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**Datasheet for the decision  
of 15 February 2023**

**Case Number:** T 0743/20 - 3.3.03

**Application Number:** 08850010.3

**Publication Number:** 2213696

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C09D175/06

**Language of the proceedings:** EN

**Title of invention:**  
POLYCARBONATE DIOL

**Patent Proprietor:**  
ASAHI KASEI KABUSHIKI KAISHA

**Opponent:**  
Goldbach, Klara

**Relevant legal provisions:**  
EPC Art. 56  
RPBA 2020 Art. 12(4), 12(5), 13(2)

**Keyword:**  
Admittance of documents  
Inventive step - Main Request (no)  
Admittance of auxiliary requests 2 and 10 (no)

**Decisions cited:**

T 1041/21



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Case Number: T 0743/20 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 15 February 2023**

**Appellant:** Goldbach, Klara  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 21 January 2020  
rejecting the opposition filed against European  
patent No. 2213696 pursuant to Article 101(2)  
EPC.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** D. Marquis  
R. Cramer

### Summary of Facts and Submissions

I. The appeal lies against the decision of the opposition division rejecting the opposition against European patent No. 2 213 696.

II. Claim 1 as granted read as follows:

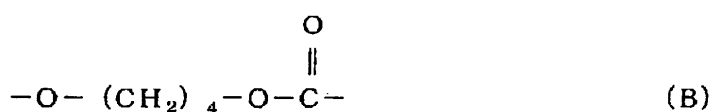
"1. A polycarbonate diol comprising repeating units represented by the following formula (A) and a terminal hydroxyl group, characterized in that: from 60 to 100 mol% of the repeating units represented by the formula (A) are the sum of repeating units represented by the following formula (B) and repeating units represented by the following formula (C); the amount of the repeating units represented by the formula (B) is from 60 to 100 mol% based on the total amount of the repeating units represented by the formula (A); the polycarbonate diol has primary and secondary terminal OH groups and has a primary terminal OH ratio of 95% or higher; and the sum of the primary terminal OH ratio and the secondary terminal OH ratio of the polycarbonate diol is 99.5% or higher.

[Formula 1]



(In the formula, R represents a divalent aliphatic or alicyclic hydrocarbon having 2 to 12 carbon atoms)

[Formula 2]



[Formula 3]



- III. The decision of the opposition division was based, *inter alia*, on the following documents:  
D1: JP 05-051428  
D1': English translation of JP 05-051428  
D2: JP 05-025264  
D2': English translation of JP 05-025264  
D3: EP 1 288 241 A1  
D20: Experimental report by Tetsuo Masubuchi, dated 20 March 2019  
D23: Experimental report filed by the opponent with letter of 18 January 2019 (Reproduction of Example 2 of D2 and Reference Example 1 of D1)  
D26: Annex 3, Table C filed by the opponent on 2 October 2019
- IV. The opposition division decided that claim 1 of the main request found a basis in the application as filed, that it was sufficiently disclosed, novel over D1 and D2 and that it was inventive over D1 as the closest prior art.
- V. The opponent (appellant) lodged an appeal against the decision of the opposition division.
- VI. The patent proprietor (respondent) maintained auxiliary requests 1-12 filed in opposition (auxiliary request 1 with letter of 29 January 2019 and auxiliary requests 2 to 12 with letter of 4 October 2019) with their reply to the statement of grounds of appeal.

VII. The parties were summoned to oral proceedings and a communication pursuant to Article 15(1) RPBA 2020 indicating specific issues to be discussed at the oral proceedings was sent to the parties.

VIII. Oral proceedings were held on 15 February 2023 by videoconference.

IX. The following documents were submitted in appeal:

with the statement of grounds:

D35: Chromatogram of 1,4-butanediol lot 170604N02

D36: Excerpt of Polyurethanes, Chemistry and Technology, J.H. Saunders, K.C. Frisch, Interscience publishers, pages 72 and 73

with the rejoinder:

D37: US 2014/0116872

D38: EP 2 730 566 A1

D39: Experimental report dated 10 September 2020

with letter of 2 February 2023 of the respondent:

D40: Experimental report dated 2 February 2023

X. The final requests of the parties were as follows:

- The appellant requested that the decision under appeal be set aside and that the patent be revoked.
- The respondent requested that the appeal be dismissed, or that the decision under appeal be set aside and the patent be maintained according to one of auxiliary requests 2 or 10 filed on 4 October 2019.

