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D E C I S I O N
of 4 November 1998

Case Number: T 0020/94 - 3.3.1

Application Number: 87201409.7

Publication Number: 0255743

IPC: C07C 69/732

Language of the proceedings: EN

Title of invention:
Tetrakis [3-(3,5-di-tert.buthyl-4-hydroxyphenyl)propionyl-oxymethyl]methane with amorphous structure, process for its preparation and its use as a stabilizer -

Patentee:
Enichem Synthesis S.p.A.

Opponent:
Ciba Specialty Chemicals Holding Inc.
Chemische Werke Lowi GmbH & Co.
Himont Incorporated

Headword:
Amorphous TPM/ENICHEM

Relevant legal provisions:
EPC Art. 54, 56, 64(2), 114(2), 123(2), 123(3)

Keyword:
"Change from process claim to product claim (not allowable)"
"Amendment (yes) - additional feature not closely related with the other features in an example"
"Novelty (yes) - onus of proof - unsupported objection"
"Inventive step (yes) - determination of the closest prior art for process claim - unobvious solution"

Decisions cited:
G 0002/88, T 0150/82, T 0295/87, T 0402/89, T 0411/89, T 0789/89, T 0019/90, T 0407/90, T 0073/92, T 0680/93

Headnote:

1. Where the granted claims are solely process claims, a change from a process claim for preparing a product to a product-by-process claim by way of amendment extends the protection conferred by the European patent to the same product obtained by a process for its preparation different to that defined in the granted process claim, contrary to the requirement of Article 123(3) EPC (point 4.3 of the reasons).

2. Despite the fact that a product-by-process claim is characterized by the process for its preparation, it nevertheless belongs to the category of claim directed to a physical entity and is a claim directed to the product *per se*. Irrespective of whether the terms "directly obtained", "obtained" or "obtainable" are used in the product-by-process claim, it is still directed to the product *per se* and confers absolute protection upon the product (point 4.4 of the reasons).

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0020/94 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 4 November 1998

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 7 December 1993 revoking European patent No. 0 255 743 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: A. J. Nuss
Members: R. Freimuth
S. Perryman

Summary of Facts and Submissions

I. The Appellant (Proprietor of the Patent) lodged an appeal on 7 January 1994 against the decision of the Opposition Division posted on 7 December 1993 revoking the European patent No. 255 743 which was granted on the basis of four claims, the only independent claim reading as follows:

"1. Process for preparing the amorphous tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having a glass transition temperature (T_g) of from 40°C to 50°C, and exhibiting no endothermic melting peaks from a temperature higher than 50°C to 200°C, comprising the step of subjecting a crystalline form of the compound aforementioned, having a melting point higher than 100°C and a purity of more than 95% by weight, to a melting step, whereupon the molten compound is solidified by sudden cooling."

II. Notice of Opposition had been filed by the Respondents 1, 2 and 3 (Opponents 1, 2 and 3 respectively), all requesting revocation of the patent in its entirety for lack of novelty and for lack of inventive step (Article 100a EPC), based *inter alia* on the documents

(1) GB-A-1 103 145,
(2) JP-A-59-104348, considered in the form of its English translation and
(6) AU-A-288 839

III. The decision under appeal was based on three alternative sets of claims as amended during opposition proceedings. The set of claims according to the main request comprised exclusively product claims referring to amorphous tetrakis[3-(3,5-di-tert.butyl-4-

hydroxyphenyl)-propionyl-oxymethyl]methane. The other two sets of claims according to the first and second auxiliary request comprised exclusively process claims referring to the process for preparing that compound.

IV. The Opposition Division held that the patent as amended according to neither request satisfied the EPC.

A. The product claims of the main request extended the protection conferred by the patent as granted where the only claims were process claims. Therefore the patent as amended according to that request offended Article 123(3) EPC.

B. The amended process claims according to the first auxiliary request were based on the application as filed as required by Article 123(2) EPC. However, the claims as amended according to that request lacked novelty with regard to the documents (2) and

(12) JP-A-56-139438, considered in the form of its English translation.

Particularly the process disclosed in Examples 1 and 2 of document (2) anticipated the subject-matter claimed. Although the product prepared in that document was described as being γ-crystals and the product in the patent in suit as being amorphous, document (12), in particular Figure 4, showed that the amorphous compounds might be denoted as γ-crystals.

