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Datasheet for the decision of 20 September 2011

Case Number: T 1245/09 - 3.3.06

Application Number: 01107717.9

Publication Number: 1138750

IPC: C10G 69/12

Language of the proceedings: EN

Title of invention:
Integrated hydroisomerization/alkylation process

Patentee:
UOP LLC

Opponent:
Shell Internationale Research Maatschappij B.V.

Headword:
Gasoline hydroisomerization/alkylation/UOP

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 54(1)(2), 56

Keyword:
"Novelty - all requests (yes)"
"Inventive step - all requests (no)"
"Public availability of prior art disclosure (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1245/09 **-** 3.3.06

D E C I S I O N
of the Technical Board of Appeal 3.3.06
of 20 September 2011

Appellant: (Opponent)	Shell Internationale Research Maatschappij B.V. Carel van Bylandtlaan 30 NL-2596 HR Den Haag (NL)
Representative:	-
Respondent: (Patent Proprietor)	UOP LLC 25 East Algonquin Road Des Plaines, IL 60017-5017 (US)
Representative:	Dossmann, Gérard Casalonga & Partners Bayerstrasse 71-73 D-80335 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted 24 March 2009 concerning maintenance of European patent No. 1138750 in amended form.**

Composition of the Board:

Chairman: L. Li Voti
Members: E. Bendl
J. Geschwind

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division to maintain the European patent 1 138 750 in amended form.

II. In opposition procedure the Opponent raised inter alia objections with regard to sufficiency of disclosure, lack of novelty and lack of inventive step and cited among others documents

D6: US-A-5 648 586
D7: STRATCO, The 1990 Alkylation Seminar: J.-L. Nocca, C5's Selective Hydrogenation and Etherification
D8: STRATCO, The 1990 Alkylation Seminar: K. Masters, Amylene Alkylation
D9: NPRA Q&A Sessions: C5 alkylation questions (from 1989 to 1993)
D17: STRATCO, The 1990 Alkylation Seminar: J.-L. Nocca, Etherification
D18: STRATCO, The 1990 Alkylation Seminar: J.-L. Nocca, Upgrading Alkylation Feedstocks by Hydrogenation
D21: WO-A-97/03148

III. In its decision the Opposition Division concluded inter alia that the Opponent was not allowed to start argumentation for the first time from a combination of documents D7,D17 and D18 at a very late stage of the procedure, that novelty was given and that the requirement of inventive step was met since, although no technical effect had been shown in the patent-in-suit, the prior art did not incite the skilled person

to specifically select a feed comprising cyclopentene for carrying out the claimed method.

IV. The Opponent/Appellant filed an appeal against this decision, objected that the requirements concerning sufficiency of disclosure, novelty and inventive step were not met and filed inter alia document

D30: combination of documents D7+D17+D18.

V. The Respondent disputed the Appellant's objections and filed in the oral proceedings before the Board, which took place on 20 September 2011 in the absence of the Appellant, a new main request and three auxiliary requests.

VI. The **main request** comprises eight claims, the only independent claim thereof reading as follows:

"1. A method for processing a hydrocarbon feedstock (16) comprising at least one C5 olefin comprising the steps of:
a) hydroisomerizing said hydrocarbon feedstock (16) in a hydroisomerization zone (18) so as to produce a hydroisomerate stream (26), wherein said hydroisomerizing of step a) includes: 1) hydrogenation of isoprene and piperylene to mono-olefins; 2) conversion of a portion of the cyclopentene to cyclopentane; and 3) isomerization of 1-pentene to 2-pentene; and
b) passing said hydroisomerate stream (26) to an alkylation unit (24) and alkylating said hydroisomerate stream (26) by a branched chain paraffin hydrocarbon to produce an alkylate stream (32)."

Claim 1 of the **first auxiliary request** differs from Claim 1 of the main request in the addition of the passage "wherein, prior to step a), a gasoline range hydrocarbon stream (14) comprising hydrocarbons having at least three carbon atoms per molecule is separated into a C6+ gasoline blending stock (20) and into said hydrocarbon feedstock (16) comprising at least one C5 olefin" at the end of Claim 1.

