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Datasheet for the decision of 14 February 2012

Case Number: T 0194/09 - 3.3.01

Application Number: 02803665.5

Publication Number: 1458698

IPC: C07D 301/10

Language of the proceedings: EN

Title of invention:
A process and systems for the epoxidation of an olefin

Patentee:
Shell Internationale Research Maatschappij B.V.

Opponents:
THE DOW CHEMICAL COMPANY
BASF SE
Scientific Design Company Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 100(b)
RPBA Art. 13(1)(3)

Keyword:
"Main request: admissibility (yes) - objection under Article 123(2) EPC raised for the first time during oral proceedings"
"Sufficiency of disclosure (no) - values for multiplication factors cannot reliably be determined"
"First, seventh to ninth and eleventh auxiliary request: admissibility (no) - not clearly allowable"
"Second auxiliary request: admissibility (no) - filed too late, adjournment would have been required"

Decisions cited:
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Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0194/09 **-** 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 14 February 2012

Appellant: (Patent Proprietor)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 12 November 2008 revoking European patent No. 1458698 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman: P. Ranguis
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. 1 458 698.

II. In the present decision the following numbering will be used to refer to the documents:

(29) "Experimental data" related to a comparison of nitric oxide and ethyl chloride as reaction modifier, submitted by Respondent 1

III. Notices of opposition had been filed by Respondents 1-3 (Opponents 1-3) requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step and insufficiency of disclosure (Articles 100(a) and (b) EPC). In addition, Respondent 3 requested revocation of the patent in suit on the ground that the patent in suit was directed to subject-matter which was excluded from patentability under Article 52(2) EPC (Article 100(a) EPC).

IV. The decision of the Opposition Division was based on the main and sole request filed with letter of 6 November 2006 (incorrectly referred to in the decision under appeal as main request of 6 November **2008**).

The Opposition Division held that the invention was not sufficiently disclosed to be carried out over the whole scope of the claims by a person skilled in the art. In particular, it took the view that the patent in suit lacked information allowing a proper determination of

the multiplication factors for all reaction modifiers and hydrocarbons, which were necessary to properly calculate the value Q as claimed.

V. With the statement setting out the grounds of appeal, the Appellant filed a new main request and an auxiliary request.

VI. With its reply to the statement setting out the grounds of appeal, Respondent 1 filed experimental data (document (29)) in support of its arguments regarding insufficiency of disclosure.

VII. In a communication accompanying the summons to oral proceedings, the Board expressed its preliminary opinion. In particular, it questioned the main and auxiliary request's compliance with Article 123(2) EPC. Further issues for discussion were whether the experiments filed by the Appellant were suitable to remedy the alleged lack of sufficiency of disclosure and whether or not they reflected the routine experiments which the skilled person with his general knowledge would have considered in order to reliably determine the multiplication factors.

VIII. With letter of 18 January 2012 the Appellant filed a new main request and two sets of auxiliary requests to replace the requests then on file. Set 1 consisted of first to fifth auxiliary requests and set 2 of sixth to ninth auxiliary requests. No submissions were made regarding the experimental data provided by Respondent 1.

IX. With letter of 8 February 2012 the Appellant filed tenth and eleventh auxiliary requests.

X. At the beginning of the oral proceedings before the Board, which took place as scheduled on 14 February 2012, the Appellant inverted the order of its main and first auxiliary requests filed on 18 January 2012. These were replaced by a new main request as well as a new first auxiliary request after the Board had come to the conclusion that the previous main request was not admissible and the previous first auxiliary request did not comply with Article 123(2) EPC. The Appellant was also informed of the Board's intention not to admit requests suffering from the same Article 123(2) EPC deficiencies. The second to sixth auxiliary requests filed on 18 January 2012 and the tenth auxiliary request filed on 8 February 2012 were withdrawn. The seventh to ninth auxiliary requests filed on 18 January 2012 and eleventh auxiliary request filed on 8 February 2012 were maintained.

The discussion regarding sufficiency of disclosure focussed on the experimental data provided by Respondent 1 and the conclusions that could be drawn from this data. The Appellant explicitly declared that it relied on its written submissions and did not wish to present additional arguments regarding this data. After the Board had informed the parties of its conclusion regarding sufficiency of disclosure and indicated that the same conclusion would be applicable to all the remaining auxiliary requests, which it was thus not inclined to admit, the Appellant filed a second auxiliary request.