C. The amended process claims according to the second auxiliary request satisfied the requirements of Article 123(2) EPC and rendered the subject-matter claimed novel over document (2). However, starting from the process disclosed in Examples 1 and 2 of

that document as closest state of the art, the process as defined in the claims as amended according to that request represented an obvious variation which did not involve an inventive step.

V. The Appellant defended the maintenance of the patent in suit in amended form on the basis of a main and two auxiliary requests submitted with the Statement of Grounds of Appeal on 29 March 1994.

A. The main request consisted of a single product claim reading as follows:

"1. Tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having an amorphous structure directly obtained by subjecting a crystalline form of tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having a melting point higher than 100°C and a purity more than 95% by weight, to a melting step, whereupon the molten compound is solidified by sudden cooling, said obtained tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having the following characteristics:

(a) a glass transition temperature (T_g) of from 40°C to 50°C,

(b) no endothermic melting peaks from a temperature higher than 50°C to 200°C."

B. The first auxiliary request comprised a set of four process claims; the only independent claim 1 thereof differed from claim 1 as granted exclusively by incorporating the additional feature "**wherein the mass is completely molten**" referring to the melting step and by substituting

the indefinite for a definite article in the first line of the claim.

C. The second auxiliary request comprised a set of four process claims, the only independent claim 1 thereof reading as follows:

"1. Process for preparing **an** amorphous tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having a glass transition temperature (T_g) of from 40°C to 50°C, and exhibiting no endothermic melting peaks from a temperature higher than 50°C to 200°C, **said features are maintained during at least four heating and cooling cycles between the temperatures of -100°C and +100°C on DSC, said process** comprising the step of subjecting a crystalline form of the compound aforementioned, having a melting point **of 122.5°C** and a purity of **98.5%** by weight, to a melting step **under nitrogen atmosphere at a temperature of 140°C and until the crystalline form is completely molten**, whereupon the molten compound is solidified by sudden cooling" (emphasis added).

VI. The Appellant argued that the patent in suit as amended satisfied the requirements of Article 123 EPC and was novel and involved an inventive step essentially for the following reasons:

A. The product claim according to the main request defined the title compound as being "directly obtained" by the given process. This wording corresponded to Article 64(2) EPC. That formulation of the claim restricted the protection conferred to compounds obtained by the process of process claim 1 as granted. Claim 1 worded in this way could not confer absolute product protection

regardless of how the products were obtained. The product claim of the patent as amended did not extend the scope of protection conferred by the process claims of the patent as granted in accordance with Article 123(3) EPC.

B. The feature "wherein the mass is completely molten", added to claim 1 as granted according to the first auxiliary request, is allowable in view of Article 123(2) EPC, since it was disclosed in Example 1 as filed. That feature was not closely related to the further features in that Example.

C. The process features disclosed in document (2) were not identical to those of the patent in suit according to the first auxiliary request. Document (2) used in the Examples 1 and 2 a commercially available product as starting compound without, however, specifying the purity thereof. Commercially available products such as Irganox 1010, 1010FF and Sunnox 10 showed a purity of less than 95 % as proven by HPLC analysis submitted on 28 September 1998. Furthermore document (2) did not contain any explicit statement referring to a **complete** melt. The Examples 1 and 2 of document (2) maintained the melt at 47°C and 35°C above the melting temperature without indicating how long this temperature was maintained. In the absence of any indication of the time, there was no basis for the finding that the compound was completely molten.

Nor was the compound, which resulted from the process claimed according to the first auxiliary request, identical to that disclosed in document (2). The compound obtained by the process of that document had a melting point of 49°C and was γ-crystalline, whereas that obtained by the

process of the patent in suit was amorphous. To interpret the crystalline compound obtained in document (2) as being amorphous, as the decision under appeal and Respondent 1 did, was inadmissible, particularly since X-ray diffractometry and differential thermal analysis were used in that document which enabled the skilled person to clearly distinguish crystalline from amorphous compounds. Variations of the process features resulted in essentially different compounds. The process feature of the patent in suit as amended to melt the mass completely, which was lacking in document (2), was of importance since small amounts of remaining, not molten crystals acted as seed crystals and induced crystallisation in the compound obtained. It was not legitimate to combine document (12) with document (2) since the disclosure of a document - as regards novelty - could not be determined by reference to another document.

Therefore, document (2) did not anticipate the claimed invention.

