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# Datasheet for the decision of 11 September 2018

**Case Number:** T 2492/16 - 3.3.02

**Application Number:** 08797735.1

**Publication Number:** 2197861

**IPC:** C07D301/10

**Language of the proceedings:** EN

**Title of invention:**
PROCESS FOR INITIATING A HIGHLY SELECTIVE ETHYLENE OXIDE CATALYST

**Patent Proprietor:**
SD Lizenzverwertungsgesellschaft mbH & Co. KG

**Opponent:**
Shell Internationale Research Maatschappij B.V.

**Headword:**
Ethylene oxide/SD LIZENZVERWERTUNGSGESELLSCHAFT

**Relevant legal provisions:**
EPC Art. 83, 111

**Keyword:**
Sufficiency of disclosure - main request (yes)
Remittal to the opposition division - (yes)

**Decisions cited:**
G 0004/95, G 0003/14

**Catchword:**

Europäisches Patentamt
European Patent Office
Office européen des brevets

**Beschwerdekammern**

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**Case Number: T 2492/16 - 3.3.02**

# D E C I S I O N
# of Technical Board of Appeal 3.3.02
# of 11 September 2018

| | |
|---|---|
| **Appellant:** (Patent Proprietor) | SD Lizenzverwertungsgesellschaft mbH & Co. KG<br>Lenbachplatz 6<br>80333 München (DE) |
| **Representative:** | Hoefer & Partner Patentanwälte mbB<br>Pilgersheimer Straße 20<br>81543 München (DE) |
| **Respondent:** (Opponent) | Shell Internationale Research Maatschappij B.V.<br>Carel van Bylandtlaan 30<br>2596 HR The Hague (NL) |

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| **Decision under appeal:** | **Decision of the Opposition Division of the European Patent Office posted on 14 September 2016 revoking European patent No. 2197861 pursuant to Article 101(3)(b) EPC.** |

**Composition of the Board:**

| | |
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| **Chairman** | M. O. Müller |
| **Members:** | J. Molina de Alba |
| | M. Blasi |

## Summary of Facts and Submissions

I. The present appeal by the patent proprietor (appellant) lies from the decision of the opposition division revoking European patent No. 2 197 861. The decision was based on a main request and 11 auxiliary requests.

Independent claims 1 and 10 of the main request read as follows:

"*1. A method for the start-up of a process for the epoxidation of ethylene comprising:*

*contacting a catalyst bed including a silver-based highly selective epoxidation catalyst with a feed gas composition at a first temperature, said feed gas composition including ethylene, oxygen, a moderator and carbon dioxide, said carbon dioxide is present in said feed gas composition in a concentration of greater than about 10 vol. %, wherein the first temperature is from 180°C to 220°C;*

*increasing the first temperature to a second temperature to produce a desired concentration of ethylene oxide; and*

*adjusting the feed gas composition in order to maintain said desired concentration of ethylene oxide while achieving a desired catalyst work rate and selectivity.*"

"*10. A method for epoxidation of ethylene comprising:*

*contacting a catalyst bed including a silver-based highly selective epoxidation catalyst with a feed gas*

*composition at a first temperature, said feed gas composition including ethylene, oxygen, a moderator and carbon dioxide, said carbon dioxide is present in said feed gas composition in a first concentration of greater than about 10 vol. %, wherein the first temperature is from 180°C to 220°C;*

*increasing the first temperature to a second temperature to produce a desired concentration of ethylene oxide;*

*adjusting the feed gas composition in order to maintain said desired concentration of ethylene oxide while achieving a desired catalyst work rate; and*

*lowering the second temperature to a third temperature, while simultaneously lowering the carbon dioxide concentration to a second concentration of about 5 vol. % or less.*"

II. In the present decision, the first and second temperatures mentioned in claims 1 and 10, and the third temperature mentioned in claim 10, have been abbreviated as T1, T2 and T3, respectively.

