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D E C I S I O N
of 14 November 2000

Case Number: T 0017/97 - 3.3.1

Application Number: 90111786.1

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IPC: C07C 69/80

Language of the proceedings: EN

Title of invention:
Method for producing an ester

Patentee:
MITSUBISHI KASEI VINYL COMPANY

Opponent:
Cognis Deutschland GmbH

Headword:
Method for producing an ester/MITSUBISHI KASEI VINYL

Relevant legal provisions:
EPC Art. 56, 113(1), 114(2)
EPC R. 57a, 58(2), 67, 71a(1)

Keyword:
"Amendments submitted during oral proceedings - appropriate and necessary"
"Inventive step (yes) - non-obvious solution"
"Substantial procedural violation (no) - erroneous assessment of document"

Decisions cited:
G 0004/92, T 0536/88, T 0501/94

Catchword:
-



Case Number: T 0017/97 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 14 November 2000

Appellant: Cognis Deutschland GmbH
(Opponent) Cognis IP
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Representative: -

Respondent: MITSUBISHI KASEI VINYL COMPANY
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Representative: Wächtershäuser, Günter, Prof. Dr.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 29 October 1996
rejecting the opposition filed against European
patent No. 0 405 332 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: A. J. Nuss
Members: P. F. Ranguis
R. T. Menapace

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the decision of the Opposition Division posted on 29 October 1996 rejecting pursuant to the provisions of Article 102(2) EPC the opposition against the European patent No. 0 405 332 (European patent application No. 90 111 786.1).

II. The decision under appeal was based on claims 1 to 6 as granted. Claim 1 read as follows:

"1. A method for producing an ester, which comprises reacting an organic acid or its anhydride with an alcohol in the presence of a catalyst of an organometallic compound, wherein an esterification reaction product containing the catalyst, is treated with a polyhydric alcohol consisting of carbon, hydrogen and oxygen atoms."

III. The Opposition Division found that the subject-matter of claim 1 was novel and involved an inventive step in view of the following documents cited with the statement of grounds of opposition:

(1) EP-A- 0 219 284

(2) US-A- 3 121 109

(3) BE-A- 582 260

(4) FR-A- 1 301 107

and document:

(6) Houben-Weyl: "Methoden der organischen Chemie", 1963, No. VI/2, pages 30 to 34

introduced by the Appellant (Opponent) during the oral proceedings and held admissible by the Opposition Division as general technical knowledge.

The Opposition Division also held in its decision that document

(5) US-A- 4 506 091,

introduced by the Appellant during the oral proceedings, had not to be considered in accordance with Article 114(2) and Rule 71a(1)EPC since this document did not affect the novelty of the subject-matter of claim 1 and was not relevant to inventive step due to the structural difference of the chelating agent, namely the required presence of a trivalent nitrogen or phosphorus atom in the chelating agent according to document (5).

IV. The Appellant's submissions in the written procedure can be summarised as follows:

- The decision of the Opposition Division to refuse to introduce document (5) in the opposition proceedings amounted to a substantial procedural violation entitling the Appellant to reimbursement of the appeal fee. Firstly, document (5) was cited in the European search report and the European patent application had been restricted in the course of the examining proceedings in view of this document. According to decision T 536/88 (OJ EPO 1992, 638), this document formed part of the opposition proceedings. On the other hand, the Respondent had concurred in the oral proceedings held before the Opposition Division that only that state of the art could qualify as the closest state of the art.

- Concerning inventive step, document (5) related to a process for preparing esters useful as plasticizers and dealt, in particular, with the problem of removing catalysts from the reacting mixture. Said process involved the reaction of one or more mono- or di-carboxylic acid or anhydride with an excess of alcohol in the presence of an organotitanate catalyst such as a tetraalkyl titanate ester, followed by the addition of a chelating agent.

- In view of document (5), the problem to be solved could only be seen in the production of a high quality ester containing a minimal amount of impurities, such as the catalyst. The solution as defined in claim 1 of the patent-in-suit consisted in treating the esterification reaction product with a polyhydric alcohol, resulting in the precipitation of the catalyst, which could then be removed by conventional methods. Said solution was however obvious over documents (5) and (6) taken in combination. The teaching of document (5) related to the treatment of the residue esterification product with compounds which had the ability to react with residual catalysts species, namely suitable chelating agents. In comparison with the patent-in-suit, the sole difference consisted in the fact that, according to document (5), only chelating agents with heteroatoms had been considered. However, it was known from the common general knowledge reflected by document (6) that polyhydric alcohols were chelating agents and, therefore, fell within the teaching of document (5). The person skilled in the art would have been directed to use polyhydric

alcohols as chelating agents in accordance with the teaching of document (5) particularly since document (6) pointed out the high stability of such complexes, especially with polyvalent metals.

