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**Datasheet for the decision  
of 7 May 2018**

**Case Number:** T 0642/14 - 3.3.01

**Application Number:** 06121086.0

**Publication Number:** 1772446

**IPC:** C07D303/08, C08G59/04

**Language of the proceedings:** EN

**Title of invention:**

Process for producing organic compounds from glycerol, the glycerol coming from renewable raw material

**Patent Proprietor:**

SOLVAY SA

**Opponents:**

Hexion Research Belgium SA  
Akzo Nobel Chemicals International B.V.  
Olin Corporation  
Kanzler Verfahrenstechnik GmbH

**Headword:**

Epichlorohydrin production/SOLVAY

**Relevant legal provisions:**

EPC Art. 54

EPC R. 115, 126(1), 126(2)

RPBA Art. 12

**Keyword:**

Notification - letter deemed to be delivered

Summons to oral proceedings - continuation of proceedings

without duly summoned party

Late-filed document admitted

Novelty - all requests (no)

Product-by-process features



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0  
Fax +49 (0)89 2399-4465

Case Number: T 0642/14 - 3.3.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.01**  
**of 7 May 2018**

**Appellant:** SOLVAY SA  
(Patent Proprietor) Rue de Ransbeek, 310  
1120 Bruxelles (BE)

**Representative:** Teipel, Stephan  
Lederer & Keller  
Patentanwälte Partnerschaft mbB  
Unsöldstrasse 2  
80538 München (DE)

**Respondent:** Hexion Research Belgium SA  
(Opponent 1) avenue Jean Monnet, 1  
1348 Ottignies-Louvain-la-Neuve (BE)

**Representative:** Hexion Research Belgium SA  
IP Section  
Avenue Jean Monnet 1  
1348 Ottignies-Louvain-la-Neuve (BE)

**Respondent:** Akzo Nobel Chemicals International B.V.  
(Opponent 2) Velperweg 76  
6824 BM Arnhem (NL)

**Representative:** Akzo Nobel IP Department  
Velperweg 76  
6824 BM Arnhem (NL)

**Respondent:** Olin Corporation  
(Opponent 3) 190 Carondelet Plaza Suite 1530  
Clayton, MO 63105-3443 (US)

**Representative:** Bumke, Jakob Wenzel  
Greaves Brewster LLP  
Copa House

Station Road  
Cheddar BS27 3AH (GB)

**Respondent:** Kanzler Verfahrenstechnik GmbH  
(Opponent 4) Stiftingtalstrasse 165c  
8010 Graz (AT)

**Representative:** Fitzner, Uwe  
Fitzner & Frese PartGmbH  
Hauser Ring 10  
40878 Ratingen (DE)

**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 17 January 2014  
revoking European patent No. 1772446 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairwoman** R. Hauss  
**Members:** G. Seufert  
L. Bühler

## Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal against the decision of the opposition division revoking the European patent No. 1 772 446, which is based on European patent application No. 06 121 086.0.

II. The patent was granted on the basis of 21 claims, independent claim 1 reading as follows:

"1. Process for producing epichlorohydrin comprising subjecting to a dehydrochlorination operation, dichloropropanol produced from glycerol, wherein the glycerol has been obtained from renewable raw materials during the manufacture of biodiesel."

III. The present decision refers to the following documents:

(10) GB 984,633

(23) H. T. Clarke, W. W. Hartman, Organic Synthesis, Coll. Vol. 1, page 233 (1941); Vol. 3, page 47, (1923)

(25) J. B. Conant, O. R. Quayle, Organic Synthesis, Coll. Vol. 1, page 292 (1941); Vol. 2, page 29, (1922)

(42) K. Gottlieb et al., Chem. Ing. Tech., Vol. 66(1), 1994, pages 64 to 66

(53) Experimental evidence: examples 1 and 2, submitted with the statement of grounds of appeal

(54) Certification regarding the origin of crude and refined glycerine provided by Patum Vegetable Oil Co. Ltd and received by Mr Aziz Mimouni (Solvay Campus), 14 March 2014

(55) Certification regarding the origin of refined glycerine (ecocerol) provided by PT Ecogreen Oleochemicals, 21 May 2014

- (56) Experimental evidence: example 3, submitted with letter received on 27 November 2014
- (59) H. R. Christen, Grundlagen der Organischen Chemie, 2<sup>nd</sup> Edition, 1972, Sauerländer-Diesterweg Salle, Aarau (DE), page 437

IV. Notices of opposition were filed by opponents 1 to 3 (respondents 1 to 3) requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC).