III. The following documents are referred to in the present decision:

(9) US 2004/049061 A1

(12) US 7 102 022 B2

(AP3) Appendix 3, filed by the respondent on 2 May 2016

(AP4) Appendix 4, filed by the respondent on 2 May 2016

IV. Revocation of the patent in suit was sought pursuant to Article 100(b) and Article 100(a) EPC (lack of novelty and inventive step).

V. In the decision under appeal, the opposition division revoked the patent because, in its opinion, the invention underlying all the requests on file was not sufficiently disclosed. The division reasoned *inter alia* that the patent examples, the supplementary example 1 filed by the appellant on 18 May 2015, and the examples in document (AP3), proved that not every desired ethylene oxide concentration could be maintained at a fixed level at T2 (see section 17.7 of the decision). It held also that the lack of information in the patent regarding the critical features T1 and "*desired*" ethylene oxide concentration confronted the skilled person with an undue burden.

VI. With the statement of grounds of appeal, the appellant filed 12 sets of claims as main request and auxiliary requests 1 to 11. These requests were identical to those underlying the appealed decision, except for auxiliary requests 1 and 2, which had been exchanged with one another.

VII. The opponent (respondent) replied to the statement of grounds of appeal with a letter dated 2 June 2017.

VIII. In a communication annexed to the summons to oral proceedings, the board gave its preliminary opinion that the invention underlying the main request was sufficiently disclosed. It was therefore inclined to remit the case to the opposition division for further prosecution.

IX. Oral proceedings were held before the board on 11 September 2018.

X. The appellant's arguments, where relevant to the present decision, may be summarised as follows:

*Claim construction*

T1 was defined in claim 1 as a temperature between 180°C and 220°C at which the catalyst bed was contacted with the feed gas composition comprising at least 10 vol.% carbon dioxide. The wording of the claim left no doubt that T1 referred to the temperature of the catalyst bed rather than to the feed gas composition. Furthermore, controlling the catalyst temperature was the usual way of proceeding, as confirmed by the respondent's example in document (AP3), where T1 was referred to the catalyst temperature or its equivalent, the reactor temperature.

The "*desired*" concentration of ethylene oxide mentioned in the claims had to be interpreted as a "*reasonable*" concentration. It was, for instance, within the range 1.5-3.0%, as disclosed in paragraph [0051] of the patent. In this context, as claim 1 did not define any discrete numerical value, the narrow interpretation of the expression "*to maintain*" by the opposition division was wrong. The expression did not require that the concentration be kept at a specific value; rather, the concentration varied with the changes that occur during the catalyst initiation phase and was corrected by adjusting the carbon dioxide concentration in the feed.

"*Desired*" selectivity in the sense of the invention was left open in the claims because for each process a different selectivity could be preferred. The

description nevertheless gave some guidance in this respect. Contrary to the respondent's opinion, the patent did not contain any passage from which it could be inferred that the desired selectivity was the "*maximum*" selectivity. Neither could be derived from paragraph [0006] that the selectivity according to the invention had to be higher than the one in the cited prior-art documents (9) and (12).

*Sufficiency of disclosure*

The invention was based on the use of carbon dioxide at the early phase of catalyst initiation to control the concentration of ethylene oxide in the effluent (see paragraphs [0009] and [0051]). The patent contained ample guidance and two specific examples on how to carry out the invention. In addition, apart from the use of carbon dioxide, the rest of features in claim 1 were well known in the cited prior art, and their values as well as their control were at the basics of the processes of olefin epoxidation. This was confirmed by the fact that in document (AP3) the respondent was able to carry out a test according to the invention without undue experimentation. By contrast, no proof was provided that the invention could not be carried out without undue burden.

On the issue of maintaining the ethylene oxide concentration, paragraph [0051] taught how to do it and the operation did not require undue experimentation. This was apparent not only from examples 1 and 2 of the patent and supplemental example 1; the respondent's example in document (AP3) also demonstrated that it was easy to find that, in order for an ethylene oxide concentration of 3.09% to be maintained, a T2 of 261°C was required; this temperature T2 was within the range

230-270°C disclosed in paragraph [0045] of the patent. Adjusting the feed gas composition was likewise a routine operation carried out by the respondent in the example of document (AP3).