In Claim 1 of the **second auxiliary request** the passage "b) passing said hydroisomerate stream (26) to an alkylation unit (24)" in Claim 1 was amended to read "b) passing said hydroisomerate stream (26) **directly** to an alkylation unit (24)" (emphasis added), as compared to Claim 1 of the main request.

The **third auxiliary request** comprises in Claim 1 the amendments of Claim 1 of the first auxiliary request and of Claim 1 of the second auxiliary request.

VII. The main arguments of the **Appellant** were as follows:

Admissibility of documents D7,D8,D17,D18,D30
Documents D7,D17 and D18 relate to a single presentation and have to be regarded as one document, i.e. document D30. D7,D8,D17 and D18 have been distributed in September 1990 at the Stratco 1990 Alkylation Seminar.

Novelty
Novelty of Claim 1 is destroyed due to the disclosures D30,D21,D6,D8 and D9.

Claim 1 of the main request requires that a portion of the cyclopentene is hydrogenated to cyclopentane. This is not a separate feature but goes inherently together with the other hydrogenation steps of Claim 1, as typical C5 olefin-comprising feedstocks comprise compounds like cyclopentene and the hydroisomerization conditions defined in the prior art documents are sufficient to convert cyclopentene to cyclopentane.

Therefore, novelty of the claimed subject-matter is not given.

Inventive step
D7 is the closest prior art, alternatively D6, D21 or D30 may be taken.

The problem to be solved is how to decrease the acid soluble oil (ASO) content and to increase octane number. No inventive step can be seen in the solution provided, as no technical effect with respect to the prior art has been evidenced by the Respondent.

The main arguments of the **Respondent** were as follows:

Admissibility of documents D7,D8,D17,D18,D30
It is unknown, whether these documents were distributed at the conference or afterwards. It is also not known whether the seminar was public and whether the participants were bound to a confidentiality agreement.

Thus, the documents should not be admitted into the proceedings.

Novelty

None of the documents teaches all three hydrogenation steps presently claimed. Therefore, the requirement of novelty is met.

Inventive step

D7 is the closest prior art. This document describes an etherification step prior to the alkylation step, which is to be avoided in the patent-in-suit.

None of the documents referred to by the Appellant cites the hydrogenation of cyclopentene to cyclopentane. The effect achieved by this difference is a reduction of the ASO content. This is shown in the patent-in-suit in Table 5, Runs 7, 8.

Thus, the claimed subject-matter involves an inventive step.

VIII. The Appellant requested in writing that the decision under appeal be set aside and the patent be revoked.

The Respondent requested that the patent be maintained on the basis of the main request or in the alternative on the basis of one of the auxiliary requests 1 to 3, all of them filed during the oral proceedings.

Reasons for the Decision

1. *Articles 83 and 123(2),(3) EPC*

1.1 The Appellant raised an objection concerning insufficient disclosure with regard to the conversion of cyclopentene to cyclopentane of the claimed method.

1.2 The Board does not share this view. However, given the fact that the requirement of inventive step is not met by all requests, the Board does not see any need to comment in detail on this issue as well as on the requirements of Article 123(2),(3) EPC with respect to the amendments made.

2. *Admissibility of documents D7,D8,D17,D18,D30*

2.1 Documents D7,D8,D17,D18,D30 are written disclosures allegedly relating to presentations held in September 1990 at the Stratco 1990 Alkylation Seminar. In the oral proceedings before the Board the Respondent did not doubt that the documents of the Seminar were distributed to the participants of this seminar. The issue was rather, **when** this happened, whether the seminar was **open to the public** and whether the participants were bound to a **confidentiality agreement**.

2.2 The introduction of document D30 was already refused by the Opposition Division given the late stage of the procedure at which the introduction of D30 was proposed. Additionally, the individual parts of this document, i.e. D7,D17 and D18 were already part of the procedure.

2.3 The Board does not see any reasons for deviating from the Opposition Division's view. Even more so, as each of the individual disclosures represents an individual lecture. The fact that they were held by the same lecturer does not necessarily mean that their contents have to be seen in context. On the contrary, in particular D17 appears to be an independent lecture given the structuring and the index of the individual chapters as shown on page 2.

Thus, the Board does not introduce D30 into the appeal procedure.