XI. The appellant's arguments, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They are essentially as follows:

- D35 and D36, which were filed as a reaction to the decision under appeal, should be admitted into the proceedings. D37, D38 and D40 should not be admitted into the proceedings.
- Claim 1 as granted lacked novelty in view of reference example 1 of D1 taking into account the data in D23.
- Claim 1 as granted lacked an inventive step starting from reference example 1 of D1 as the closest prior art in combination with D3.
- Auxiliary requests 2 and 10 were not substantiated in appeal and should not be admitted into the proceedings.

XII. The respondent's arguments, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They are essentially as follows:

- D35 should not be admitted into the proceedings. D37 and D38, filed with the reply to the statement of grounds of appeal and D40, filed in reaction to the communication of the Board, should be admitted into the proceedings.
- Claim 1 as granted was novel over reference example 1 of D1 taking into account the data in D20.

- Claim 1 as granted was inventive starting from reference example 1 of D1 as closest prior art in combination with D3.
- Auxiliary requests 2 and 10, which were substantiated in the rejoinder and in first instance proceedings, should be admitted into the proceedings.

### **Reasons for the Decision**

#### 1. Admittance of documents

- 1.1 D35 is a chromatogram concerning the experiments done in D23. It was submitted by the appellant with their statement of grounds of appeal. D37 and D38 are patent documents filed by the respondent with their reply to the statement of grounds of appeal. The filing of D35, D37 and D38 in appeal underlies the provisions of Article 12(4) to (6) RPBA 2020.
- 1.2 D35 is cited in reaction to the decision under appeal and in particular the part on page 13 noting that D23 submitted in the first instance proceedings did not include gas chromatography curves, concluding that D23 was less complete and therefore less credible than D20 for the assessment of novelty in view of D1. D37 and D38 are intended to provide information on the level of impurity of industrially produced 1,4-butanediol relating to the question of novelty as well. D37 and D38 can be seen as being filed in reaction to D26 (Annex 3, Table C) filed in the first instance proceedings with respect to the same issue two months before the oral proceedings before the opposition division.



- 1.3 D35, D37 and D38 were filed at the earliest point in time in the appeal proceedings, they relate to the question of novelty, address specific points critical to the decision on novelty while remaining in the same framework as dealt with in the decision, and they do not add complexity to the case nor affect the procedural economy. On this basis, the Board finds it appropriate to exercise its discretion according to Article 12(4) RPBA 2020 by admitting D35, D37 and D38 into the proceedings.
- 1.4 D36 is an excerpt from a book on polyurethanes submitted by the appellant with their statement of grounds of appeal. The admittance of that document into the proceedings was not contested by the respondent. As D36 provides background knowledge and its admittance was not contested, it is also admitted into the proceedings.
- 1.5 D40 is an experimental report that was provided by the respondent with letter of 2 February 2023, after issuance of the preliminary opinion of the Board and following the summons to oral proceedings. According to Article 13(2) RPBA 2020, any amendment to a party's appeal case made after notification of a summons to oral proceedings shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.
- 1.6 The experimental report D40 was said to address the question of inventive step and in particular was intended to show that the distinguishing features over the closest prior art D1 resulted in an improved impact resistance and tensile strength of the polyurethanes obtained using polycarbonate diols according to granted

claim 1 (letter of 2 February 2023 pages 4 and 5). It was argued that D40 was filed in reaction to the preliminary opinion of the Board "in which inventive step was doubted for the first time in the proceedings, including first instance proceedings". The Board cannot follow that justification especially because inventive step over D1 as the closest prior art was in fact objected to by the opponent since the beginning of the opposition proceedings (notice of opposition, section VIII.2.1) and the presence of improved mechanical properties over D1 was also not recognized in the decision under appeal (page 15, sixth paragraph). It follows that the fact that the Board raised concerns with respect to inventive step is an ordinary development in the appeal proceedings and not an exceptional circumstance which could justify the filing of D40 at this stage of the appeal proceedings (Case Law of the Boards of Appeal, 10th Edition 2022, V.A. 4.5.4a)). D40 is therefore not admitted into the proceedings under Article 13(2) RPBA 2020.