D. The process claimed was not obvious since the products obtained were not obvious. Document (12) referred *inter alia* to amorphous products having a higher softening point of at most 100°C and being coloured. However, as shown in the experimental report filed on 28 September 1998, amorphous products would not be obtained when following the teaching of document (12).

The process claimed was not obvious because its process features were not derivable from the prior art. Document (1) and the corresponding document (6) represented the closest state of the

art since they referred to the preparation of an amorphous product. Document (2) could not give any incentive to arrive at the claimed process, as it related to the preparation of a crystal, not an amorphous product. Moreover, it was silent about the feature of melting the mass completely. Document (12) referred to a different process using solvents and a recrystallisation step.

VII. The Respondent 1 submitted that the patent in suit as amended offended Article 123 EPC and was neither novel nor involved an inventive step essentially for the following reasons:

A. The product claim according to the main request was a product-by-process claim. Irrespective of whether formulated by using the term "obtained" or the term "obtainable", the scope of such product claims remained the same, namely that of a claim to the product itself. The scope of protection conferred by a product claim exceeded the scope of protection conferred by a process claim governed by Article 64(2) EPC, since the latter encompassed exclusively the products directly obtained by that process. The switch from process claims in the patent as granted to a product claim according to the main request extended the scope of protection violating Article 123(3) EPC.

B. The feature "wherein the mass is completely molten" introduced into claim 1 according to the first auxiliary request was disclosed exclusively in Example 1 of the application as filed in combination with the other specific features of

that Example. A generalisation of this feature to any material and to any cooling process as covered by the claim was not derivable from the application as filed and offended Article 123(2) EPC.

C. The process claimed as amended according to the first auxiliary request was identical to that disclosed in document (2). The additional feature "wherein the mass was completely molten" in the process claim as amended was inherently disclosed in that document. The teaching therein to prepare a melt reveals to the skilled person that the solid is completely transformed into the liquid state of matter. The compound produced according to the process in document (2) was necessarily identical to that produced in the patent in suit since identical processes must result in identical products. The compound produced in document (2) was denoted "γ-crystalline" although it was in fact amorphous. The low melting point of that compound of 49°C, which was practically identical to the glass transition temperature of 48°C measured in the patent in suit, supported this finding. In document (2) the sudden cooling of the molten mass in the process of Example 1 necessarily resulted in an amorphous product being transparent. Furthermore the spectrum in Figure 4 of document (12) showed an amorphous compound being nevertheless labelled "γ-crystalline". Document (12) was not combined with document (2) in order to anticipate the patent in suit as amended, but the disclosure of the latter document alone destroyed novelty.

The lack of novelty was further evidenced by the following documents submitted on 1 August 1994:

(13) Plast. Massy, Vol. 1986, (12), pages 9 to 10, submitted in the form of its abstract

(13a) Chemical Abstracts, Vol. 106 (1987), 68211g, and

(14) print out of STN-database about registry no. CAS 6683-19-8, CAS ONLINE.

D. The process claimed, in so far as it might be novel, did not involve an inventive step since it represented an obvious variation of the prior art documents (2), (12) and (13). Particularly document (2) was to be considered closest prior art since it had the most process features in common with the claimed process.

VIII. The Respondent 2 withdrew his opposition on 7 May 1998 without having made any submission as to the substance.

IX. The Respondent 3 submitted on 12 March 1994 that he was no longer interested to proceed with the appeal procedure. He was informed in writing that he was therefore presumed to wish to cease to be a party to the appeal proceedings.

X. The Appellant requested that the decision under appeal be set aside and that the patent in suit be maintained on the basis of the sole product claim submitted on 29 March 1994 (main request) or on the basis of one of two sets of four process claims submitted at the same date (first and second auxiliary request).

The Respondent 1 requested that the appeal be dismissed.

XI. Oral proceedings were held on 4 November 1998 in the absence of the Respondents 2 and 3. At the end of the oral proceedings the decision of the Board was given orally.

Reasons for the Decision

1. The appeal is admissible.

2. *Parties to the appeal*

The Respondent 2's declaration to withdraw his opposition is to be understood as withdrawal from the appeal proceedings. Thus, he ceases to be a party to appeal proceedings as far as the substantive issues are concerned (see decision T 789/89, OJ EPO 1994, 482, points 2.3 and 2.6 of the reasons). The Respondent 3 declared at the start of the appeal proceedings that he would not proceed with the appeal procedure. The Board interprets this declaration as a request to cease to be a party to the proceedings. The Board's conclusion, after having been communicated to him, was not contested by the Respondent 3.

