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**Datasheet for the decision  
of 24 July 2012**

**Case Number:** T 0132/09 - 3.3.01

**Application Number:** 03722565.3

**Publication Number:** 1499602

**IPC:** C07D 301/12

**Language of the proceedings:** EN

**Title of invention:**

Process for the epoxidation of olefins

**Patentee:**

Evonik Degussa GmbH  
ThyssenKrupp Uhde GmbH

**Opponents:**

THE DOW CHEMICAL COMPANY  
BASF SE

**Headword:**

Olefin epoxidation/EVONIK DEGUSSA

**Relevant legal provisions:**

EPC Art. 123, 87, 54

**Keyword:**

"Entitlement to priority (main request, no; auxiliary request 1, yes)"  
"Novelty (main request, no; auxiliary request 1, yes)"  
"Remittal, auxiliary request 1"

**Decisions cited:**

G 0002/98

**Catchword:**

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Case Number: T 0132/09 - 3.3.01

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.01  
of 24 July 2012

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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 28 October 2008  
revoking European patent No. 1499602 pursuant  
to Article 101(2)(3)(b) EPC.

**Composition of the Board:**

**Chairman:** P. Ranguis  
**Members:** L. Seymour  
C.-P. Brandt

## Summary of Facts and Submissions

I. European patent No. 1 499 602 claims priority of 2 May 2002 and was filed on 29 April 2003 as international application PCT/EP 03/04442, which was published as WO 03/093255. The claims as granted consisted of one independent claim 1, and twenty-seven dependent claims, claim 1 reading as follows:

"1. Process for the epoxidation of olefins by

i) reacting an olefin with hydrogen peroxide in the presence of an epoxidation catalyst and an alcoholic solvent, whereby hydrogen peroxide is employed as an aqueous solution containing 10 to 70 wt.-% of hydrogen peroxide or as an alcoholic solution prepared by reaction of hydrogen and oxygen in the presence of a noble metal catalyst and the alcohol;

ii) separating product olefin oxide and unreacted olefin from the reaction product of step i);

iii) recovering a stream comprising the alcoholic solvent,

**characterized by**

iv) subjecting the recovered stream of step iii) to hydrogenation."

II. Oppositions were filed and revocation of the patent in its entirety requested pursuant to Articles 100(b) and 100(a) EPC (lack of novelty and inventive step).

III. The following documents were cited *inter alia* during the opposition/appeal proceedings:

(1) WO 02/062779

(28) EP 02 009 869.5 (priority document for the patent in suit)

(29) EP-A-1 359 148 (publication of document (28)).

IV. The appeal lies from the decision of the opposition division revoking the patent under Article 101(2),(3)(b) EPC. The decision was based on the claims as granted (main request), and two auxiliary requests submitted with letter of 25 January 2008.

The sole ground for revocation was that the subject-matter of the respective claims 1 of the requests under consideration lacked novelty with respect to examples B1 and B2 of document (1), which was identified as constituting prior art under Article 54(3) EPC and Article 54(4) EPC 1973, since the claims according to the requests on file enjoyed the claimed priority date of 2 May 2002.

V. The appellants (patentees) lodged an appeal against this decision. With the statement of grounds of appeal, the appellants filed a main request and six auxiliary requests, the former being identical to the claim set of the first auxiliary request forming the basis of the decision under appeal.

Claim 1 of the main request differed from claim 1 as granted in that the following feature had been added at the end of the claim:

"whereby the olefin is propene and propene is used mixed with propane".

- VI. In their replies to the statement of grounds of appeal, the respondents (opponents 1 and 2) maintained their objection of lack of novelty with respect to claim 1 of the main request in view of document (1).
- VII. A communication was sent as annex to the summons to oral proceedings. With respect to the main request, it was noted that it would have to be examined whether the assessment in the decision under appeal concerning the status of document (1) as prior art under Article 54(3) EPC was correct (cf. above point IV), since the additional feature introduced into claim 1 (cf. above point V) did not appear to be disclosed in the priority document (28).
- VIII. With its response of 14 June 2012, the appellants filed a main request and five auxiliary request to replace those previously on file. The main request was identical to that filed with the statement of grounds of appeal (cf. above point V).

In auxiliary request 1, a number of claims present in the claim set as granted were deleted, with corresponding renumbering of claims and adjustment of dependencies. In addition, claim 1 differed from claim 1 as granted (cf. above point I) in the addition of the following feature at the end of the claim:

"wherein in step iv) the recovered solvent stream is subjected to a heterogeneous catalytic hydrogenation at a hydrogen partial pressure of 0.5 to 30 MPa and the

hydrogenation is carried out using a fixed bed catalyst and the recovered solvent stream is directed through the catalyst bed in a trickle mode".

For each of the auxiliary requests, a table was submitted indicating where the basis for the amendments was to be found in the patent in suit, in the application as originally filed, and in the priority document.

In addition, the appellants pointed to the fact that the present priority document (28) had subsequently been published as document (29). Should the present priority claim be denied, the latter would constitute prior art under Article 54(3) EPC.