Main request (granted claims)

2. Novelty over D1

2.1 In section 1.3 of the decision under appeal the opposition division acknowledged novelty of granted claim 1 over reference example 1 of D1 on the grounds that it failed to disclose polycarbonate diols having a sum of primary and secondary terminal OH ratio of 99.5% or higher. In particular, two experimental reports (D20 and D23) were discussed in the decision of the opposition division, D20 showing that the measured sum of primary and secondary OH ratio of the polycarbonate diol was not according to granted claim 1, and D23 showing that the sum was according to granted claim 1.

The opposition division considered that the data in D20 were made more credible by the presence of more detailed information on how the individual components had been determined (including GC curves) and by the quantitative calculation based on the individual peaks.

- 2.2 Lack of novelty in view of reference example 1 of D1 was pursued in appeal. Reference example 1 of D1 discloses the preparation of a polycarbonate diol from ethylene carbonate, 1,6-hexanediol and 1,4-butanediol. It was not in dispute that the resulting polycarbonate diol prepared from that example was according to claim 1 as granted but for the primary terminal OH ratio and the sum of primary terminal OH ratio and secondary terminal OH ratio which were not disclosed therein.
- 2.3 The question of novelty in appeal depends on whether it has been proven that the polycarbonate diol prepared in reference example 1 of D1 necessarily has a primary terminal OH ratio of 95% or higher and a sum of primary terminal OH ratio and secondary terminal OH ratio of 99.5% or higher.
- 2.4 With D20 the respondent provided a rework of the preparation disclosed in reference example 1 of D1 showing that the polycarbonate diol produced therein had a primary OH ratio of 96.32% and a secondary OH ratio of 2.65%. Based on D20, the respondent concluded that the polycarbonate diol of reference example 1 of D1 was not according to granted claim 1. D23 provided by the appellant also contains a rework of reference example 1 of D1 showing that the polycarbonate diol of that example had a primary OH ratio of 99.8% and a secondary OH ratio of 0.1%. Based on D23, the appellant concluded that the polycarbonate diol of reference

example 1 of D1 was according to granted claim 1.

- 2.5 The Board however finds that neither D20, nor D23 can be considered as fully representative of the preparation of reference example 1 of D1. In particular, the level of impurities of the starting materials 1,4-butanediol and 1,6-hexanediol is not disclosed in D1. This is relevant to the question of novelty since it was acknowledged by the parties that the level of impurities in the starting materials has a direct and significant influence on the values of the primary and secondary OH ratios of the produced polycarbonate diols. In particular the summary of the data on page 14 of the reply to the statement of grounds of appeal shows that the level of impurity of 1,4-butanediol and 1,6-hexanediol is directly relevant to both primary and secondary OH ratios and this to such an extent that a composition obtained from 1,4-butanediol and 1,6-hexanediol could fall under granted claim 1 or not.
- 2.6 In the absence of relevant data in D1 concerning the level of impurity of the 1,4-butanediol and 1,6-hexanediol starting material used in the preparation disclosed in reference example 1, the Board concludes that that example cannot be reproduced to the identical and that it cannot be shown that the unknown primary terminal OH ratio and the sum of primary and secondary OH ratios is the inevitable result of the process disclosed therein. That can also explain why the attempts to reproduce reference example 1 of D1 in D20 and D23 do not lead to the same conclusion.
- 2.7 The Board therefore finds that granted claim 1 is novel over D1.

3. Inventive step over D1

3.1 The contested decision addressed the question of inventive step in view of D1 as the closest prior art. Both parties also acknowledged in appeal that reference example 1 of D1 can be seen as the closest prior art (statement of grounds of appeal, page 22, section 6 and reply to the statement of grounds of appeal, page 20).

It was also acknowledged by both parties in appeal that granted claim 1 differed from reference example 1 in D1 in that i) the primary terminal OH ratio is 95% or more and ii) the sum of the primary and secondary terminal OH ratio is 99.5% or more (statement setting out the grounds of appeal, page 23, first full paragraph; reply to the statement setting out the grounds of appeal, page 20, second paragraph).