Opponent 4 (respondent 4) joined the opposition proceedings pursuant to Article 105 EPC requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC).

V. The decision under appeal was based on the set of claims as granted (main request) and sets of claims according to auxiliary requests 1 to 4, submitted with letter of 10 October 2013.

The opposition division held that the subject-matter of the main request was not novel over the disclosure of document (42), the enabling disclosure of which was supported by common general knowledge as illustrated, *inter alia*, in document (23).

The subject-matter of auxiliary requests 1, 2 and 4, each relating in claim 1 to a process for producing epichlorohydrin, was not considered to involve an inventive step starting with document (42) as the closest prior art. The technical problem to be solved was formulated as the provision of an alternative process. The solution, which was the selection of

glycerol of a suitable grade of purity as starting material for the production of dichloropropanol, was regarded to be obvious for the person skilled in the art.

The subject-matter of auxiliary request 3, which related in claim 1 to a process for producing epoxy resins, was considered to lack an inventive step, as it was the result of a mere juxtaposition of two well-known processes disclosed in documents (42) and (10).

- VI. With the statement of grounds of appeal, the appellant filed sets of claims according to a main request and auxiliary requests 1 to 5. New evidence was also filed including documents (53) to (55) and (56).
- VII. In their replies to the statement of grounds of appeal, respondents 2 to 4 maintained their objections with regard to lack of novelty and inventive step. Respondent 4 also filed document (59).
- VIII. Summons to attend oral proceedings were issued on 23 January 2018.
- IX. In a communication issued in preparation for oral proceedings, the board expressed its preliminary opinion and informed the parties on points which might require discussion. In particular, the board mentioned that the main request, contrary to the appellant's statement in the grounds of appeal, did not correspond to the set of claims as granted, as claim 21 had been redrafted. The board, *inter alia*, gave a negative opinion on novelty. In that context, the board indicated that novelty of the claimed subject-matter hinged on the question as to whether or not the dichloropropanol starting material, which was

characterised by "product-by-process"-type features, differed from known dichloropropanol as disclosed, *inter alia*, in document (23).

- X. With letters dated 12 February 2018 and 6 March 2018, respondents 2 and 3 informed the board that they withdrew their requests for oral proceedings and would not be attending these proceedings scheduled for 7 May 2018.
  
- XI. In a communication dated 5 March 2018, the board drew respondent 1's attention to the missing advice of delivery with regard to the summons mentioned in point VIII above.
  
- XII. In reply to that communication, respondent 1 stated that the summons had not been received and signed a print-out of the summons, which it had retrieved via the EPO web-site, for acknowledgement of receipt.
  
- XIII. In a further communication dated 5 April 2018, the board informed respondent 1 that, upon inquiry about the notification to the summons of 23 January 2018, the board was informed by Deutsche Post that the summons were notified to respondent 1 on 26 January 2018. This was more than 2 months before the date of oral proceedings in accordance with Rule 115(1) EPC. The date fixed for oral proceedings was maintained. Respondent 1 was invited to inform the board and the parties if it disputed the notification of the summons on 26 January 2018 and disagreed with the holding of oral proceedings scheduled for 7 May 2018.
  
- XIV. By letter dated 19 April 2018, respondent 1 informed the board that it would not be attending the oral proceedings. It did not present any comments or



observations in substance with regard to the issues raised in the board's communication of 5 April 2018.

XV. With letter of 18 April 2018, the appellant filed a corrected main request (set of claims as granted, as indicated in the statement of grounds of appeal) and corrected auxiliary requests 1 to 3 and 5. Auxiliary request 4, filed with the statement of grounds of appeal, was re-submitted in unamended form. The appellant filed further sets of claims as auxiliary requests 6 to 15, which were subsequently withdrawn (see point XVI below).