IX. The appellants' arguments, insofar as they are relevant to the present decision, may be summarised as follows:

With respect to the main request, the appellants argued that the subject-matter claimed was entitled to the priority date based on document (28). The process according to this document was not restricted to the use of propene "mixed with propane in an amount of between 0 and 10 vol.% of propane". A more general disclosure could be derived from the document as a whole. Thus, the passages on page 12, lines 11 to 18 and page 16, lines 20 to 24, generally referred to mixtures of propene and propane, without imposing any limitations as to the quantity of propane present. Moreover, according to said passage on page 16, a stream consisting substantially of propene and propane was returned to the epoxidation reaction. Since the propane present would not be consumed in this reaction,

the skilled person would understand that recycling would result in enrichment of propane, and would conclude that no upper limit as to its concentration had been intended. Since priority had been validly claimed, document (29) could not be invoked in order to attack novelty.

Turning to auxiliary request 1, the appellants submitted that the subject-matter claimed had a clear basis in priority document (28), as indicated in Table 1 filed with letter of 14 June 2012. Therefore, document (29) was not to be regarded as state of the art. Moreover, the subject-matter of claim 1 was novel with respect to examples B1 and B2 of document (1), in view of the features introduced regarding the method used for carrying out the hydrogenation step (cf. above point VIII).

- X. The respondents' arguments, insofar as they are relevant to the present decision, can be summarised as follows:

The respondents argued that the subject-matter of claim 1 of the main request did not enjoy the claimed priority, and document (29) was therefore to be seen as novelty destroying.

With respect to auxiliary request 1, the respondents confirmed that they had no objections under Articles 123(2), 123(2) or 54 EPC. Moreover, the respondents agreed with the appellants at oral proceedings that this request should be remitted to the opposition division for further prosecution.

XI. The appellants (patent proprietors) requested that the decision under appeal be set aside and that the case be remitted to the first instance for further prosecution on the basis of the main request, or alternatively on the basis of auxiliary requests 1 to 5, all filed with letter dated 14 June 2012.

The respondents (opponents 1 and 2) requested that the appeal be dismissed.

XII. At the end of the oral proceedings, the decision of the board was announced.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *Main request, claim 1*

2.1 *Priority right (Article 87 EPC)*

Claim 1 of the main request relates to a process for the epoxidation of olefins comprising steps i) to iv). In step i), an olefin is reacted with hydrogen peroxide in the presence of an epoxidation catalyst and an alcoholic solvent, and, in step ii), olefin oxide and unreacted olefin are separated from the reaction product of step i). According to the feature introduced at the end of claim 1, "the olefin is propene and propene is used mixed with propane" (cf. above points I and V).



The standard to be applied in deciding whether the claimed priority date is to be acknowledged is whether this subject-matter is directly and unambiguously derivable from the priority document (28) as a whole (see decision G 2/98, OJ EPO 2001, 413, headnote).

In the claims of priority document (28), the term "propane" only appears in claim 13. However, in this claim, specific percentages by weight of this component are defined for the product stream and the overhead product obtained from steps i) and ii), respectively. Moreover, claim 13 is dependent on claim 12, which relates to a specific epoxidation reaction wherein "the catalyst is a titanium silicalite and the solvent is methanol". Hence, this very specific disclosure cannot provide a basis for the much more general subject-matter claimed in claim 1 of the main request.

As regards the content of the description of priority document (28), it is disclosed on page 6, lines 7 to 11, that propene is the preferred olefin to be used in the epoxidation reaction. Further down on the same page, it is specified that "**propene may be used mixed with propane in an amount of between 0 and 10 vol.% of propane**" (page 6, lines 28, 29; emphasis added). Thus, the propene feed is defined as optionally containing propane, but only in a maximum amount of 10 percent by volume. This passage cannot therefore provide a direct and unambiguous basis for the use mixtures of propene and propane without any limitation as to the relative amounts thereof.

The appellants referred to page 12, lines 11 to 18, and page 16, lines 20 to 24, as providing a basis for a

general disclosure of the use of propene mixed with propane in the reaction of step i), without limitation on the amount of propane.

The cited passage on page 12 is embedded in a section starting on page 11, line 4 and ending on page 12, line 24, relating to "one embodiment of the present invention" in which "the reaction mixture is separated in a pre-evaporator into an overhead product containing propene, possibly propane, propene oxide and solvent, and into a bottom product ..." (page 11, lines 4 to 7). Thus, this embodiment illustrates specific means for working up the reaction product of step i), and cannot therefore provide a basis for introducing a definition as to the composition of the olefin to be used in the general context of the epoxidation reaction. Indeed, as an "embodiment of the present invention", the cited passage must be read in the context of the previous section of the description relating to the epoxidation step i) (see page 6, line 7 to page 8, line 9). Here, the amount of propane that may be present in the propene feed is clearly restricted to 10 volume, as explained in the previous paragraph.