XI. The main request received during oral proceedings on 14 February 2012 consists of 16 claims with independent claim 1 reading as follows:

"1. A process for the epoxidation of ethylene, which process comprises reacting a feed comprising the ethylene, oxygen and a reaction modifier in the presence of a silver-based catalyst comprising silver and rhenium with the reaction modifier being present in a relative quantity Q which is the ratio of an effective molar quantity of active species of the reaction modifier present in the feed to an effective molar quantity of hydrocarbons present in the feed, and which process comprises the steps of:
— operating at a first operating phase wherein the value of Q is Q_1 and
— subsequently operating at a second operating phase having a hydrocarbon composition and a reaction modifier composition of the feed of which at least one is different from the hydrocarbon composition and the reaction modifier composition of the feed employed in the first operating phase and wherein the concentration of the reaction modifier(s) in the feed applied in the second operation phase is calculated, in response to a change in the quantity or type hydrocarbon(s) present in the feed, such that the value of Q is Q_2, whereby the value of the quotient Q_2/Q_1 is in the range of from 0.5 to 1.5."

Independent claim 12 is directed to a method for making a 1,2-diol or a 1,2-diol ether comprising producing ethylene oxide according to claim 1. Independent claims 13, 14 and 16 refer to a system suitable for performing the claimed process, a computer program

product suitable for instructing a data processing system of a computer system to execute the calculations for the claimed process and a computer system configured to receive instructions from the computer program product.

The first auxiliary request received during oral proceedings on 14 February 2012 differs from the main request in that the catalyst is defined as a silver-based catalyst comprising silver, rhenium or compound thereof, a further element or a compound thereof which further element is selected from the group of nitrogen, sulfur, phosphorus, boron, fluorine, Group IA metals, Group IIA metals, molybdenum, tungsten, chromium, titanium, hafnium, zirconium, vanadium, thallium, thorium, tantalum, niobium, gallium and germanium and mixtures thereof, and optionally a rhenium co-promoter which may be selected from one or more of sulfur, phosphorus, boron, or compound thereof, on a support material, in particular an α—alumina support. In addition, the reaction modifier comprises an organic chloride.

The second auxiliary request received during oral proceedings on 14 February 2012 differs from the first auxiliary request in that the reaction modifier consists of chlorohydrocarbons having up to 10 carbon atoms, in particular up to 6 carbon atoms, which comprise one or more of methyl chloride, ethyl chloride, ethylene dichloride and vinyl chloride.

The seventh auxiliary request filed on 18 January 2012 consist of 15 claims, claim 1 reading as follows:

"1. A process for the epoxidation of ethylene, which process comprises reacting a feed comprising the ethylene, oxygen and a reaction modifier in the presence of a silver—based catalyst comprising silver, rhenium or compound thereof, a further element or compound thereof which further element is selected from the group of nitrogen, sulfur, phosphorus, boron, fluorine, Group IA metals, Group IIA metals, molybdenum, tungsten, chromium, titanium, hafnium, zirconium, vanadium, thallium, thorium, tantalum, niobium, gallium and germanium and mixtures thereof, and optionally a rhenium co-promoter which may be selected from one or more of sulfur, phosphorus, boron, or compound thereof, on a support material, in particular an α—alumina support with the reaction modifier being present in a relative quantity Q which is the ratio of an effective molar quantity of active species of the reaction modifier present in the feed to an effective molar quantity of hydrocarbons present in the feed, and which process comprises the steps of:

- operating at a first operating phase wherein the value of Q is Q_1, and

— subsequently operating at a second operating phase wherein the feed composition is different from the feed composition employed in the first operating phase, such that the value of Q is Q_2, whereby the value of the quotient Q_2/Q_1 is in the range of from 0.5 to 1.5, and wherein the composition of the reaction modifier(s) or the hydrocarbon(s) in the feed for application in the second operation phase has been calculated using calculated values of Q and wherein the reaction modifier comprises an organic chloride selected from

one or more of methyl chloride, ethyl chloride, ethylene dichloride and vinyl chloride."

Independent claims 11, 12, 13, and 15 are directed to a method for making a 1,2-diol or a 1,2-diol ether comprising producing ethylene oxide according to claim 1, a system suitable for performing the claimed process, a computer program product suitable for instructing a data processing system of a computer system to execute the calculations for the claimed process and a computer system configured to receive instructions from the computer program product.

The eighth auxiliary request differs from the seventh auxiliary request in that the feature "and the hydrocarbons present in the feed comprise one or more of methane, ethane, propane and cyclopropane, in addition ethylene" was added to the process and system claims 1 and 11.