Claim 1 of auxiliary request 1 differs from claim 1 as granted in the addition of the feature "**and wherein the glycerol used is a purified product and comprises at least 1 mg/kg by weight of aldehydes and at most 0.5 % by weight of aldehydes**".

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that the upper limit of the amount of aldehydes has been restricted to "**at most 0.1 % by weight of aldehydes**".

Claim 1 of auxiliary request 3 differs from claim 1 as granted in the addition of feature the feature "**and wherein the glycerol used is a crude product comprising, water in an amount of at least 5 weight percent and a metal salt, preferably selected from NaCl, KCl, sodium sulfate and potassium sulfate, in an amount of at least 1 percent by weight**".

Claim 1 of auxiliary request 4 is directed to a process for epoxy resin production and reads as follows:

"1. Process for producing epoxy resins according to which epichlorohydrin which has been obtained by subjecting to a dehydrochlorination operation, dichloropropanol produced from glycerol, wherein the glycerol has been obtained from renewable raw materials during the manufacture of biodiesel, is used as starting material."

Claim 1 of auxiliary request 5 differs from claim 1 as granted in the addition of the feature **"and wherein the glycerol contains at least methanol in an amount of at least 10 mg/kg"**.

XVI. Oral proceedings took place as scheduled on 7 May 2018. At the end of these proceedings, the appellant withdrew auxiliary requests 6 to 15.

XVII. The arguments of the appellant, as far as they concern the decisive issues of the present decision, can be summarised as follows:

Admission of document (53)

Document (53) was filed in reply to the decision under appeal. It was designed to close any potential gap in the chain of evidence and also demonstrated that the origin of the glycerol resulted in the formation of a specific dichloropropanol or epichlorohydrin. It was therefore also relevant for the question of novelty.

Novelty

The process according to claim 1 of the main request was novel over document (23). The difference resided in the specific, inherently different dichloropropanol starting material obtained according to the specific

process defined in claim 1. Document (53) was evidence for a qualitative difference between products obtained from glycerol ex biodiesel and glycerol ex hydrolysis. The conditions during the manufacture of the biodiesel were irrelevant, since document (53) had demonstrated that it could make a difference.

The arguments with respect to novelty of the subject-matter of claim 1 of auxiliary requests 1 to 3 and 5 were the same. The dichloropropanol starting material obtained from the specifically defined glycerol was novel.

Document (53) also proved that epichlorohydrin was qualitatively different depending on the process of its preparation. Claim 1 of auxiliary request 4 was therefore novel over documents (10) or (59) basically for the same reasons as those provided for claim 1 of the main request.

XVIII. The arguments of the respondents as far as they concern the decisive issues of the present decision, can be summarised as follows:

Admission of document (53)

The late filing of document (53) was not justified. It had not been submitted in response to a newly raised issue. The lack of experimental support had already been addressed in the notice of opposition by respondent 2. The appellant had had ample opportunity to provide all necessary facts and evidence during already lengthy opposition proceedings.

## Novelty

The subject-matter of claim 1 of the main request was not novel. The process for the production of dichloropropanol did not limit claim 1 of the main request. According to well established jurisprudence of the boards of appeal, a claim to a substance covered that substance, irrespective of how it was prepared. The same principle applied if a substance that was used as starting material in a process was characterised by its process of production. It had not been shown that the glycerol ex biodiesel or the dichloropropanol obtained from said glycerol differed from glycerol and dichloropropanol obtained in a different way. Document (53) was insufficient in this respect. The production of biodiesel was not a constant process and consequently by-products/impurities, which allegedly distinguished the glycerol and dichloropropanol, were also not constant. The examples in document (53) were not sufficiently detailed to provide conclusive evidence that the glycerol and the subsequently obtained dichloropropanol were novel products.

The same arguments applied with regard to the subject-matter of claim 1 of auxiliary requests 1 to 3 and 5 and claim 1 of auxiliary request 4. The latter disclosed a process in which epichlorohydrin was used as a starting material. It had not been shown that this compound differed from known epichlorohydrin.