As regards the omission of T1 in the patent examples, claim 1 left no doubt that T1 was between 180°C and 220°C. The fact that its precise value was not explicitly mentioned was not an obstacle for carrying out the invention since adjusting the catalyst bed temperature to a point between 180°C and 220°C and adjusting the carbon dioxide content in the feed to at least 10 vol.% were basic operations. The examples disclosed the gradual heating of the catalyst from less than 100°C to 245°C, which necessarily passed through the range 180-220°C. Thus, as taught in paragraphs [0038] and [0039], at a certain point within that range the carbon dioxide concentration in the feed was raised to at least 10 vol.%.

XI. The respondent's arguments, where relevant to the present decision, may be summarised as follows:

*Claim construction*

According to claim 1, T1 was not the temperature of the catalyst bed but the temperature of the feed gas. In addition, it was a single value between 180°C and 220°C.

The "*desired*" concentration of ethylene oxide was likewise a single numerical value. This was apparent from the use of the singular form in the claims and in paragraph [0049], and from the fact that the intent of the patent was to maintain the ethylene oxide production at a constant level during catalyst

initiation (see paragraph [0051]). In this context, "*maintaining*" the desired concentration of ethylene oxide implied that the latter was a fixed value and that it did not vary beyond the margin of error in measurement.

The "*desired*" selectivity mentioned in claim 1 had to be read as the "*maximal*" or "*optimal*" selectivity. Alternatively, in view of paragraph [0006], which stated that the invention aimed at providing a new and improved method for the start up of a process of ethylene epoxidation, it meant a selectivity higher than the one in the prior-art documents (9) and (12) cited in paragraphs [0004] and [0005] respectively. As that selectivity was of 90%, the desired selectivity in the sense of the invention had to be understood as being of more than 90%.

*Sufficiency of disclosure*

Having regard to the claim construction above, the skilled person could not carry out the invention over the whole breadth of the claims. There were various reasons for this. On the one hand, because the invention required the adjustment of multiple variables to reach and maintain the desired ethylene oxide concentration at a single numerical value and to achieve the desired selectivity at an unspecified T2. On the other hand, because claims 1 and 10 encompassed embodiments that did not work, as demonstrated by the patent examples and the additional evidence on file.

On the aspect of adjusting multiple variables, the claims did not specify any temperature regime so that a huge number of variations of T1, T2 and T3 were possible and not all of them worked (see the discussion

of examples two paragraphs below). This confronted the skilled person with an undue amount of testing to ascertain which temperature regimes were applicable to the invention. This difficulty was further increased by the fact that the claims did not define T2 and T3 and because the meaning of T1 was uncertain:

According to the claims, T1 was a temperature between 180°C and 220°C at which the feed gas first contacted the catalyst. However, it was well known that the feed gas temperature in this kind of olefin epoxidation method could not be controlled. Hence, the skilled person could not assure a T1 between 180°C and 220°C, as required by the claims. Moreover, even if T1 were the temperature of the catalyst, the patent contained inconsistent information. Firstly, because the examples disclosed a process where the catalyst was contacted with the feed gas at a temperature below 100°C rather than between 180°C and 220°C. Secondly, because if T1 additionally required the feed gas composition to contain at least 10 vol.% carbon dioxide (see claim 1), then the operation sequence depicted in paragraphs [0046] and [0049] introduced uncertainty: the sequence started by heating the reactor with the catalyst to a temperature of between 180°C and 220°C; then, ethylene and a ballast gas were introduced; subsequently, the introduction of oxygen and a moderator got the reaction started and raised the temperature; and, only then, a concentration of carbon dioxide greater than 10 vol.% was allowed to build up. Following this sequence, the temperature at the time of introducing the carbon dioxide (i.e. T1) could be well outside the range 180-220°C required by claim 1.