The ninth auxiliary request differs from the eighth auxiliary request in that methyl chloride was deleted from the list of reaction modifiers.

The eleventh auxiliary request differs from the eighth in that the quotient Q_1/Q_2 was limited to 0.95 to 1.05.

XII. The arguments provided by the Appellant, to the extent that they are relevant for the present decision, can be summarised as follows:

- Admissibility of the main request

The new main request was filed in reply to an objection under Article 123(2) EPC which was raised for the first time in the oral proceedings before the Board. The feature in question was deleted and replaced by the features of claims 11 and 12 of the patent as granted. A similar disclosure could be found on page 14, lines 8-18 of the application as filed. The feature that in the second operating phase the feed composition is different from the one in the first operating phase was redundant because of the introduction of the features of claim 11. This was also supported by page 3, lines 11-16. In addition, the optional feature in dependent claim 4 objected to by Respondent 2 had been deleted.

- Sufficiency of disclosure

The patent in suit, taking into account common general knowledge, provided sufficient information for the skilled person to carry out the invention. Concerning the multiplication factors, detailed information were provided in paragraphs [0029] to [0037] of the patent. The multiplication factors for halogen or nitrate or nitrite-forming compounds as reaction modifiers was the number of the halogen or nitrogen atoms in the molecule. Concerning the multiplication factors for hydrocarbon compounds, it was clear from the patent that these factors reflected the relative ability of the hydrocarbon, as compared to the feed olefin, to remove or strip the modifier from the catalyst surface. Thus, the multiplication factor of the olefin was by definition 1 and for other hydrocarbons the factor was

determined relative to this. Ranges for multiplication factors were given because these factors were not necessarily the same for the same feed component in the same process when a different catalyst was used. For reaction modifiers and hydrocarbons, where the multiplication factor was not already provided, it could be determined by routine experimentations. It would be a matter of mere routine for a skilled person to set up a standard experiment and then change one variable and assess the response to allow the unknown factor to be determined, because this was commonly done in the science and engineering art. The multiplication factors for methyl chloride or the hydrocarbons could be determined using an epoxidation process with ethyl chloride as reaction modifier as standard system.

Concerning the experimental data provided by Respondent 1 no observations or comments were provided.

- Admissibility of the second auxiliary request

The second auxiliary request was based on the first auxiliary request. In addition to the amendment addressing the objection under Article 123(2) EPC, the features of dependent claim 3 of the patent as granted were introduced into claim 1. Claim 3 was independently opposed by the Respondents and data against chlorohydrocarbons as reaction modifiers could therefore have been submitted at an earlier stage.

XIII. The arguments provided by Respondent 1, to the extent that they are relevant for the present decision, can be summarised as follows:

- Admissibility of the main request

The main request was clearly late-filed. It was not in response to matters which were being discussed for the first time, because objections under Article 123(2) EPC had been raised during the opposition proceedings. The amendments were complex in that the first feature had been deleted completely and replaced by an entirely new feature. Furthermore, the amendments introduced clarity issues as well as further issues under Article 123(2) EPC. The main request was therefore ***prima facie*** not admissible.

- Sufficiency of disclosure

The patent in suit did not provide sufficient information for the skilled person to be able to reproduce the claimed invention across its whole scope. The postulation of the patent that the multiplication factors of nitrate- or nitrite-forming compounds, or even chlorine compounds, were equivalent to the number of nitrogen or chlorine atoms per molecule was wrong. This was clearly demonstrated by experiment 1 of document (29). The nitrate- and nitrite-forming compounds behaved so differently that it would not be possible to use the calculation of the alleged invention to control selectivity in a reliable manner over the whole scope of the claims. Concerning the routine experiments for the determination of multiplication factors of hydrocarbons or methyl compounds, no details of such experiments were provided in the patent in suit. According to the Appellant, routine experiments could be based on ethylene and ethyl chloride as standard. However, they could equally

well have been based on ethylene and nitric oxide with a multiplication factor of 1 as taught by the patent as standard. Due to the different behaviour of nitric oxide, entirely different multiplication factors would have been obtained for the same system. This additionally highlighted the fact that the invention could not be reproduced in a reliable manner based on the information in the patent. None of this was contested by the Appellant.

- Admissibility of the second auxiliary request

Such a request had never been filed before. At this late stage it came as a total surprise to the Respondents and deprived them of the possibility to deal with it in a satisfactory way, which they could have done if that request had been filed in time.