3. *Late-filed evidence (Article 114(2) EPC)*

3.1 Documents (13), (13a) and (14) are new evidence submitted with Respondent 1's letter on 1 August 1994 for the first time. The Appellant has objected to their introduction into the appeal proceedings since they were not prepublished.

The document (13) forms part of the December issue 1986 of a scientific journal and the abstract (13a) thereof was published in 1987. The priority date of all the claims of the patent in suit being 25 July 1986, both documents are postpublished and unable to be relevant in the assessment either of novelty or of inventive step. Thus, these late filed documents are not admitted into the proceedings (Article 114(2) EPC). Document (14), which identifies the structure of the commercial product used in document (13), could only be admitted if the latter were admitted; therefore document (14) is not admitted into the proceedings.

3.2 The indication of the purity of the commercially available products Irganox and Sunnox is a new fact and the HPLC spectra thereof are new evidence submitted for the first time on 28 September 1998 by the Appellant during appeal proceedings. No reason has been given for this late filing, nor can the Board see any such reasons. These facts and evidence are intended to support novelty of the process claims of the patent in suit; the claims, however, are already novel for other reasons as set out below (cf. point 6 below). Therefore, these facts and evidence lack relevance for the decision to be taken and are not admitted into the proceedings (Article 114(2) EPC).

3.3 The Appellant's experimental report, repeating some experiments of document (12), is new evidence submitted for the first time on 28 September 1998 during appeal proceedings. No reason has been given for this late filing. This evidence is intended to support inventive step of the claimed process in view of that document. However, the teaching of

document (12) is not relevant in the assessment of inventive step (cf. point 7 below). Therefore, the evidence based thereon lacks relevance for the decison to be taken either, and is not admitted into the proceedings (Article 114(2) EPC).

Main Request

4. *Amendments (Article 123(3) EPC)*

4.1 The patent in suit in the form as granted comprised exclusively process claims for preparing amorphous tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane. The patent in suit in the form as amended now comprises a product claim relating to this amorphous product *per se* (see point V. A above).

4.2 There are basically two different types of claim, namely a claim to a physical entity, e.g. a product, and a claim to a physical activity, e.g. a process for preparing a product (see decisions G 2/88, OJ EPO 1990, 93, point 2.2. of the reasons; T 150/82, OJ EPO 1984, 309, point 7 of the reasons). These two basic types of claim are referred to as the two possible categories of claim. Therefore, the proposed amendment of the patent in suit as granted according to the main request consists in a change of the category of the claims, i.e. a switch from the category of a physical activity to the category of a physical entity.

4.3 Article 123(3) EPC requires that the claims of a patent may not be amended during opposition proceedings in such a way as to extend the protection conferred. This applies to all amendments including the change of the category of claim. In order to

decide whether or not the change of the category in the patent in suit satisfies that requirement, it is necessary to compare the protection conferred by the category of claim before amendment, i.e. as granted, with that of the new category of claim after amendment (see decision G 2/88, loc cit., points 3.2. and 4.1 of the reasons).

4.3.1 The protection conferred by a claim directed to a process for preparing a product covers that process. Pursuant to Article 64(2) EPC, the product insofar as it is directly obtained by that process, is also protected. Hence, the same product, when obtained by any other process for preparing the product, is not within the scope of protection conferred by the process claim. In the present case, the process claim as granted, i.e. before the amendment to a product claim, confers protection to the process claimed and, exclusively, to the particular tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane directly obtained by the claimed process; that particular tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, when obtained by any other process, is not protected by the claims as granted.

4.3.2 The protection conferred by a claim directed to a product *per se*, however, is absolute upon such product. The product claim, thus, confers protection to that product regardless of the process by which it is prepared (see decisions G 2/88, loc cit., point 5 of the reasons; T 402/89 of 12 August 1991, point 2 of the reasons; T 73/92 of 25 March 1996, point 7 of the reasons; the latter neither published in OJ EPO). Hence, the product, when obtained by any process of preparation, is also within the scope of protection conferred by the product claim. In the present case,

the product claim of the patent in suit after amendment confers absolute protection to the particular tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane as defined therein. Thus, that particular tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, obtained by any preparation process other than that defined in the process claims as granted, is also protected by the product claim as amended.