- XIX. The appellant requested that the decision under appeal be set aside and that the oppositions be rejected (main request), or, alternatively, that the patent be maintained on the basis of one of auxiliary requests 1 to 5, all filed with letter of 18 April 2018.

XX. Respondents 2 and 3 requested in writing that the appeal be dismissed. Respondent 2 further requested in writing that documents (53) and (56) not be admitted into the appeal proceedings.

Respondent 4 requested that the appeal be dismissed. It further requested that documents (53) and (56) not be admitted into the appeal proceedings.

Respondent 1 did not file any requests.

### **Reasons for the Decision**

1. The appeal is admissible.
2. Procedural matters
  - 2.1 Summons to attend oral proceedings
    - 2.1.1 According to Rule 115(1) EPC (second sentence) at least two months' notice of the summons shall be given, unless the parties agree to a shorter period.

Pursuant to Article 119 EPC (first sentence) summonses must be notified by the EPO in accordance with the Implementing Regulations. Rule 126(1) EPC (first sentence) stipulates that summonses must be notified by registered letter with advice of delivery or equivalent. Under Rule 126(2) EPC (first half-sentence) the letter is deemed to be delivered to the addressee on the tenth day following posting, unless the letter has failed to reach the addressee or has reached him at a later date; in the event of any dispute, it shall be incumbent on the European Patent Office to establish that the letter has reached its destination or to

establish the date on which the letter was delivered to the addressee, as the case may be (Rule 126(2) EPC, second half-sentence).

2.1.2 Since no advice of delivery of the summons or equivalent had been received by the EPO, the board invited respondent 1 to acknowledge the receipt of the summons. It also submitted an investigation request to the postal service "Deutsche Post". The results of this inquiry were communicated to respondent 1 (see points XI to XIII above).

2.1.3 In view of the results of the inquiry, which confirmed the receipt of the summons by respondent 1 on 26 January 2018, and in the absence of any evidence or arguments by respondent 1 to the contrary (see points XI and XIV above), the board was satisfied that the summons complied with the requirement to give at least two months' notice, pursuant to Rule 115(1) EPC (second sentence). Accordingly, the oral proceedings could take place on 7 May 2018 as scheduled.

2.2 Non-appearance at oral proceedings

As communicated in advance (see points X and XIV above), respondents 1, 2 and 3 did not attend the oral proceedings to which they had been duly summoned. The board decided to continue the proceedings pursuant to Rule 115(2) EPC and Article 15(3) RPBA.

2.3 Admission of document (53)

2.3.1 Respondents 2 and 4 objected to the admission of document (53) into the appeal proceedings, arguing that its late submission was not justified (see point XVIII above).

2.3.2 Document (53) had been filed with the statement setting out the grounds of appeal in an attempt to further supplement the experimental evidence relied on during the opposition proceedings and to support the appellant's view on inventive step, in particular, its contention that the use of glycerol obtained from the manufacture of biodiesel was advantageous for the preparation of epichlorohydrin. The filing of such supplementary data, which does not significantly change the case, but attempts to improve the conclusiveness of the experimental evidence already on file is considered to be a normal reaction of the losing party. Moreover, at the oral proceedings before the board, the appellant also relied on document (53) as evidence that the dichloropropanol obtained by a process according to claim 1 of the main request was novel. This issue was not addressed in the decision under appeal. It was raised by the board in its communication pursuant to Article 15(1) RPBA based on the board's claim construction and on novelty objections which were maintained by respondent 3, but had played no role in the opposition division's assessment of novelty (see point IX above).

2.3.3 In these circumstances, the board considered it appropriate to admit document (53) into the proceedings.

2.4 Admission of document (56)

In view of the fact that the appellant did not rely on document (56) in its argumentation on the issue of novelty, and since the case could be decided on the basis of that sole issue (see points 3.6, 4.2 and 5.3

below), a decision on the admission of document (56) is not necessary.