XIV. The arguments provided by Respondent 2, to the extent that they are relevant for the present decision, can be summarised as follows:

- Admissibility of the main request

Concerning this issue Respondent 2 agreed with the observations of Respondent 1. In addition, the replacement of the previously present feature by an entirely new feature raised an issue under Article 123(3) EPC.

- Sufficiency of disclosure

There was nothing to add to the observations and comments of Respondent 1.

- Admissibility of the second auxiliary request

In addition to the comments by Respondent 1 it was observed that this request was now the fourteenth request submitted within one month and it was based on a request which was itself late-filed.

XV. The arguments provided by Respondent 3, to the extent that they are relevant for the present decision, can be summarised as follows:

- Admissibility of the main request

The objection under Article 123(2) EPC was not a surprise, because it had been discussed before the Opposition Division and had even been explicitly mentioned in the decision under appeal. Moreover, the objection to deletion of the term "silver-based" had already been mentioned in the Board's letter accompanying the summons. Claim 1 of this request was not merely a combination of sub-claims and gave rise to issues under Articles 123(2) and 84 EPC.

- Sufficiency of disclosure

There was nothing to add to the observations and comments of Respondent 1.

- Admissibility of the second auxiliary request

With its new second auxiliary request, for which no justification was provided, the Appellant left the

Respondents no chance to react. Its admissibility would be a violation of the Respondents' right to be heard.

XVI. The Appellant requested that the decision under appeal be set aside and that the case be remitted to the department of first instance for further prosecution on the basis of the main request, or, alternatively, on the basis of the first or second auxiliary requests filed during oral proceedings, or seventh to ninth auxiliary requests filed with letter of 18 January 2012 or eleventh auxiliary request filed with letter of 8 February 2012.

XVII. Respondents 1-3 requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Admissibility

2.1 The Appellant filed a new main request during the oral proceedings in direct response to an objection under Article 123(2) EPC against the expression "and wherein the composition of the reaction modifier(s) or the hydrocarbon(s) in the feed for application in the second operation phase has been calculated using calculated values of Q", in particular against the expression "using calculated values of Q", which was raised for the first time during the oral proceedings.

2.2 The new main request was based on the former auxiliary request filed with the Appellant's statement of grounds of appeal and substituted the expression, which was considered to violate the requirement of Article 123(2) EPC, with the features of dependent claim 12 of the patent in suit, which corresponded to claim 12 of the application as filed. Since claim 12 referred back to claim 11, the Appellant also included the features corresponding to claim 11. The Board considered the Appellant's response to substitute the expression held unallowable by features which, at least prima facie, appeared to be supported by the application as filed, as a bona fide attempt to overcome the objection raised under Article 123(2) EPC during the oral proceedings. As the Appellant also re-introduced the term "silver-based" into the main request in order to address an objection raised in the Board's communication accompanying the summons to oral proceedings, the Board, in exercising its discretion under Rule 13(1) RPBA to accept amended claims even at a late stage of the proceedings, decided in the present case to admit the new main request into the proceedings.

2.3 It was argued that the objection against this expression had not been raised for the first time during the oral proceedings before the Board, but had already been discussed before the Opposition Division and explicitly mentioned in the contested decision. It could therefore not have surprised the Appellant.

2.4 In its decision the Opposition Division stated under point 2), first paragraph, of the reasons that the main request complied with the requirement of Article 123(2) EPC, referring to various pages of the description as

originally filed. In the paragraph following this statement, the Opposition Division referred to Opponent 1's objection "that from page 14, line 8 ("in this way") a limitation could be derived which does not cover the whole scope of the claim 1" and continued by explaining that it "could not share the view that this phrase has to be construed as a back reference to the former paragraph only". Thus, the objection of Opponent 1 was apparently that the passage on page 14, lines 8-13 was linked to the preceding paragraph, a view which the Opposition Division did not share. This objection was, however, rather different from the objection regarding, in particular, the expression "using calculated values of Q". Neither the decision under appeal nor the minutes of the oral proceedings before the Opposition Division referred to any other objection with regard to the paragraph on page 14. If further aspects had been discussed, this was at least not apparent to the Board from either the minutes or the decision of the Opposition Division. No request for correction of the minutes had been filed. Furthermore, the Respondents had neither raised an objection under Article 123(2) EPC against the Appellant's main or auxiliary requests filed with the statement of grounds of appeal, which both contained the aforementioned expression, nor had they contested the decision of the Opposition Division regarding this issue.