4.3.3 In the present case, when comparing the protection conferred by the categories of claim before (point 4.3.1) and after (point 4.3.2) amendment, it is clear that the protection conferred after amendment extends beyond that conferred before, contrary to the requirements of Article 123(3) EPC: the particular tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, when obtained by a process of preparation which is different to that of the claims as granted, is not protected before the amendment of the claims of the patent in suit, but is now protected as a result of the amendment.

4.4 The Appellant attempted to overcome this objection in formulating the product claim as amended in the form of a product-by-process claim using the term "directly obtained". He argued that this formulation of the claim, borrowed from Article 64(2) EPC, restricted the protection conferred exclusively to that product which is directly obtained by the process of the claims as granted. The product claim as amended, thus, would not confer absolute product protection regardless of how the product was obtained, and did not extend the protection conferred by the claims as granted, a view which the Board does not share.

In the present case the claim as amended is a claim to a product even if the product is defined in terms of a process for its preparation. Thus, despite the fact that this product is characterized by the process for its preparation, the claim nevertheless belongs to the category of claim directed to a physical entity, i.e. a product (cf. point 4.2 above). A product-by-process claim is interpreted according to the jurisprudence of the Boards of Appeal as a claim directed to the product *per se*, since the reference to a process for its preparation serves only the purpose of defining the subject-matter for which protection is sought, which is a product. Whether or not the term "directly obtained" or any other term, such as "obtained" or "obtainable", is used in a product-by-process claim, the category of that claim does not change as it is directed to a physical entity and the subject-matter of that claim, for which protection is sought, remains the product *per se* (see decisions T 411/89 of 20 December 1990, point 2.2 of the reasons; T 407/90 of 3 November 1997, point 2.5.3 of the reasons; neither published in OJ EPO; T 19/90, OJ EPO 1990, 476, point 4.9.2 of the reasons). Therefore, irrespective of how a product-by-process claim is worded, it is still directed to the product *per se* and confers absolute protection upon the product, precisely as any other claim to a product *per se*. That product claim, hence, confers protection upon the product regardless of the process by which it is prepared. In the present case, irrespective of the wording of the product-by-process claim of the patent in suit as amended, that claim is directed to a physical entity, i.e the particular tetrakis[3-(3,5-

di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, regardless of the process by which it is in fact prepared. Thus, the product-by-process claim as amended does extend the protection conferred by the process claims as granted.

4.5 Consequently, in the Board's judgement, the change of category from the claims as granted to the claim as amended extends the protection conferred. For these reasons, claim 1 offends Article 123(3) EPC and the main request is rejected.

First Auxiliary Request

5. *Amendments (Article 123(2) and (3) EPC)*

5.1 The Appellant has introduced the feature "wherein the mass is completely molten" into process claim 1 as granted. The Respondent 1 has objected to this amendment in view of Article 123(2) EPC since it was only disclosed in one example in combination with other particular features of that Example; the incorporation of that feature into the claim represented an undue generalisation to starting compounds, having any characteristics covered by that claim, and to any cooling method.

5.2 In order to determine whether an amendment offends against Article 123(2) EPC it has to be examined whether or not technical information has been introduced which a skilled person would not have objectively, i.e. directly and unambiguously, derived from the application as filed (see decision T 680/93 of 29 November 1994, point 2 of the reasons; not published in OJ EPO).

5.3 The feature "wherein the mass is completely molten" is disclosed in Example 1 on page 7, lines 7 and 8 of the application as filed. However, that feature merely defines the exact physical state of matter. This liquid state of matter is independent of any particular characteristics in the solid state of the starting compound used in Example 1, e.g. melting point and purity. The particular reaction temperature used in Example 1 would be considered inessential by the skilled reader in so far as the complete liquid state of matter is achieved. Hence, the feature of completely melting the mass is closely related neither to the characteristics of the starting compound to be melted used in that particular Example, i.e. its melting point of 122.5°C and its purity of 98.5% b.w., nor to the reaction temperature applied in that particular Example, i.e. 140°C.

The liquid state of matter is of course also independent of any particular cooling method following the melting. Consistently therewith, the application as filed on page 6, lines 2 to 4 discloses that sudden cooling can be obtained by any method known in the art.

Therefore the skilled person does not associate the feature objected to with other particular features in Example 1, neither with the particular characteristics of the starting compounds nor with the particular cooling method used therein, contrary to Respondent 1's submission.