The Board has no reason to take a different view on the selection of the closest prior art and on the identification of the distinguishing features.

3.2 The problem identified in the decision under appeal was to provide alternative polycarbonate diols for making polyurethane of high mechanical strength (decision of the opposition division, page 15).

3.3 The respondent argued based on the examples of the patent in suit that the objective technical problem was to improve the tensile strength and impact resilience (reply to the statement setting out the grounds of appeal, page 21, last paragraph). In particular, the respondent pointed at compared values of tensile strength and impact resilience measured on the polyurethanes obtained from i) the polycarbonate diol of example 3 representing granted claim 1 with that of

example 1 being comparative as the sum of the primary and secondary terminal OH ratio was 99.1 % (i.e. outside of the range of 99.5% or more defined in granted claim 1). It was also pointed at ii) the polycarbonate diol of example 4 according to granted claim 1 to be compared with comparative example 2 (for which both the primary terminal OH ratio at 94.8 % and the sum of the primary and secondary terminal OH ratio at 96.2% are outside of the ranges defined in granted claim 1). A comparison was also made between iii) the polycarbonate diol of example 5 and that of example 2 (with the sum of the primary and secondary terminal OH ratio of 97.3 %, i.e also outside of the range of claim 1).

- 3.4 In essence, these examples of the patent in suit show that improvements in tensile strength and impact resilience depend to a large extent on i) a higher primary terminal OH ratio and that, and at least by extension, ii) the sum of primary and secondary terminal OH ratios has also an influence on these properties. The improvements in tensile strength and impact resilience essentially correspond to the teaching also known from the prior art D3 (paragraph 9, lines 13-30 and paragraph 17) so that even if the patent in suit does not offer a clear comparison with the preparation of the polycarbonate diol according to reference example 1 of D1, it appears credible that the combination of features i) and ii) leads to an improvement of tensile strength and impact resilience. The problem solved by granted claim 1 was therefore to provide polycarbonate diols which allowed the production of polyurethane with improved tensile strength and impact resilience.

- 3.5 The question of obviousness starting from reference example 1 of D1 was whether the skilled person would have considered polycarbonate diols with i) a primary terminal OH ratio of 95% or more and ii) a sum of the primary and secondary terminal OH ratio being 99.5% or more as a solution to the posed problem.
- 3.6 D3 cited by the appellant relates to the production of polycarbonate diols comprising units derived from 1,6-hexanediol and 1,5-pentanediol or 1,4-butane diol (paragraph 42) and aims at producing polyurethanes having high mechanical properties such as tensile strength, elongation and impact resilience (paragraphs 9 and 10).
- 3.7 D3 aims at producing polycarbonate diols having a ratio of primary hydroxyl groups at the terminals (corresponding to the primary terminal OH ratio defined in granted claim 1) of 99 % by weight or more (claim 1 of D3). The passage in lines 16-19 of paragraph 24 of D3 further discloses a preferred range of primary terminal OH ratio of 99.5 % by weight or more. Such a high primary terminal OH ratio is associated with improved tensile strength and impact resilience (paragraphs 9 and 17). That teaching is directly relevant to D1 since impact resilience of the prepared polyurethane is said to be particularly improved when 1,6-hexanediol and 1,4-butanediol, the two diols used in reference example 1 of D1, are used in the production of polycarbonate diols (paragraph 42 of D3).
- 3.8 The respondent argued that the teaching of D3 would not lead to granted claim 1 because it also teaches to remove any secondary terminal OH groups in the produced polycarbonate diols. While it can be agreed that D3 teaches that the presence of secondary terminal OH

groups on the polycarbonate diols is generally detrimental to the properties of the polyurethane (paragraph 17), D3 does not teach the complete removal of these groups from polycarbonate diols. On the contrary, paragraph 18 of D3 clearly indicates that while it is preferred that the primary terminal OH ratio is as high as possible, increasing "infinitely" the primary terminal OH ratio of the polycarbonate diol would require to "infinitely" increase the purity of 1,5-pentanediol and/or 1,6-hexanediol, which is said to be too large a labour for the purification of the diols. D3 then teaches in the same paragraph that excellent effects can be obtained as long as the primary terminal OH ratio of the polycarbonate diol is not lower than its required lower limit, which in the preferred situation mentioned above, would correspond to a range of 99.5 % by weight.