With regard to the aspect that claims 1 and 10 encompassed embodiments that did not work, the evidence

on file showed that the invention could not be reproduced:

- Examples 1 and 2 in the patent not only did not disclose T1, they did not succeed in maintaining the desired ethylene oxide concentration at a single numerical value either. Moreover, the catalyst selectivity achieved at T2 was below the desired 90%.

- Similarly, in the supplementary example 1, filed by the appellant on 18 May 2015, the ethylene oxide concentration could not be kept constant at T2 and showed a variation of 25%. Furthermore, a selectivity beyond 90% was not achieved at T2 but only later, at a lower temperature and carbon dioxide concentration.

- Lastly, the respondent's experimental data "according to the invention" in documents (AP3) and (AP4) showed that it was not possible to produce and maintain the desired ethylene oxide concentration of 3.09% when T2 was in the range taught in the patent, i.e. 245-255°C; T2 needed to be increased up to 261°C. Further, the selectivity achieved at T2 was of only 87%; a selectivity approaching 90% was reached later, at a lower temperature and carbon dioxide concentration.

XII. The parties' final requests were the following:

The appellant requested that the decision under appeal be set aside and that the case be remitted to the opposition division for further prosecution on the basis of any of the sets of claims filed with the statement of grounds of appeal as main request and auxiliary requests 1 to 11.

Furthermore, supplementary examples 3 to 5, filed with the appellant's letter of 28 November 2017, should be admitted into the appeal proceedings, and the respondent's request to discuss the topic of Article 123(2) EPC should be rejected.

Lastly, Mr Rizkalla should be allowed to make technical submissions during the oral proceedings.

The respondent requested that the appeal be dismissed, or alternatively, that the case be remitted to the opposition division for a continuation of the opposition proceedings in relation to Articles 84, 54 and 56 EPC.

It further requested that the case not be remitted for examination of added subject-matter in relation to any of auxiliary requests 1 and 3 to 11.

Furthermore, supplementary examples 3 to 5, filed by the appellant with its letter of 28 November 2017, should not be admitted into the appeal proceedings.

Lastly, Mr Baker should be allowed to make technical submissions during the oral proceedings.

XIII. At the end of the oral proceedings, the board's decision was announced.

## Reasons for the Decision

1. *Requests that accompanying person be permitted to make oral submissions at the oral proceedings*

None of the parties had objections to the other party's technical expert making oral submissions during the oral proceedings. The board, also taking into account that the criteria established by decision G 4/95 of the Enlarged Board of Appeal (OJ EPO 1996, 412) were met, had none either. It thus allowed the parties' request that their accompanying persons be permitted to make oral submissions at the oral proceedings.

2. *Invention underlying the claims of the main request*

2.1 The invention in question is directed to a method for the epoxidation of ethylene by contacting a catalyst bed including a silver-based highly selective epoxidation catalyst with a feed gas composition comprising ethylene, oxygen, a moderator and carbon dioxide. The method includes two consecutive phases:

(i) a start-up phase in which the catalyst is initiated by increasing its temperature of contact with the feed gas from T1, comprised between 180°C and 220°C, to T2 "*to produce a desired concentration of ethylene oxide*" and by "*adjusting the feed gas composition in order to maintain said desired concentration of ethylene oxide while achieving a desired catalyst work rate and selectivity*"; and

(ii) a phase in which the temperature is lowered from T2 to T3.

The method is characterised by the fact that the ethylene oxide concentration in the reactor's effluent is controlled by adjusting the carbon dioxide concentration in the feed gas, which is of greater than 10 vol.% at T1 and 5 vol.% or less at T3.

Claim 1 of the main request defines the start-up phase (i), while claim 10 refers to both phases (i) and (ii).

2.2 As explained in the patent in paragraphs [0050] and [0051], the gist of the invention is to maintain plant production's capacity through the start-up phase, during which the catalyst is initiated. Through this phase, the ethylene oxide concentration in the effluent is maintained at production levels (e.g. between 1.5% and 3.0%) in spite of the variations caused by the changes in the catalyst's reactivity and selectivity until the initiation process is completed and performance stabilises. This maintenance of the ethylene oxide concentration is achieved by adjusting the carbon dioxide and ethylene concentrations in the gas feed. Thus, if the ethylene oxide concentration rises above the production level, which could compromise safety, it is reduced by increasing the carbon dioxide concentration; conversely, a drop in the ethylene oxide concentration below the production level is countered by increasing the ethylene concentration or reducing the level of carbon dioxide.