5.4 In the Board's judgement, the skilled person is not presented with technical information, when reading claim 1 as amended, which is not directly and unambiguously derivable from the application as filed.

5.5 The Board concludes that claim 1 as amended does not extend the subject-matter claimed beyond the content of the application as filed, thus satisfying Article 123(2) EPC.

5.6 The incorporation of the additional feature "wherein the mass is completely molten" into claim 1 as granted brings about a restriction of the scope of the claims and, therefore, of the protection conferred thereby, which is in keeping with the requirements of Article 123(3) EPC.

6. *Novelty*

6.1 The Appellant and the Respondent 1 were divided on the matter whether or not the product tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane prepared according to the process claimed was novel over the disclosure of document (2). The Appellant argued that the product prepared in the process of the patent in suit was completely amorphous in contrast to the γ-crystal structure of the product in document (2), whereas the Respondent 1 submitted that the γ-crystal structure in document (2) was in fact amorphous.

6.1.1 Claim 1 of the patent in suit as amended defines the product tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, prepared according to the process claimed, as being **amorphous**, as having a glass-transition temperature of from 40°C to 50°C, and as exhibiting no endothermic melting peaks from a temperature higher than 50°C to 200°C. All these product features specify that the product prepared has a completely amorphous structure, excluding even the presence of small amounts of crystals.

6.1.2 Document (2) discloses tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane and a process for preparing that product. The product is defined according to claims 1 and 2, and page 3, line 1, as having a γ-**crystal** structure. On page 11, last line, to page 12, line 3 that document states that "when said product was determined for the **crystal** structure by means of X-ray-diffraction spectrum according to the powder method, it was **confirmed** that it has a γ-**crystal** structure" (emphasis added). The Examples 1 and 2 of document (2) back up that disclosure in stating on page 14, lines 6 and 7, and on page 14, last line to page 15, first line, that "the product was found to be a granule having a γ-structure according to X-ray-diffractometry". Hence, the product prepared in document (2) is explicitly taught to be of a crystal structure, precisely of the γ-crystal structure. Document (2) even explicitly confirms the crystal structure of the product by means of a conventional X-ray-diffraction spectrum according to the powder method, a tailor-made method for identifying a crystal structure and for distinguishing that structure from an amorphous one. For these reasons, in the Board's judgement, document (2) discloses to the skilled person a crystal structure of the product prepared therein.

6.1.3 The Respondent 1 questioned the crystal structure of the product prepared in document (2) and submitted that this product was in fact amorphous. According to established jurisprudence, the Respondent 1, who is the Opponent, carries the burden of proof for the facts he alleges (see Case Law of the Boards of Appeal, edition 1996, section VI A, point 10.5). If a party, whose arguments rest on these alleged facts, is unable to discharge its onus of proof, it loses thereby.

6.1.3.1 To support his submission, the Respondent 1 argued that the low melting point of the product in document (2) of 49°C (page 11, paragraph 3), which was very similar to the glass transition temperature of the product in Example 1 of the patent in suit of 48°C, indicated both products to be identical. However, the product tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane is polymorphous, existing in various allotropic forms (see page 2, line 44 of the patent in suit), which was never contested by the parties. Therefore, the quasi identity of the melting point in document (2) with the glass-transition temperature specified in the patent in suit, on its own, does not necessarily result in the conclusion that both products do have identical morphology too.

The explicit teaching of a crystal structure in document (2) on the one hand and of an amorphous structure in the patent in suit on the other hand, shows that, on the contrary, the morphologies of both products are different.

6.1.3.2 The Respondent 1 submitted in view of Example 1 in document (2) that the process step of sudden cooling the molten mass automatically produced an amorphous product which was moreover reported to be transparent. However, his submission, that the product was inevitably amorphous due to that process step, lacks any evidence to support it. Nor is Respondent 1's suggestion that transparency is tantamount to an amorphous structure backed up by any evidence.

6.1.3.3 Furthermore, the Respondent 1 referred to document (12) to back up his submission, that the product prepared in document (2) was in fact amorphous. The former document disclosed a product,

which was labelled γ-crystal, but which was nevertheless described as non-crystalline and glassy, i.e. amorphous (page 12, lines 9 to 12; Figure 4). He projected the amorphous structure from document (12) to the product disclosed in document (2), labelled γ-crystal likewise.