2.4 With regard to the individual documents D7,D8,D17,D18 no proof has been submitted by the Respondent supporting the allegation that the seminar was not open to the public or that the participants were bound by a confidentiality agreement. It was not denied by the Respondent that the seminar's participants received the printout of the written submissions. The only question to be clarified is, whether this happened at the seminar or some time, i.e. a couple of weeks or months later.

However, this question is of no relevance for the present appeal, as the seminar took place in September **1990**, whereas the priority date of the patent-in-suit is March **2000**. Given the length of this period, the skilled person was certainly able to obtain the documents well before the present priority date.

2.5 Given the fact that a confidentiality agreement or restrictions in the participation of the seminar have not been proven and that the priority date of the

patent-in-suit is almost ten years after the seminar, documents D7,D8,D17,D18 are considered to have been publicly available at the priority date of the patent-in-suit and to represent state of the art according to Article 54(2) EPC (1973).

3. *Main request*

3.1 Novelty

3.1.1 The Appellant has argued that the hydrocarbon feedstock according to Claim 1 of the main request may contain only one or a combination of two C5 olefins. This would imply that not all three steps of 1) hydrogenating isoprene and piperylene to mono-olefins, 2) conversion of cylopentene to cyclopentane and 3) isomerization of 1-pentene to 2-pentene need to be carried out in the process as claimed.

3.1.2 Given the wording of the main request as amended in the oral proceedings and taking into account that a possible contradiction with the dependent claims has been removed, the Board does not have any doubt that the use of the wording "step a) includes: 1) [...], 2) [...] **and** 3) [...]" (emphasis added) means, that all three features 1), 2) and 3) have to be carried out when processing feedstock according to the method of Claim 1.

3.1.3 None of the prior art documents cited by the Appellant discloses **directly and unambiguously** all three steps. This is particularly true for D6,D8,D9,D21 cited by the Appellant.

3.1.4 Therefore, the requirement of novelty is met by Claim 1 of the main request.

3.2 Inventive step

According to the problem and solution approach, which is used by the Boards of Appeal of the European Patent Office in order to decide on the question of inventive step, it has to be determined which technical problem the object of a patent objectively solves vis-à-vis the closest prior art document. It also has to be determined whether or not the solution proposed to overcome this problem is obvious in the light of the available prior art disclosures.

3.2.1 The patent-in-suit aims at providing a method for reducing the C5 olefin concentration of a hydrocarbon feedstock while maintaining the octane rating (paragraph [0009] of the patent-in-suit) and reducing the ASO concentration (paragraph [0021] of the patent-in-suit).

The Appellant suggested document D7 or alternatively D6 or D21 as the closest prior art.

D7 reports on the C5 stream utilization for the alkylate production in order to decrease the olefin content and to achieve an increase in the octane number (page 2, first paragraph; see also point 3.2.5 hereinafter).

D6 refers to the alkylation of isobutane with pentenes and the production of a high octane isopentane gasoline blending component as well as the reduction of

sulphuric acid consumption during alkylation (col. 1, lines 11-18).

D21 relates to the selective hydrogenation of diolefins and acetylenic compounds and the isomerization of olefins in an olefin rich stream containing sulphur impurities (page 1, lines 6-9).

Thus, given the greater similarity of the problem to be solved with the one of the patent-in-suit, D7 is considered to represent the closest state of the art. This is also in agreement with the findings of the parties.

3.2.2 The problem to be solved vis-à-vis D7 is therefore the reduction of the ASO concentration.

3.2.3 As the solution to this problem the method according to Claim 1 of the main request has been suggested.

3.2.4 The Board cannot see that the posed problem has been solved over the entire scope claimed. The only proof that allegedly a reduction of the ASO concentration has been achieved are the examples on file, in particular Runs 7 and 8.

The starting material for both runs appears to be different, the only common feature being, as conceded by the Respondent, that a "C5 olefin fraction from a full range FCC gasoline" was used as starting material. No proof has been provided that an **identical** starting material was used; a comparison of the results can therefore not be made.

Consequently, no effect has been demonstrated by the patent-in-suit and the problem to be solved has to be re-defined in a less ambitious way as the provision of a method **alternative** to the one described in D7.