- 3.9 The teaching of D3 with respect to the primary terminal OH ratio in polycarbonate diols based on 1,6-hexanediol and 1,4-butanediol is therefore that when it is above 99.5 % by weight, a polyurethane having improved tensile strength and impact resilience can be obtained. That teaching together with the information that the secondary OH groups do not need to be completely eliminated satisfies both conditions i) and ii) (together with the condition that both types of OH groups are present) and provides the solution to the problem posed. It follows that applying the teaching of D3 to the preparation of reference example 1 of D1 leads to granted claim 1. Granted claim 1 therefore does not involve an inventive step.

Auxiliary requests 2 and 10



4. Admittance

4.1 The respondent maintained auxiliary requests 1-12 filed in opposition with their reply to the statement setting out the grounds of appeal. Auxiliary requests 1, 3-9, 11 and 12 were, however, withdrawn at the oral proceedings before the Board. The admittance of the maintained auxiliary requests 2 and 10 was contested by the appellant on the grounds that these requests had not been substantiated in appeal.

4.2 Article 12(3) RPBA 2020 requires that the statement of grounds of appeal and the reply shall contain a party's complete appeal case and that these shall set out clearly and concisely the reasons why it is requested that the decision under appeal be reversed, amended or upheld, and should specify expressly all the requests, facts, objections, arguments and evidence relied on. The case law of the Boards of Appeal has consistently held that this requirement is not met if claim requests are not substantiated, except if the amendments made are self-explanatory. It has also held that requests that are not self-explanatory are to be considered as submitted only on the date of their substantiation (Case Law of the Boards of Appeal, 10th Edition 2022, V.A.5.12.6).

4.3 Auxiliary request 2 was dealt with on page 28 of the reply to the statement of grounds of appeal. In that passage the respondent merely introduces the amendment made in claim 1 and essentially reiterates the same argument of inventive step made for the main request in the final paragraphs of page 27 of the rejoinder relating to the main request, namely that D3 taught to avoid secondary terminal OH groups and as such it could not lead to the subject matter of operative claim 1.

There is no further argument on inventive step regarding auxiliary request 2 and why the amendment made in claim 1 of that request could lead the Board to a different conclusion from the one reached for the granted claims as the main request. The Board thus finds that auxiliary request 2 was not substantiated in appeal and finds it appropriate to make use of its discretion under Article 12(5) RPBA 2020 not to admit auxiliary request 2 into the proceedings.

- 4.4 A substantive argumentation for auxiliary request 10 was not provided in appeal. The respondent contended that that request had already been substantiated during the first instance proceedings, referring to submissions provided with letters of 4 October 2019 and 29 January 2019, which were cited in the rejoinder. A generic reference to submissions filed in opposition is however not sufficient for providing a proper substantiation in appeal. In any case, even if the Board had been prepared to take these letters into account, the lack of substantiation in appeal would not have been healed. Indeed, in the letter of 4 October 2019 it is only specified that auxiliary request 10 corresponds to auxiliary request 5 filed on 29 January 2019 (page 2). The letter dated 29 January 2019 also does not contain a substantiation with regard to inventive step for that request, here again indicating that auxiliary request 5 corresponds to "previous" auxiliary request 4 (page 2). The reply to the notice of opposition dated 1 March 2018 with which that auxiliary request 4 was filed contains a passage indicating the basis for the amendment made (page 2) and a short passage on page 14 about inventive step which essentially paraphrases the same argumentation as that provided for the main request in appeal. Therefore, even after a sweeping search in the first

instance submissions of the respondent, which is not the task of the Board (T 1041/21, point 5), the Board can only conclude that a substantiation regarding inventive step of auxiliary request 10 cannot be found. The Board thus concludes that auxiliary request 10 was not substantiated in appeal and finds it appropriate to make use of its discretion under Article 12(5) RPBA 2020 not to admit auxiliary request 10 into the proceedings.

## 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. Hampe

D. Semino

Decision electronically authenticated