Similarly, the cited passage on page 16, lines 20 to 24, is embedded in the section of document (28) relating to specific examples (see page 15, line 16 to page 18, line 16). On page 16, line 4, there is a reference to "a propene feed", but it is not specified that this contains propane. However, the overhead product, separated in the pre-evaporation stage, contains propane (page 16, lines 15 to 17), and an uncondensed portion of this stream containing propane is returned

to the epoxidation reaction (page 16, lines 22 to 24). It can therefore be concluded that the propene feed used in the examples must contain some propane, but it is not specified how much. This is not equivalent to a direct and unambiguous disclosure that unlimited amounts of propane may be present in the propene feed, particularly not in the context of a more general disclosure as now claimed.

For these reasons, the board concludes that the subject-matter of claim 1 of the main request is not entitled to the priority date of 2 May 2002, but only to the filing date of 29 April 2003 (cf. above point I).

## 2.2 *Novelty (Articles 52(1) and 54 EPC)*

The consequence of the conclusion reached under point 2.1, as acknowledged by the appellants (cf. last paragraph of above point VIII), is that European patent application document (29), filed on 2 May 2002 and published on 5 November 2003 constitutes prior art under Article 54(3) EPC and Article 54(4) EPC 1973, relevant to the assessment of novelty, in so far as the same contracting states are designated.

In particular, document (29) discloses in claim 1 a process for the epoxidation of olefins comprising the same four steps as those disclosed in present claim 1. The definition of the hydrogen peroxide according to step i) of present claim 1 is also to be found in paragraph [0019] of document (29) (column 4, lines 37 to 39 and 44 to 48). In the same paragraph it is further disclosed that "propene may be used mixed with propane in an amount of between 0 and **10 vol.% of**

**propane**" (column 4, lines 47, 48, emphasis added). This disclosure of a specific mixture of propene with 10 percent by volume of propane falls under the more general definition appearing in present claim 1 that "the olefin is propene and propene is used mixed with propane". Thus, document (29) discloses all the features of present claim 1 in combination.

Consequently, the appellants' main request fails for lack of novelty of claim 1 with respect to document (29).

In view of this conclusion, which was not contested by the appellants, there is no need to examine the question of lack of novelty with respect to document (1) (cf. above point VI).

3. *Auxiliary request 1*

3.1 *Amendments (Articles 123(3), 123(2) EPC)*

Table 1 filed by the appellants with letter of 14 June 2012 accurately indicates the basis in the application as originally filed for the subject-matter now claimed (see column headed "PCT/EP03/04442"). Moreover, independent claim 1 has been restricted with respect to claim 1 as granted by incorporation of features from dependent claims 10 and 15. The amended request therefore meets the requirements of Article 123(2) and (3) EPC. This was not disputed by the respondents.

3.2 *Priority right (Article 87 EPC)*

As acknowledged by the respondents, Table 1 filed by the appellants with letter of 14 June 2012 (see column headed "EP 02 009 869") accurately sets out the basis in priority document (28) for the subject-matter now claimed. Accordingly, auxiliary request 1 enjoys the claimed priority date of 2 May 2002.

3.3 *Novelty (Articles 52(1) and 54 EPC)*

The respondents did not raise any novelty objections, and the board sees no reason to differ.

Document (29), which now enjoys the same effective date as the subject-matter claimed in auxiliary request 1 (cf. above point 3.2), is not to be regarded as state of the art according to Article 54 EPC.

Furthermore, the novelty objection previously raised with respect to the main request in view of document (1), which constitutes prior art under Article 54(3) EPC and Article 54(4) EPC 1973 (filing date: 6 February 2002; publication date: 15 August 2002), no longer holds. Thus, according to present claim 1, "the hydrogenation is carried out using a fixed bed catalyst and the recovered solvent stream is directed through the catalyst bed in a trickle mode". In contrast, the hydrogenation disclosed in the examples according to document (1) is performed in an autoclave (see page 19, lines 1 to 6). Moreover, the remaining parts of document (1) also do not directly and unambiguously disclose all the features recited in present claim 1 in combination.

For the above reasons, it is concluded that the subject-matter of claim 1 is novel. The same is true of dependent claims 2 to 12.

In view of this outcome, there is no need for the board to examine the lower-ranking requests.

4. *Remittal*

Thus, the board has come to the conclusion that the subject-matter of auxiliary request 1 overcomes the objection of lack of novelty, which formed the basis of the decision under appeal (see above point IV). However, the opposition division has not yet taken a decision on the questions of sufficiency of disclosure and inventive step, which were raised as a grounds of opposition pursuant to Articles 100(b) and 100(a) EPC (see above point II).

The board therefore finds it appropriate to exercise its discretion under Article 111(1) EPC to remit the case to the first instance for further prosecution, as requested by the appellants and agreed by the respondents (see above points X and XI).

**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 for further prosecution on the basis of the first auxiliary request, filed with letter dated 14 June 2012.

The Registrar:

The Chairman:

G. Nachtigall

P. Ranguis