*Main request*

3. Novelty

3.1 Claim 1 of the main request is directed to a process for the preparation of epichlorohydrin via dehydrochlorination of dichloropropanol, in which the dichloropropanol starting material is characterised by a process for its production (i.e. produced from glycerol, which in turn is obtained from renewable materials during the manufacture of biodiesel). The dichloropropanol is not further defined and encompasses  $\alpha,\beta$ - and  $\alpha,\gamma$ -isomers.

The board notes that the steps for the preparation of the dichloropropanol starting material are not technical features of the claimed dehydrochlorination process. The presently claimed process is therefore not to be equated with a multi-step process with consecutive steps for the preparation of glycerol, dichloropropanol and epichlorohydrin. The method steps for the production of the starting material solely define the specific dichloropropanol to be used in the claimed process and can be taken into account in the assessment of novelty only to the extent that they inevitably result in a structural feature or a characterising property of said starting material.

In this context, the board observes that the process by which the dichloropropanol starting material may be obtained according to claim 1 of the main request is not limited in terms of particular reaction conditions and may also include separation and purification



operations, such as extraction, distillation, chromatography etc. Potentially distinguishing dichloropropanol properties which may be the result of such specific conditions cannot be taken into account in the examination of novelty of the claimed subject-matter. Accordingly, the board takes the view that the starting material is defined solely by the presence of dichloropropanol molecules and therefore does not differ from "generic" dichloropropanol.

- 3.2 Novelty of claim 1 of the main request was challenged, *inter alia*, in view of the disclosure of document (23).

This document describes a process for the preparation of epichlorohydrin via dehydrochlorination of  $\alpha,\gamma$ -dichloropropanol (see document (23), in particular, the equation on top of the first page). The preparation of the dichloropropanol starting material is not explicitly disclosed, but reference is made to document (25), which describes its preparation from glycerol (see document (23), first page, first paragraph, line 4). The origin of the glycerol is not mentioned.

Document (23) therefore discloses the same process step for the production of the same product using the same starting material as claim 1 of the main request.

- 3.3 In view of the board's explanation in point 3.1 above, the claimed process can only be considered novel over document (23) if the dichloropropanol which is obtained from glycerol, which, in turn, is obtained from the manufacture of biodiesel, inevitably differs in terms of at least one characteristic property from the dichloropropanol used in document (23). Properties which may change depending on specific circumstances -

in the present case, for example on particular manufacturing conditions or work-up procedures of either glycerol or dichloropropanol - cannot be taken into account, since they are not inevitably obtained according to the definition of claim 1, which does not restrict the procedures or conditions in its definition of how the dichloropropanol starting material may be obtained.

In support of its assertion that the dichloropropanol prepared according to claim 1 of the main request was different, the appellant relied on document (53).

- 3.4 Document (53) describes two examples in which glycerol was chlorinated under identical conditions to yield a reaction mixture 2 comprising dichloropropanol. This mixture was then dehydrochlorinated under identical conditions and the resulting reaction mixture 3 separated into an aqueous phase and an organic phase containing mainly epichlorohydrin. The colour of both phases was measured for each example. The APHA value of the organic phase in example 1 was 64, and in example 2 it was 229. The parameter "APHA value" reflects the "yellowness" of a liquid.

The two examples differ in the glycerol starting material from which the dichloropropanol was obtained, which was refined glycerol ex biodiesel from Patum Vegetable Oil Co. Ltd in example 1 and refined glycerol ex hydrolysis from ECOCEROL, PT Ecogreen in example 2. The origin of both types of glycerol was certified by documents (54) and (55), which are considered to be an integral part of document (53).

According to the appellant, the different colour values in the epichlorohydrin end-product proved that the

dichloropropanol prepared from glycerol "ex biodiesel" was inherently different from dichloropropanol from other origins.

3.5 The board does not agree.

Document (53) does not provide any information as to the properties of the dichloropropanol obtained in examples 1 and 2. Indeed, in none of the examples was this compound isolated and characterised. The observed APHA values may indicate the presence of different types or amounts of colour-forming by-products/impurities (see paragraph [0020] of the patent in suit) in the organic phases containing epichlorohydrin. However, since the preparation of dichloropropanol according to claim 1 may include all kinds of purification and separation steps they cannot be used as evidence that the epichlorohydrin product (e.g. after isolation and purification), let alone the dichloropropanol product of examples 1 and 2, differ in terms of at least one characteristic property.