- Moreover, a comparison between example 1 of document (5) and example 1 of the patent-in-suit showed that the reactions were quite the same except that diethanolamine as chelating agent was used in the former and pentaerythritol in the latter. Such a substitution was however obvious in view of the common general knowledge of the person skilled in the art as shown by document (6).

V. Oral proceedings took place on 14 November 2000. The Appellant, having been duly summoned, informed the Board that he would not be represented at these oral proceedings. They thus took place in the absence of the Appellant (Rule 71(2) EPC).

VI. During the oral proceedings, the Respondent's former requests were replaced by a sole request comprising five claims, independent claim 1 reading as follows:

"1. A method for producing an ester by dehydration esterification, which comprises reacting an organic acid or its anhydride with an alcohol in the presence of a catalyst of a tetraalkyl titanate showing catalytic activities at a temperature of at least 180°C, wherein the esterification reaction product containing the catalyst, is treated with a polyhydric alcohol consisting of carbon, hydrogen and oxygen atoms to produce a reaction product with the catalyst, which is removed as solid in the presence or absence of an adsorbing agent."

VII. The Respondent's arguments in support of the inventive step submitted in writing and during the oral proceedings may be summarised as follows:

- The closest prior art is document (5). In the light of this document, the problem to be solved can be seen in the provision of an alternative process for producing a high quality ester useful as a plasticizer containing a minimum amount of impurities such as a catalyst.

- In order to remove the catalyst from the reaction mixture, document (5) discloses the use of a chelating agent having a trivalent nitrogen or phosphorous atom to cause the hydrolysis of the complexed titanium residue during steam distillation. Document (5) did not consider the possibility of using a polyhydric alcohol and furthermore viewed the presence of a nitrogen or phosphorous atom as a necessary feature. Document (6) was unable to render obvious the claimed subject-matter since this document taught that polyhydric alcohols did not form hydrolysable complexes with metals like titanium.

VIII. The Appellant requested that the decision under appeal be set aside, that the patent be revoked and the appeal fee be reimbursed.

The Respondent requested that the decision under appeal be set aside and that the patent be maintained with the claims and the description as submitted during the oral proceedings.

IX. At the end of the oral proceedings the decision of the Board was given orally.

Reasons for the Decision

1. *Admissibility of the appeal*

The appeal is admissible.

2. *Admissibility of the Respondent's request*

2.1 As is apparent from paragraph VI above, claim 1 of the sole request submitted at the oral proceedings before the Board results from a plurality of substantial amendments introduced in claim 1 of the patent-in-suit. The first question to be decided is, therefore, whether such request can be admitted into the proceedings at such an advanced stage of the appeal proceedings. According to the established jurisprudence of the Boards of Appeal, the admissibility of amendments to the text of the granted patent during opposition and appeal proceedings is a matter that is for the instance in question to decide in its discretion under Rules 57a and 58(2) EPC. To be admissible, proposed amendments should be "**appropriate**" and "**necessary**" having regard to the nature of the grounds for opposition and the issues raised thereby, namely if they are occasioned by grounds for opposition laid down in Article 100 EPC.

2.2 On the basis of the above considerations, the proposed amendments concerning the fact that the ester is produced by dehydration esterification and that the reaction product is removed as solid in the presence or absence of an adsorbing agent are, in the Board's judgment, admissible. Indeed, the Board found (see point 6.5 below), in agreement with the parties (see points IV and VII above) that the technical problem to be solved was to provide an alternative process for the production of a high quality ester containing a minimal

amount of impurities such as the catalyst. In accordance with the "problem/solution approach" consistently applied by the Boards of Appeal to assess inventive step on an objective basis, after having determined the technical problem, the further step is to verify whether all the embodiments encompassed by the claimed subject-matter represent a solution to said problem. As it became clear at the oral proceedings before the Board, the amendments mentioned above were appropriate and necessary to meet those requirements for without a dehydration esterification and without the removal of the catalyst, the problem might not be solved.

3. Article 123(2) EPC

3.1 The features added to the present claim 1 find support in the application as originally filed as emerges from the passages indicated below in connection with the said features:

- "dehydration esterification": page 5, line 2, examples 1 to 4,
- "tetraalkyltitanate showing catalytic activities at a temperature of at least 180°C": page 4, lines 25 to 26, claim 2,
- "to produce a reaction product with catalyst, which is removed as solid in the presence or absence of an adsorbing agent.": page 6, lines 13 to 20.

3.2 Present claims 2 to 5 correspond to claims 3 to 6 as originally filed.

3.3 For these reasons, the claims as amended comply with the requirements of Article 123(2) EPC.

4. *Article 123(3) EPC*

The features incorporated in claim 1 restrict the scope of the claims as granted so that the present claims do not contravene the requirements of Article 123(3) EPC.

5. *Novelty - Article 54(1)(2) EPC*

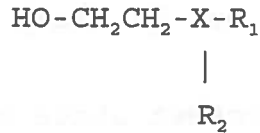
After examination of the cited prior art documents, the Board is satisfied that the subject-matter as defined in the present claims is novel. Since novelty was never contested by the Appellant, it is not necessary to give detailed reasons for this finding.

6. *Inventive step - Article 56 EPC*

6.1 The patent-in-suit relates to a process for producing by dehydration esterification an ester useful as plasticizer by reacting an organic acid or its anhydride with an alcohol in the presence of a tetraalkyl titanate catalyst and then treating the esterification reaction product with a polyhydric alcohol, so that the catalyst contained in the reaction product is readily separated in the form of a solid, whereby a high quality ester can readily and economically be obtained (see column 1, lines 3 to 8; column 2, lines 10 to 20 and claim 1).

6.2 Document (5), acknowledged in the description, also refers to a process for preparing esters useful as plasticizers and deals, in particular, with the problem of removing catalysts from the reacting mixture. Said process involved the reaction of one or more mono- or di-carboxylic acid or anhydride with an excess of alcohol in the presence of a catalytically effective amount of an organotitanate such as tetraalkyl titanate

esters, followed by the addition of a chelating or treating agent selected from tri(alkylaryl)phosphites or a member of the group of the structural formula:



wherein X represents a nitrogen or a phosphorus atom and R₁ and R₂ are selected from the group consisting of hydrogen, -CH₂CH₂OH, and an alkyl group containing from 1 to 10 carbon atoms, then forming insolubles containing catalyst residues by steam distillation, and filtering a purified ester product from the resulting hydrolyzed titanium catalyst residues without the necessity of washing procedures (see column 2, line 7 to column 3, line 9). Products refined in the manner of this invention are of high purity, substantially free of residual titanium, of low acid number and generally suitable for applications requiring highest quality esters such as lubricants, and electrical, medical or food grade plasticizer applications (see column 3, lines 11 to 16).

6.3 By contrast, this is not the case in the documents (1) to (4), given that documents (1), (2) and (4) use highly-crosslinked polyol titanate in polymeric form obtained through the reaction of titanium esters with polyhydric alcohol, rendering that type of catalyst insoluble and, therefore, removable without any further step of separation. Document (3) does not even mention a separation step and teaches that the reaction product may be used as such.

- 6.4 The Board thus comes to the same conclusion as the parties, namely that document (5) is the closest prior art for determining the technical problem which the claimed invention addresses and alleges it solves by the method as set out in claim 1.
- 6.5 In view of this closest state of the art, and in the absence of any evidence showing an improvement in respect thereof, the technical problem is to be seen in the provision of a further process for producing a high quality ester containing a minimum amount of impurities such as the catalyst (see page 1, lines 3 to 6 of the application as originally filed).
- 6.6 The description of the application as originally filed, in particular the examples 1 to 4, demonstrates that the claimed subject-matter represents indeed a solution to the technical problem as defined in point 6.5 above.
- 6.7 It remains to be decided whether or not the proposed solution to the problem underlying the patent-in-suit is obvious in view of the cited state of the art.
- 6.8 The Appellant submitted that document (5) taught the treatment of the residue esterification product with compounds which had the ability to react with residual catalyst species, namely suitable chelating agents and that it was obvious in view of document (6) to replace the chelating agents described in document (5) by a polyhydric alcohol as defined in document (6).
- 6.9 However, in sharp contrast to the interpretation of the Appellant, the skilled person would have noticed that the teaching of document (5) did not encompass all the chelating agents conceivable but was limited to chelating agents having a N or P heteroatom (see point 6.2 above). This teaching is furthermore emphasized by the statement in column 4, lines 30 to 36, indicating

that the "necessary feature of the present invention is the presence of a trivalent nitrogen or phosphorous atom in the chelating agent, wherein an electron pair on the nitrogen or phosphorous atom remains free to function essentially as a Lewis base electron donor in the sense of the classical Lewis acid-base concept". Moreover, the nature of the chelating agent is also to be understood in view of the function it fulfills. As explained in the description of document (5), in particular in column 2, line 66 to column 3, line 11, the aim of the chelating agent is to cause hydrolysis of the complexed titanium residues during steam distillation in order to convert the treated catalyst to oxides of titanium.

- 6.10 In the Board's judgment, the person skilled in the art when trying to solve the problem underlying the patent-in-suit would not have been directed to complexes of titanium with polyhydric alcohol as disclosed in document (6) since, on one hand, in the absence of any evidence to the contrary it cannot be assumed that polyhydric alcohols might have been considered as a Lewis base when associated with an organometallic compound and, on the other hand, since document (6), on page 33, last paragraph, teaches that titanate of polyhydric alcohols did not form hydrolysable complexes at room temperature so that no separation of the free titanate acid occurs, as explicitly required in document (5). The Board notes, moreover, that nothing in the description of the patent-in-suit shows that hydrolysis of the catalyst may occur in the same way as in the disclosure of document (5), since a) in all the examples the process is carried out without the addition of water and b) due to the dehydration esterification according to the patent-in-suit little or even no water is present in the esterification reaction product. Nor can documents (1) to (4) provide the person skilled in the art relevant information in

this context since documents (1), (2) and (4) use highly-crosslinked polyol titanate in polymeric form obtained through the reaction of titanium esters with polyol, rendering that type of catalyst insoluble and, therefore, removable without any further step of separation, while document (3) does not even mention a separation step and teaches that the reaction product may be used as such. The Board also notes that, contrary to the Appellant's assertion, example 1 of the patent-in-suit not only differs from example 1 of document (5) in respect of the nature of the chelating agent but also due to the introduction of water in the latter.

6.11 The Board concludes that the process such as defined in claim 1 is not obvious in view of the cited prior art and, therefore, said claim 1 involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

6.12 For the same reasons, the Board concludes that the subject-matter of dependent claims 2 to 5 involves an inventive step.

7. *Article 113(1) EPC*

The Board holds that the present decision to maintain the patent on the basis of a set of claims amended during oral proceedings in the absence of the Appellant does not conflict with the principles laid down in the decision of the Enlarged Board of Appeal G 4/92 (OJ EPO 1994, 149), whereby a decision may not be based on new facts put forward for the first time during the oral proceedings. The submission of restricted claims is neither a fact nor can it be evidence within the meanings of the above decision. The Appellant had reasonably to expect that the Respondent would try to overcome the objections based on the lack of inventive

step in restricting the scope of the claims accordingly. Consequently, the absence of the Appellant at the Oral proceedings did not prevent the Board from taking a decision.

8. *Request for reimbursement of the appeal fee - Rule 67 EPC*

8.1 The Appellant's request for reimbursement of the appeal fee is based on the fact that the Opposition Division had disregarded document (5) pursuant to Article 114(2) and Rule 71a(1) EPC, because this document, which the Opponent had cited for the first time during the oral proceedings, was not considered to be relevant for novelty and inventive step due to the structural difference of the chelating agent (see point 6 of the reasons for the decision under appeal).

8.2 This finding is contrary to what is set out in point 6.4 above; it was caused by an erroneous assessment of the relevance of document (5). Such a misinterpretation, by its very nature, does not constitute a procedural violation within the meaning of Rule 67 EPC, in that it concerns the true content of a document and its (technical) impact on the patent-in-suit. Thus, in the present case it is irrelevant for the purposes of reimbursement of the appeal fee, whether document (5), which had already been mentioned in the description, therefore automatically formed part of the opposition proceedings or not (see decisions T 536/88, OJ EPO 1992, 638; T 501/94, OJ EPO 1997, 193). At any event, an error in this respect, whilst possibly making some difference to the reasons of the decision, would not have lead to a different outcome of the opposition proceedings in the present case.

8.3 Under these circumstances, two of the preconditions for the reimbursement of the appeal fee under Rule 67 EPC were not fulfilled, namely that a procedural violation which is also substantiated has occurred.

Order

For these reasons it is decided that:

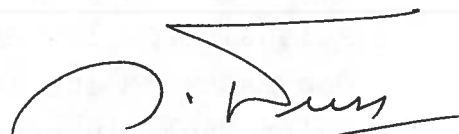
1. The decision under appeal is set aside and the case is remitted to the first instance with the order to maintain the patent with the description and claims 1 to 5, both as submitted at the oral proceedings on 14 November 2000.

2. The appellant's request for reimbursement of the appeal fee is rejected.

The Registrar:


N. Maslin

The Chairman:


A. Nuss