The Respondent 1's objection implies, that the product prepared in document (2) is identical to that prepared in document (12). He bases the assumed identity of those products exclusively on their identical label "γ-crystal". However, there is no proof for that assumed identity. On the contrary, this allegation does not take into account the very different melting points of the products obtained in document (2) and in document (12): the former shows a melting point of 49°C (page 11, paragraph 3), the latter of 70°C to 80°C (comparative Example 6 in table 2 on page 26). Therefore, these products cannot be considered to be identical, irrespective of their label. Furthermore, they are prepared according to two very different processes: the former by sudden cooling of a melt as set out below, the latter by recrystallisation of a solution (see page 24, comparative Example 6).

Hence, the Respondent 1 failed to prove that the product prepared in document (12), labelled γ-crystal, is identical to that prepared in document (2).

6.1.4 The Respondent 1, on whom the onus of proof rests for the facts he alleged, has submitted no experimental evidence relating to carrying out the process of document (2) to show that the product so obtained is indeed amorphous and, hence, identical to that prepared in the process of the patent in suit. In the

absence of pertinent evidence, Respondent 1 has not discharged the burden of proof which is upon him, with the consequence that the Board cannot accept his submissions in this respect.

6.1.5 The Respondent 1 further argued that the products prepared in document (2) and in the patent in suit were necessarily identical since the processes for their preparation were identical too. The process of document (2) does not disclose the critical feature of **completely** melting the mass as set out in point 6.2 below. For these reasons Respondent 1's submission is not supported by the facts and is disregarded by the Board.

6.2 The Appellant and the Respondent 1 had also divergent views on the matter whether the process of document (2) disclosed implicitly the feature that the mass was **completely** molten.

Document (2) does not contain any explicit statement to a complete melt; nor is the feature implicitly disclosed in that document. According to the Examples of document (2) the starting compound is molten under heating at up to 47°C above its melting point before sudden cooling, without indicating how long this temperature is maintained. That document neither discloses prolonging the melting step for a determined or critical period of time. In the absence of any indication of the time, there is no basis for a finding that the compound was indeed **completely** molten in the sense of the patent in suit. As the Appellant submitted, the complete melt excludes the presence of even very small amounts of not molten seed crystals in the melt which would prevent an amorphous product from being obtained by sudden cooling. The difference between the process now claimed and that of document (2) is reflected in the

different morphology of the products prepared in document (2), i.e. crystal, and in the patent in suit, i.e. amorphous. Therefore, document (2) does not implicitly disclose to the skilled person the feature of the process claimed to melt the mass completely.

6.3 In the Board's judgement, it follows from the above that the product prepared according to claim 1 of the patent in suit is amorphous, contrary to the product prepared in document (2), which has a crystal structure. Furthermore, that document lacks disclosure of the process feature to melt the mass completely. Thus, document (2) does not anticipate the subject-matter of the claimed invention.

6.4 The Board is satisfied that, for the same reasons, the subject-matter of the claimed invention is not disclosed in any of the further cited documents either. This being not in dispute between the parties during appeal proceedings and the Opposition Division having already acknowledged novelty for the present claims, it is not necessary to give detailed reasons for this finding.

6.5 Therefore, the Board concludes that the subject-matter of the patent in suit is novel and meets the requirements of Articles 52(1) and 54 EPC.

7. *Inventive step*

7.1 In accordance with the "problem-solution approach" consistently applied by the Boards of Appeal to assess inventive step on an objective basis, it is necessary to establish the closest state of the art

being the starting point, to determine in the light thereof the technical problem which the invention addresses and solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art.

7.2 The patent in suit aims at preparing a tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane which is amorphous and has a glass-transition temperature (T_g) of up to 50°C. A product having these characteristics already belongs to the state of the art. In Example 2(a), document (1) teaches the preparation of that product, reportedly being a clear amber glass, which softens from 50°C (page 6, line 13). As generally known, the characterisation of the product as being a glass is tantamount to an amorphous structure. The amorphous product is prepared in document (1) by treating a solution of tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, obtained from the conventional transesterification process, and finally evaporating the solvent. The document (6) is identical to document (1) and therefore concerns the same teaching.

The Board considers, in agreement with the Appellant, that this state of the art represents the closest one, since it aims at preparing a product with precisely the characteristics as indicated in the patent in suit, i.e. amorphous and a low softening point of 50°C. The Board observes that in the present case, where the invention lies in a **process** for preparing a tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having known characteristics, the closest prior art is that document which discloses said product having

precisely those characteristics together with a process for the preparation thereof. This assessment reflects objectively the factual situation of the person skilled in the art at the priority date of the patent in suit.

