.6 The respondents submitted however that it was well-known in the art (for example D2, column 3, line 61 to column 4, line 18; D7, chapter 1 on pages 98-100; D21) to presulphide hydrotreatment catalysts like CoMo or NiMo on alumina, which are also used in D3 (paragraph [0020]), in order to increase their activity and to add some sulphur compounds to the feed in order to maintain their activity.
- 3.7 The board cannot follow this argument because, even though the skilled person would have decided on the basis of this knowledge to use these catalysts in sulphided form also in the process of D3, there is no disclosure in the prior art suggesting to add an amount of sulphur that would necessary result in at least 2000 w-ppm elemental sulphur in the feed in a process like that of D3 without bringing about severe disadvantages in the resulting product quality due to an expectable deactivation of the catalyst at least during isomerisation.
- 3.7.1 In particular, D2 (column 2, lines 15-16) discloses in its example 1 a hydrotreating step at a temperature of 410°C, which is outside the limits of claim 1 at issue and of the preferred temperature of D3 (see claim 9), carried out in presence of a sulfided NiMo catalyst and

with the addition of 1000 w-ppm sulphur to the starting depitched tall oil feedstock, i.e. an amount insufficient to reach the minimum amount of 2000 w-ppm required by claim 1 at issue. Even though this document encompasses the use of feeds as required in claim 1 at issue (see for example claim 7 citing palm oil) or of lower temperatures (see example 5 describing the hydrotreating of animal tallow - a feed according to claim 1 at issue - at a temperature of 370°C), the hydrotreating step disclosed in D2 is not followed by an isomerisation step like in the process of D3.

Therefore, in the board's view, this document would not prompt the skilled person to add even higher amounts of sulphur to the feed used in the different process of D3 without expecting severe disadvantages due to an expectable deactivation of the catalyst at least during isomerisation.

- 3.7.2 As regards document D7 (page 98, 1. Introduction, lines 1 to 4), this relates to a study of the HDO reactions occurring in the stabilisation or upgrading of pyrolysis oils obtained from biomass aiming at the elimination of organic groups like carbonyls, carboxyls and guaiacyls. Such oils contain in particular specific organic compounds (see Tables 1 to 4 concerning the conversion of 4-methylacetophenone, diethyldecane-dioate and guaiacol) which, as stated by the appellant during oral proceedings and not contested by the respondents, would not be found in a fresh feed of biological origin of the type of claim 1 at issue. Moreover, D7 does not aim at the preparation of a diesel composition by HDO and isomerisation as in D3.

Therefore, even though this document suggests the use of about 2000 ppm sulphur for increasing the

decarboxylation selectivity of NiMo or CoMo catalysts (see Table 4 on page 107: 49 mmol/l H<sub>2</sub>S corresponding to 2000 w-ppm, according to respondent 2's submission), this is a very specific disclosure directed to the treatment of a very different feedstock, and so it would not be taken into consideration by the skilled person looking for a possible modification of the process of D3.

- 3.8 In the board's view, it follows from the above considerations that it was not obvious for the skilled person, faced with the posed technical problem, to modify the process of D3 by adding such an amount of sulphur as required by claim 1 at issue to the feed in the expectation of arriving at a process which nevertheless allows a high yield of diesel range hydrocarbons as shown in the patent.
4. The board thus concludes that the subject-matter of claim 1 according to auxiliary request 5a involves an inventive step (Article 56 EPC).

A similar conclusion applies to dependent claims 2 to 15.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form based on the claims of auxiliary request 5a, filed with the grounds of appeal and a description to be adapted where appropriate.

The Registrar:

The Chairman:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated