BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS | BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE | CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 14 March 2002

Case Number: T 0166/98 - 3.3.1

Application Number: 93105047.0

Publication Number: 0563825

IPC: C07C 403/20

Language of the proceedings: EN

Title of invention:
Process for producing vitamin A acid

Patentee:
KURARAY CO., LTD.

Opponent:
BASF Aktiengesellschaft, Ludwigshafen

Headword:
Vitamin A acid/KURARAY

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes) - non-obvious solution of the technical problem"

Decisions cited:
T 0219/83

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0166/98 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 14 March 2002

Appellant: (Opponent)
BASF Aktiengesellschaft, Ludwigshafen
-Patentabteilung - C6-
Carl-Bosch-Strasse 38
D-67056 Ludwigshafen (DE)

Representative:
-

Respondent: (Proprietor of the patent)
KURARAY CO., LTD.
1621 Sakazu
Kurashiki-City (JP)

Representative:
Müller-Boré & Partner
Patentanwälte
Grafinger Strasse 2
D-81671 München (DE)

Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 15 December 1997 concerning maintenance of European patent No. 0 563 825 in amended form.

Composition of the Board:

Chairman: P. P. Bracke
Members: J. M. Jonk
E. Lachacinski

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the decision of the Opposition Division by which the European patent No. 0 563 825 (granted in respect of European patent application No. 93 105 047.0) as amended during the opposition proceedings was found to meet the requirements of the EPC.

II. The opposition was filed against the patent as a whole, and based on the ground of lack of inventive step as indicated in Article 100(a) EPC. It was supported by:

(1) Tetrahedron, Vol. 37 (1981), pages 2019 to 2096.

III. The decision was based on Claims 1 to 10 as filed on 4 December 1997. The only independant Claim 1 read as follows:

"A process for producing vitamin A acid which comprises oxidizing vitamin A aldehyde by adding an acid to a mixture containing vitamin A aldehyde, a lower unsaturated compound having at least one double bond and at least 3 carbon atoms and up to 10 carbon atoms, and an aqueous solution of an alkali metal chlorite."

IV. Concerning inventive step, which was the only issue to be dealt with, the Opposition Division considered that the technical problem underlying the patent in suit was to find a process for producing vitamin A acid by oxidation of vitamin A aldehyde at low cost and high yield and without using toxic heavy metal compounds, such as those of manganese and silver. Furthermore, it held that the solution of this problem as claimed was not obvious in the light of document (1), since this

document did not relate to the conversion of compounds having conjugated double bonds, and because it did not disclose the addition of an acid to a mixture containing the aldehyde and the chlorite.

V. Oral proceedings before the Board were held on 14 March 2002. The Appellant, after having informed the Board accordingly in a letter dated 6 January 2002, did not attend the oral proceedings.

VI. The Appellant argued in writing that the claimed solution to the technical problem indicated in the patent in suit was obvious in the light of document (1), since it followed from this document that, compared to numerous other methods for the oxidation of α,β-unsaturated aldehydes, the method using sodium chlorite as oxidation agent was the most preferred one, since it worked well with sensitive substrates and effected oxidations quickly and in a stereospecific manner.

Furthermore, he disputed that the claimed process involving the addition of an acid to a mixture of chlorite and aldehyde instead of the addition of a mixture of acid and chlorite to the aldehyde solution as disclosed in document (1) would lead to improved yields of the desired vitamin A acid. In this context, he argued in particular that the comparative test as submitted by the Respondent on 28 April 1997 did not reflect the process disclosed in document (1), since the concentration of the aldehyde in the solvent and the molar ratio of the aldehyde to the alkali metal chlorite was different.

Even if the Board would accept that the claimed process compared to that of document (1) led to an improvement of the yield of vitamin A acid as alleged by the Respondent, a skilled person trying to improve an

unsatisfatory yield would have taken a separate addition of chlorite and acid to the aldehyde into consideration, since documents

(2) Acta Chemica Scandinavia, 27 (1973), pages 888 to 890, and

(3) Abstract of JP 62142137 A2 submitted by the Appellant as Enclosure 4 with his letter of 8 April 1998,

disclosed the addition of sodium chlorite to the reaction mixture containing the aldehyde and the acid, and document

(4) Example 7 of DE-A1-3 820 177 submitted by the Appellant as Enclosure 3 with the same letter,

disclosed the addition of sodium chlorite and of an acid to a solution containing the aldehyde and a chlorine scavenger.

A further manner of adding the reaction components involving a selection from only a few possibilities would lead to the order of addition as claimed.

VII. The Respondent defended inventive step in line with the decision of the Opposition Division. In this context, he emphasised that the addition of the acid to the reaction mixture was an essential feature of the claimed process. In support, he referred to the comparative test as submitted by him on 28 April 1997. Moreover, he disputed the Appellant's contention that this comparative test would not reflect the prior art as disclosed in document (1). He concluded, that the claimed solution of the technical problem underlying the patent in suit to provide a process for preparing vitamin A acid in high yields and maintaining its

respective isomeric trans or cis form, while avoiding the use of toxic heavy metal catalysts, such as Mn or Ag compounds, would not have been obvious for the skilled person.

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

The Respondent requested in writing that the appeal be dismissed.

IX. At the conclusion of the oral proceedings the Board's decision was pronounced.

Reasons for the Decision

1. The appeal is admissible.

2. The only issue to be dealt with is whether the subject-matter of the claims involves an inventive step.

2.1 For deciding whether or not a claimed invention meets this criterion, the Boards of Appeal consistently apply the problem and solution approach, which involves essentially identifying the closest prior art, determining in the light thereof the technical problem which the claimed invention addresses and successfully solves, and examining whether or not the claimed solution to this problem is obvious for the skilled person in view of the state of the art.

According to the established case law of the Boards of Appeal the closest prior art is normally a prior document disclosing subject-matter conceived for the same purpose as the claimed invention and having the most relevant technical features in common.

2.2 Thus, in view of the fact that none of the documents cited by the Appellant relates to a process for preparing vitamin A acid, the Board considers, that the closest state of the art with respect to the claimed subject-matter of the patent in suit is the prior art referred to in the patent in suit.

According to this prior art, vitamin A acid is prepared by oxidising vitamin A aldehyde in the presence of a heavy metal, such as Mn and Ag, containing catalyst (see column 1, lines 24 to 31, of the patent in suit).

2.3 Regarding this closest state of the art, the Respondent argued essentially that the process of the patent in suit had the advantages that the use of toxic heavy metals was not necessary anymore, and that the vitamin A acid was selectively obtainable in its isomeric trans or cis form in high yields.

2.4 Thus, in the Board's judgment, the technical problem underlying the patent in suit in the light of the closest prior art can be seen in the provision of a process for preparing vitamin A acid from vitamin A aldehyde in a stereospecific manner and in high yields, while avoiding the use of toxic heavy metal catalysts.

2.5 This technical problem is solved by providing a process according to present Claim 1 which is essentially characterised in that:

(a) the oxidation of vitamin A aldehyde is carried out with an aqueous solution of an alkali metal chlorite in the presence of an acid, and

(b) the acid is added to the reaction mixture containing the aldehyde, the alkali metal chlorite and an unsaturated compound as defined in the claim.

2.6 Having regard to the technical information provided in the patent in suit, the Board considers it plausible that the technical problem as defined above has been solved. Example 1 shows that starting from vitamin A aldehyde having a ratio of the trans form of 98.5% a vitamin A acid having a purity of at least 99% and a trans form ratio of 99,5% is obtained in a yield of 55.9%, and Example 2 shows that starting from vitamin A aldehyde having a cis form ratio of 92% vitamin A acid having a purity of at least 99% and a cis form ratio of 95% is achieved in an amount of 46%.

2.6.1 The Appellant did not contest the test-results given in the patent in suit, but he disputed the relevance of the claimed order of addition of the reaction components (feature (b) as indicated under point 2.5 above) for the solution of the technical problem underlying the patent in suit as defined above. In this context, he submitted that the comparative test as filed by the Respondent on 28 April 1997, which showed that by adding an aqueous solution of sodium chlorite and acid to the reaction mixture as indicated in document (1), instead of an aqueous solution of merely the acid as claimed in the patent in suit, only a low yield of the vitamin A acid of 27,3% was achieved, did not reflect the process of document (1) with respect to the concentration of the vitamin A aldehyde in the reaction mixture and the molar ratio of said aldehyde to the alkali metal chlorite.

2.6.2 The comparative test as filed by the Respondent corresponds to the experiment as described in document (1) (page 2093, left column, last paragraph), except that said experiment has been essentially modified by replacing the aldehyde with vitamin A aldehyde in order to achieve such a comparison of the closest prior art

with the examples of the patent in suit that the effect on the yield of vitamin A acid has its origin in the different order of addition of the reaction components.

It is true, that the Respondent also modified said experiment with respect to the concentration of the vitamin A aldehyde in the reaction mixture and the molar ratio of said aldehyde to the alkali metal chlorite. However, the Board does not see any reason to expect that these modifications would have a negative effect on the reaction. Moreover, the Appellant did not substantiate his submission that the so modified experiment did not reflect the process of document (1).

Therefore, the Board concludes that it is rather plausible that the order of addition as claimed improves the yield of vitamin A acid and, consequently, represents an essential feature of the claimed invention.

2.6.3 Regardless of that, the Board observes that it is not sufficient in opposition proceedings for the opponent to impugn a granted patent with assertions which have not been substantiated (see e.g. T 219/83, OJ EPO 1986, 211, point 12 of the Reasons).

2.7 In assessing inventive step the question now is whether a skilled person starting from the closest prior art as indicated in the patent in suit, and having knowledge of the documents cited by the Appellant, would arrive at the solution of the above defined technical problem as claimed.

2.8 Document (1) discloses a variety of methods for the conversion of α,β-unsaturated aldehydes to the corresponding acids, and clearly teaches that the best method comprised the use of sodium chlorite, since this method gives the desired conversion in a stereospecific

manner even in systems where steric hindrance and/or sensitive functionality are present (see the abstract on page 2091, and page 2092, left column, last paragraph to the right column, second paragraph). As indicated in the experimental section (page 2093, left column, last paragraph), the oxidation of the aldehyde is carried out by dissolving it in tert-butyl alcohol and 2-methyl-2-butene, adding an aqueous solution of sodium chlorite and sodium dihydrogenphosphate, and stirring the obtained reaction mixture at room temperature overnight. Furthermore, it follows from page 2096, that the oxidation of five α,β-unsaturated aldehydes, including cinnamic aldehyde and citral, gives the corresponding acids in yields of from 87% to 95%.

Thus, even if the skilled person had considered this document for the solution of the above defined technical problem, it does not give any pointer to the skilled person to solve the technical problem as defined above by providing a process as claimed which is characterised by the particular order of addition of the reaction components.

2.9 In this context, the Appellant argued by referring to the documents indicated above under point VI that different manners of adding chlorite and acid were known, and that another manner of adding the reaction components involving a selection from only a few possibilities would lead to the claimed invention.

2.10 However, these documents do not disclose the specific order of addition as claimed in Claim 1. Moreover, in the Board's judgment, the skilled person having regard to the high yields indicated with respect to the process of document (1) of from 87% to 95% (see point 2.8 above) would not have had any reason to

modify the order of addition of the reaction components as disclosed in document (1) in order to improve the yields.

2-11 Furthermore, the Board observes that a skilled person in view of the disclosures of the cited documents indeed **could** have used the claimed order of addition of the reaction components. However, according to the established case law of the Boards of Appeal for determining lack of inventive step, it is necessary to show that considering the teaching of the relevant prior art as a whole, without using hindsight based on the knowledge of the claimed invention, the skilled person **would** have arrived at the **claimed solution of the technical problem to be solved**. However, as indicated above, a skilled person, when trying to solve the present technical problem underlying the patent in suit, would not have had any reason to use the order of addition as claimed in order to provide a process for preparing vitamin A acid from vitamin A aldehyde in a stereospecific manner and in high yields.

2.12 Thus in view of these considerations, the Board concludes that the solution of the above defined technical problem as claimed in Claim 1 of the patent in suit is not obvious to the skilled person in the light of the cited documents, and consequently involves an inventive step in the sense of Article 56 EPC.

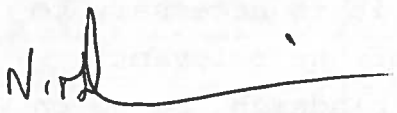
Claims 2 to 10 relate to particular embodiments of the subject-matter of Claim 1. They are therefore also allowable.

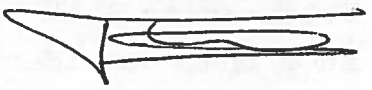
Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:





N. Maslin P. P. Bracke