*3. Claim construction*

The fact that independent claims 1 and 10 do not specify the meaning of the expressions "*desired concentration of ethylene oxide*", "*desired catalyst selectivity*" and "*to maintain the desired ethylene oxide concentration*", led the parties to diverging

interpretations. The parties also disputed whether the "*first temperature*" (T1) referred to the temperature of the feed gas or that of the catalyst bed.

As all these features were present in the granted claims, their clarity is not open to discussion according to decision G 3/14 of the Enlarged Board of Appeal (see catchword). However, their construction is closely linked to the issue of whether the invention is sufficiently disclosed. Therefore, it needs first to be established how the skilled person would interpret them. This is made in the following.

*3.1* *Meaning of "desired concentration of ethylene oxide"* and *"to maintain the desired ethylene oxide concentration"*

Taking into consideration the nature of the invention as explained in point 2.2 above, the board cannot concur with the respondent that the desired ethylene oxide concentration has to be a single numerical value, since that concentration necessarily varies with the changes in work rate and selectivity experienced by the catalyst during its initiation phase; these variations are then corrected by adjusting the carbon dioxide or the ethylene concentration in the feed. Consequently, maintaining the desired ethylene oxide concentration in the sense of the invention has to be understood as maintaining the concentration within the range of typical production levels, i.e. preventing significant drops and increases that compromise safety.

This is confirmed by paragraph [0051] of the patent. This paragraph, in a first part, refers to the maintenance of the ethylene oxide concentration at a constant level, namely a design level of 1.5 to 3.0%.

Subsequently, in its second part, the paragraph teaches how concentrations above or below this design level can be avoided. Reading these two parts together can only lead to the conclusion that maintenance at a constant level means maintenance within the design level of 1.5 to 3.0%, rather than at a single numerical value.

*3.2 Meaning of "desired catalyst selectivity"*

The patent teaches in paragraphs [0008] and [0019] that, in the course of catalyst initiation, a selectivity of 80% to 84% is achieved. Further, paragraph [0020] states that the catalysts of the invention achieve a selectivity of greater than 83%, and paragraph [0048] defines the typical and preferred selectivity range achieved during the start-up phase as being 79-85% and 82-84% respectively.

Contrary to the respondent, the board does not read in these passages that the desired selectivity is the maximum or optimal selectivity. Nor does it read in paragraph [0006] that selectivity has to be higher than that reached in the cited prior-art documents (9) and (12). The board can only derive from these passages that the desired catalyst selectivity in the sense of the invention is of more than 79%.

*3.3 Meaning of "first temperature"*

From a purely linguistic point of view, the sentence in claims 1 and 10 "*contacting a catalyst bed ... with a feed gas composition at a first temperature*", allows the reader to interpret that T1 is either the temperature of the feed gas composition or that of the catalyst bed.

On this issue, the respondent considered that T1 made reference to the temperature of the feed gas. In the board's view, however, the respondent's consideration was wrong. This is apparent from document (AP3), in which the respondent acknowledged that it is not technically possible to control the feed gas temperature at a value of 180°C to 220°C. The same follows from point 17.2 in the appealed decision, according to which the respondent had substantiated that "*journal articles and commercial data demonstrate that feed gas temperature is not possible to be controlled, adjusted to a further temperature range or increased to control anything*". Hence, the only construction that technically makes sense is that T1 refers to the temperature of the catalyst bed. In addition, this interpretation is derivable from the patent itself, where the temperature regime for T1 is disclosed in relation to the catalyst bed rather than in relation to the feed gas. See for instance paragraph [0046], which states "... *to first heat the catalyst up to a first temperature from about 180 °C to about 220 °C*" (emphasis added). Accordingly, the temperature T1 defined in the claims has to be understood as the temperature of the catalyst bed.