Moreover, document (1) has been acknowledged in the patent in suit as relevant prior art relating to glassy solids with a softening point of 50 to 60°C (page 2, lines 18 and 34), and hence, as starting point of the claimed invention.

The Respondent 1 submitted that the disclosure of document (2) was to be considered as closest prior art and thus as starting point in the assessment of inventive step. It referred to a process comprising the sudden cooling of a melt of tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane; therefore these process features came closest to the claimed process. However, that document relates to the preparation of a crystal product as set out in very detail in point 6.1 above. Thus, contrary to document (1), document (2) does not refer to the preparation of an amorphous product as does the patent in suit. The Board concludes therefore that the latter document represents state of the art being further away from the patent in suit than documents (1) and (6).

7.3 In the next step the technical problem which the invention addresses in the light of the closest state of the art is to be determined.

In view of the closest state of the art, i.e. document (1), the technical problem underlying the patent in suit can only consist in providing a further process for preparing tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane in amorphous form, while retaining the low softening point.

7.4 Claim 1 of the patent in suit suggests, as the solution to this problem, to subject a crystalline tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane, having a melting point higher than 100°C and a purity of more than 95 % by weight, to a melting step, wherein the mass is completely molten, whereupon the molten compound is solidified by sudden cooling.

7.5 The specification of the patent in suit demonstrates e.g. in Example 1 that the claimed process achieves an amorphous product and a low softening point, i.e. solves the problem defined above. According to page 4 lines 41 to 45 of the patent in suit, the X-Ray Check of the product obtained results in the diffraction spectrum shown in Figure 3, which proves the product to be amorphous. The Viscosity Check on page 4, lines 54 to 56 in combination with page 3, lines 15 to 29 of the patent in suit, wherein the viscosity of the amorphous product is measured within a temperature range of from 80°C to 120°C, demonstrates additionally the stability of the amorphous form. According to page 4 lines 23 to 39 of the patent in suit, the DSC Check of the product obtained yields an endothermic melting peak at 48°C, which proves the product to have a low softening point.

For these reasons, the Board is satisfied that the problem underlying the patent in suit has been successfully solved. This finding has not been challenged by the Respondent 1.

7.6 It remains to decide whether or not the proposed solution to the problem underlying the patent in suit is obvious in view of the state of the art.

7.6.1 Document (2) teaches a process for preparing tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having a **crystal** structure (see point 6.1 above). Thus, it does not address the problem underlying the patent in suit, i.e. to provide a process for preparing an **amorphous** product (see point 7.3 above). Consequently, document (2) cannot give any hint on how to solve that problem.

The process disclosed in document (2) comprises a melting step without, however, neither disclosing the process feature of the process claimed to melt the mass **completely**, nor suggesting that feature to be critical (see point 6.2 above). To achieve a complete melt, as already pointed out above, represents a critical process feature since it excludes the presence of even very small amounts of remaining, not molten seed crystals in the melt which would prevent an amorphous product to be obtained by sudden cooling.

For these reasons, in the Board's judgement, document (2) does not render obvious the proposed solution to the problem underlying the patent in suit.

7.6.2 In comparative Example 6 on page 24, document (12) teaches a process for preparing tetrakis[3-(3,5-di-tert.butyl-4-hydroxyphenyl)-propionyl-oxymethyl]methane having an amorphous structure (see point 6.1.3.3 above). The disclosed process comprises the treatment of a solution of that product including a recrystallisation step. Therefore, the process of document (12) is substantially different to the claimed process comprising the sudden cooling of a complete melt.

For these reasons, document (12) also does not give any pointer to and does not render obvious the claimed solution, either taken alone or in combination with document (2).

7.6.3 The Respondent 1 not relying on further documents in order to object to obviousness, the Board is satisfied that none of the other documents in the proceedings renders the proposed solution obvious.

7.7 For these reasons the Board concludes that the subject-matter of claim 1, and by the same token, that of dependent claims 2 to 4 involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

Second Auxiliary Request

8. Since the preceding first auxiliary request is allowable for the reasons set out above, there is no need for the Board to decide on the second auxiliary request being of lower order.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the claims submitted as first auxiliary request on 29 March 1994, and a description yet to be adapted.

The Registrar: The Chairman:

E. Görgmaier A. Nuss