3.2.5 The question to be clarified is, whether it would have been obvious for a person skilled in the art, when starting from D7, to arrive at the invention of the patent-in-suit.

D7 describes the utilization of a C5 stream for TAME and alkylate production (D7, page 2, line 2). According to Respondent's argumentation this means that an etherification step always precedes the alkylation step.

The Board cannot follow this line of argumentation, as D7 does not give a hint towards the **combination** of etherification and alkylation. Subsequent to the introductory part mentioning the C5 stream utilization for TAME and alkylate production, D7 continues with the chapter "Alkylation pretreatment" and the further chapter "TAME feedstock pretreatment". Alkylation and TAME production are therefore treated in D7 as two separate options.

In addition, under the heading "alkylation pretreatment" on page 3 of D7, reference is made to "hydrotreating alkylation feedstocks", the removal of diolefins/dienes and the isomerization of pentene-1 to pentene-2.

Thus, D7 differs from Claim 1 only in the step of converting a portion of the cyclopentene to cyclopentane.

Claim 1 of the main request only requires that a (small) portion of the cyclopentene needs to be converted to cyclopentane. However, it was known that cyclopentene can be part of a C5 stream to be hydrogenated and alkylated (D6, column 1, line 43). Thus, it was obvious for the skilled person to use such a C5 stream within the teaching of D7 and to expect a partial hydrogenation of cyclopentene to cylopentane under the used hydroisomerization conditions. Consequently, given the teaching of D6 and D7, the claimed method is considered to be derivable from the prior art.

The requirement of Article 56 EPC (1973) is therefore not considered to be met by the main request.

4. *First auxiliary request*

4.1 Novelty

4.1.1 Claim 1 of the first auxiliary request distinguishes from Claim 1 of the first auxiliary request in the additional feature "wherein prior to step a), a gasoline range hydrocarbon stream (14) comprising hydrocarbons having at least three carbon atoms per molecule is separated into a C6+ gasoline blending stock (20) and into said hydrocarbon feedstock (16) comprising at least one C5 olefin".

4.1.2 Since this additional feature further limits the scope of protection compared to Claim 1 of the main request, the same considerations as made above are of relevance.

4.2 Inventive step

4.2.1 The separation of a hydrocarbon into a C5 olefin stream and a C6+ stream is already known from the state of the art relating to the same technical field (see D6, Fig. 2 and col. 5, lines 27-32).

4.2.2 Since no effect has been attributed to this additional feature, the claimed subject-matter is considered to be derivable from a combination of documents D7 and D6.

5. *Second auxiliary request*

5.1 Novelty

5.1.1 In Claim 1 of the second auxiliary request the term "directly" was added after "b) passing said hydroisomerate stream (26)" into Claim 1 of the first auxiliary request.

5.1.2 Again, since this feature further restricts the scope of Claim 1 compared to Claim 1 of the main request, the considerations concerning novelty for the main request apply as well.

5.2 Inventive step

5.2.1 Although the term "directly" cannot be found expressis verbis in the patent-in-suit, it is derivable from the figure that the hydroisomerizing step may be "directly"

followed by an alkylation step. The Respondent explained the meaning of "directly" as follows: no further reaction step (such as an etherification step) takes place between the hydrogenation and the alkylation step.

5.2.2 This feature can also be found in D6, Fig. 2 and col. 5, lines 56-64): the hydrogenated C5 feed 204 passes the cooler 208 and goes directly to the alkylation reactor 220.

5.2.3 Thus, the additional feature, which does not cause any effect, is also derivable from D6 and Claim 1 of the second auxiliary request does not meet the requirement of Article 56 EPC (1973) due to the combination of D7 and D6.

6. *Third auxiliary request*

6.1 Novelty

6.1.1 Claim 1 of the third auxiliary request contains the added features of the first and the second auxiliary requests as discussed above.

6.1.2 Therefore, also this request meets the requirement of novelty based on the same considerations as explained above.

6.2 Inventive step

6.2.1 Since both additional features are derivable from the method as described in Fig. 2 of D6 and both features do not cause any effect, also their combination is

derivable from D6 and the subject-matter of auxiliary request 3 is obvious from a combination of D7 and D6.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar | The Chairman

D. Magliano | L. Li Voti