*4. Sufficiency of disclosure (Article 83 EPC) - main request*

4.1 Having regard to the invention as disclosed in the patent and to the claim construction depicted above, the board considers that the invention is sufficiently disclosed.

4.2 The board has no doubts that increasing, decreasing or maintaining the temperature of a reactor is an operation that falls within the competences of the

skilled person; this was not disputed. The fact that the skilled person can regulate the composition of the feed gas without undue burden, especially increasing or reducing its carbon dioxide content, was also undisputed. Consequently, the board fails to see how contacting the catalyst at a temperature of between 180°C and 220°C (T1) with a feed gas containing at least 10 vol.% carbon dioxide can pose difficulties. Neither can lowering the temperature from T2 to T3 while simultaneously decreasing the carbon dioxide concentration to 5 vol.% or below.

It was likewise undisputed that the catalysts according to the invention reach a selectivity of above 79% when they are submitted for sufficient time to a temperature T2 as disclosed in the patent (e.g. at least 100 hours and at least 230°C, see paragraph [0050]).

4.3 The main issue with regard to sufficiency of disclosure thus lies in whether the skilled person is able to maintain the ethylene oxide concentration at the desired level of 1.5 to 3.0% during the whole catalyst initiation phase at T2.

4.3.1 As set out above (see point 2.2), this is explained in the patent in paragraph [0051], which teaches that concentrations above or below the limits of this range can be avoided by adjusting the carbon dioxide or the ethylene concentration in the feed. More specifically, the paragraph discloses the following:

> "*Ethylene oxide production at a higher level than the design level, 1.5-3.0% in the reactor's effluent, is controlled by increasing the concentration of carbon dioxide in the feed. On the other hand, ethylene oxide production at a lower*

*level than the design is controlled by increasing the concentration of ethylene in the feed, to bring it closer to the design value and/or reducing the concentration of $CO_2$, via removing a higher amount in the $CO_2$ absorber, the contactor.*"

Hence, the opposed patent contains a clear teaching on how to maintain the desired ethylene oxide concentration.

4.3.2 In addition, the patent examples 1 and 2, the supplementary example 1 filed by the appellant on 18 May 2015, and the respondent's test according to the invention in documents (AP3) and (AP4) demonstrate that the skilled person can indeed carry out the invention without undue burden.

(a) In examples 1 and 2, a freshly prepared silver-based epoxydation catalyst at a temperature of below 100°C was introduced into the reactor and then tested with a feed gas mixture containing ethylene, oxygen, a moderator and 14% or 10% carbon dioxide, respectively. The reactor temperature was then gradually increased to T2=245°C or 247°C respectively, and the catalyst was kept at that temperature for 140 hours. In the case of example 1, after 100 hours the carbon dioxide concentration was adjusted to 12% in order to maintain the outgoing ethylene oxide concentration at **2.2%**; at the end of the 140 hours, the catalyst's selectivity was of 84.0% and the ethylene oxide concentration of **2.5%**. In the case of example 2, carbon dioxide was maintained at 10% during the 140 hours and the catalyst reached a selectivity of 84.5%; the ethylene oxide concentration fluctuated between **2.3%** and **2.2%**.

Examples 1 and 2 thus demonstrate that, as taught in paragraph [0051] of the patent, it is possible to reach and maintain the ethylene oxide concentration at the desired level, namely within the ranges 2.2-2.5% (example 1) or 2.2-2.3% (example 2), by adjusting the initial carbon dioxide concentration during the catalyst initiation phase at T2=245-247°C.

The board acknowledges in this respect that, as argued by the respondent, examples 1 and 2 do not explicitly mention at which temperature T1 the catalyst was contacted for the first time with a feed gas containing at least 10% carbon dioxide. This however does not take away from the conclusion drawn above, namely that an ethylene oxide concentration at the desired level can be obtained by adjusting the initial carbon dioxide concentration during the catalyst initiation phase.