Furthermore, the board concurs with respondent 4 that the by-product/impurity profile of a compound is not a constant feature and depends on the reaction conditions and work-up procedures by which a compound has been obtained. It therefore cannot be ruled out that the observed APHA values of the epichlorohydrin-containing phases are the result of the use of two specific glycerol products with a by-product/impurity profile which is the consequence of how they have been prepared (i.e. the specific reaction conditions in the biodiesel manufacture or the hydrolysis) and how and to what degree they have been purified, rather than whether the glycerol has been obtained from biodiesel. Contrary to the appellant's view, the APHA-value observed in

document (53) cannot therefore serve as proof that epichlorohydrin obtained from glycerol ex biodiesel as claimed, and by implication dichloropropanol, inevitably differ in terms of at least one characteristic property (i.e. a property that is consistently and inevitably obtained) from epichlorohydrin or dichloropropanol that had been obtained differently.

- 3.6 It follows from the above that document (53) does not provide conclusive evidence that dichloropropanol obtained from glycerol, which, in turn is obtained in the manufacture of biodiesel, will inevitably differ in terms of at least one property from other dichloropropanol.

In the absence of such evidence and in view of the fact that the dichloropropanol starting material is the only technical feature that could distinguish the presently claimed process from the process disclosed in document (23), the board concludes that the subject-matter of claim 1 of the main request lacks novelty within the meaning of Article 54 EPC.

*Auxiliary requests 1 to 3 and 5*

4. Novelty

- 4.1 Claims 1 of auxiliary requests 1 to 3 and 5 differ from claim 1 of the main request in that the amount of certain by-products/impurities in the glycerol which may be used in the preparation of dichloropropanol, is specified. These amendments do not alter the above assessment of lack of novelty. Indeed, the parties did not submit any novelty arguments specific to these auxiliary requests. In this context, the board also

notes that according to established jurisprudence of the boards of appeal a particular level of purity is not an element that can impart novelty, unless such a level could not have been achieved by conventional purification methods, for which there is no evidence on file. There is no evidence of any inevitable feature or property of the dichloropropanol resulting from its preparation from glycerol containing such by-products/impurities. The board also notes that document (53) is not relevant at all in this context, as it does not provide any information with regard to the type and/or amount of by-products that are present in the refined glycerol used in examples 1 and 2 (see documents (54) and (55)).

- 4.2 The board therefore concludes that auxiliary requests 1 to 3 and 5 must also be refused for lack of novelty (Article 54 EPC).

*Auxiliary request 4*

5. Novelty

- 5.1 Claim 1 of auxiliary request 4 is directed to a process for the preparation of epoxy resins from epichlorohydrin. The latter is characterised by "product-by-process"-type features (i.e. obtained by subjecting to a dehydrochlorination reaction dichloropropanol which has been produced from glycerol, which, in turn, has been obtained from biodiesel manufacture; see point XV above). Hence, the same considerations as in point 3.1 above apply, that is the method steps for the preparation of epichlorohydrin are not features of the claimed process, but solely define the epichlorohydrin product.

5.2 Document (10) discloses that epoxy resins are generally obtained by the action of epichlorohydrin on a phenol having at least two hydroxyl groups (see page 1, lines 21 to 23). Moreover, the use of epichlorohydrin as starting material in the preparation of epoxy resins is part of the skilled person's common general knowledge, as illustrated in document (59).

Accordingly, novelty of the claimed process over the disclosure of document (10) or (59) can only be acknowledged if the epichlorohydrin obtained as set out in claim 1 of auxiliary request 4 can be distinguished by any characteristic property from "generic" epichlorohydrin.

5.3 As already explained in point 3.5 above, no such evidence has been provided. The subject-matter of claim 1 of auxiliary request 4 therefore lacks novelty over the disclosure of documents (10) and (59).

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairwoman:



M. Schalow

R. Hauss

Decision electronically authenticated