(b) The same follows from supplementary example 1 filed by the appellant on 18 May 2015. This example shows a start-up process of ethylene epoxidation where T1 is 205.8°C (see hour 28, at which the catalyst is contacted with the feed composition containing more than 10% carbon dioxide for the first time). The catalyst is then heated to T2=245-246°C and kept at that temperature for more than 100 hours (hour 61 to hour 169). During those hours, the catalyst selectivity achieves 87.4% and the ethylene oxide concentration is maintained within production levels (**1.8-2.4%**) by reducing the initial carbon dioxide concentration of about 11% down to 9%. Hence, supplementary example 1 also shows that the ethylene oxide concentration may be maintained

during catalyst initiation at the desired level by adjusting the carbon dioxide content in the feed.

(c) The respondent's example "according to the invention" in documents (AP3) and (AP4) leads to the same conclusion. Its test protocol is disclosed on page 29 of (AP3) and its raw data are displayed on pages 45 to 52 of (AP4). In that example, T1 was 205°C and its corresponding carbon dioxide concentration was 11%. The catalyst temperature was gradually increased from T1 to T2=245°C, a preferred T2 according to the patent. At this temperature, however, the ethylene oxide concentration of **3.09%** could not be maintained by *inter alia* increasing the ethylene concentration; it dropped to about **2.2%** (see Figures 6 and 7 in document (AP3) and raw data in (AP4)). T2 was then raised to 253°C, but the ethylene oxide concentration dropped again, this time to **2.6%**. It was only at T2=261°C (i.e. outside the preferred range in the patent) that the desired **3.09%** ethylene oxide concentration could be maintained.

From these results, the respondent concluded that this example proved a lack of sufficiency. The board however disagrees. Firstly, because the ethylene oxide concentrations at 245°C and 253°C, i.e. 2.2% and 2.6% respectively, are still within the desired range of 1.5 to 3.0%. Hence, the results obtained at those temperatures confirm that the invention as defined in claim 1 can be carried out. Secondly, because the respondent had no difficulty finding out that T2 had to be raised to 261°C in order to achieve and maintain the ethylene oxide concentration at 3.09%. This was confirmed during the oral proceedings by the respondent's

expert Mr Baker, who stated that the test "according to the invention" in (AP3) and (AP4) had been carried out only once, i.e. the temperature T2 of 261°C was arrived at in one single experiment without the need for repetition or undue testing. In this respect, it should be noted that, contrary to the respondent's opinion, 261°C is not outside the range given in the patent for T2; it falls well within the ranges of at least 230°C or typically 230-270°C disclosed in paragraphs [0050], [0040] and [0045]. Hence, by following the teaching in the patent, and without any undue burden, it was possible to maintain the ethylene oxide concentration at 3.09%, i.e. at one single numerical value. In consequence, even applying the respondent's narrow interpretation of claim 1 that the ethylene oxide concentration has to be maintained at a single numerical value, the invention can be carried out.

4.4 Hence, the board concludes that the patent contains sufficient information for the skilled person to carry out the invention without undue burden, as confirmed by the evidence on file. In view of this and in the absence of proof of the opposite, the board holds that the invention underlying the claims of the main request is sufficiently disclosed (Article 83 EPC).

5. The board did not need to decide on the admittance of supplementary examples 3 to 5, filed with the appellant's letter of 28 November 2017, since these examples are of no relevance for the present decision.

Likewise, there was no need to decide on the respondent's request to discuss the topic of Article 123(2) EPC, as this request concerned the

auxiliary requests and the board considered the main request to meet the requirements of Article 83 EPC.

*6. Remittal (Article 111(1) EPC)*

The appealed decision was restricted to the question of sufficiency of disclosure. Therefore, and in conformity with the appellant's request, the board decided to remit the case to the opposition division for further prosecution.

## Order

## For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division for further prosecution on the basis of the main request filed with the letter dated 20 January 2017.

The Registrar: The Chairman:

S. Fabiani M. O. Müller

Decision electronically authenticated