3. Sufficiency of disclosure (Article 100(b))

3.1 Respondents 1-3 raised an objection under Article 100(b) EPC against the patent in suit. The question to be examined in the present case is, therefore, whether the patent in suit as a whole discloses the invention in a

manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

It is established jurisprudence of the Boards of Appeal that an invention is sufficiently disclosed if it can be performed by a person skilled in the art without undue burden in the whole area claimed, using common general knowledge and taking into account further information given in the description of the patent or patent application.

3.2 Claim 1 of the main request is concerned with an epoxidation process which is carried out in the presence of a silver-based catalyst comprising silver and rhenium and a reaction modifier. The reaction modifier is present in a relative quantity Q, which is the ratio of an **effective molar quantity** of active species of the reaction modifier present in the feed to an **effective molar quantity** of hydrocarbon present in the feed. The process is operated at a first operating phase wherein the value of Q is Q_1 and subsequently operated at a second operating phase having a hydrocarbon composition and a reaction modifier composition of the feed which is different from those in the first operating phase and wherein the concentration of the reaction modifier in the feed applied in the second operating phase is calculated in response to a change in the quantity or type of hydrocarbon present in the feed such that the value of Q is Q_2, whereby the value of quotient Q_2/Q_1 is in the range of from 0.5 to 1.5. This enables the operator of an epoxidation process to avoid unwanted variations in selectivity, when the feed composition, e.g. the type of quantity of hydrocarbons, changes, and to avoid the

trial-and-error procedures which would otherwise be necessary each time a change in the feed composition occurs. The parameter Q and therefore the effective molar quantity are thus critical parameters of the process, indispensable for achieving the goal of the invention which is keeping the selectivity essentially constant, preferably at optimum level.

3.3 It follows from the above that the definition of the parameter Q or the definition of the effective molar quantity in the description of the patent in suit must be such that the skilled person can apply it **reliably** to identify (or calculate) those concentrations of reaction modifiers which have to be applied in the second operating phase in order to solve the technical problem of avoiding variations in the selectivity.

3.4 According to the patent in suit (see paragraphs [0028] to [0030]) the effective molar quantity of active species of the reaction modifier is determined by multiplying the molar quantity of the reaction modifier with a "multiplication factor" (F_{RM}). If several reaction modifiers are present, which is frequently the case in practice, the effective molar quantity of active species may be determined by multiplying the molar quantity of each of the reaction modifiers present in the feed with a multiplication factor and adding up the resulting multiplication products. Concerning the multiplication factors of the reaction modifier, the patent in suit states that the multiplication factors represent the number of active heteroatoms, in particular halogen atoms and/or nitrogen atoms, present per molecule of the reaction modifier. This implies that, for example, the

multiplication factor for ethyl chloride as reaction modifier is 1, for ethylene dichloride 2, for nitric oxide or nitropropane 1 (see paragraph [0024]), etc. However, according to the patent in suit, reaction modifiers which are methyl compound such as methyl chloride or methyl bromide are apparently an exception to that "rule" and their multiplication factors may vary between 2 to 5 (column 7, lines 13-17 of the patent in suit). According to column 7, lines 19 to 20 of the patent in suit, the factors for these compounds can be determined and verified by **routine experimentation**.

3.5 Similarly, the effective molar amount of the hydrocarbons is defined in the patent in suit (see paragraph [0031]) as the multiplication product of the molar quantity of the hydrocarbon with a multiplication factor (F_{HC}). According to the patent, the multiplication factor for ethylene is 1 by definition. The factor for methane may be at most 0.5, the factor for ethane may be in the range of from 50 to 150 and the factor for higher hydrocarbons in the range of 10 to 10000. According to column 8, lines 4-5, these factors may be determined and verified by **routine experimentation**.

As explained in the patent (paragraphs [0007] to [0009]) and by the Appellant in its statement of grounds of appeal (page 4, point 4.2.7), the reason for using the effective molar quantity rather than the actual molar quantities is that it takes account of differences in the behaviour of different reaction modifiers and different hydrocarbons. The nature of the catalyst, the reaction modifier and the hydrocarbon are

relevant to the value of the multiplication factor, "since it reflects the chemical/physical interaction between the catalyst and the component". As a consequence the multiplication factors are not necessarily the same for the same feed, if a different catalyst is used. For these reasons, ranges rather than a single specific value are present for the multiplication factors of certain reaction modifiers or for the hydrocarbons.

3.6 The patent in suit does not contain a method for the determination of the required multiplication factors. For the reaction modifiers the patent in suit merely states that the multiplication factors are equivalent to the number of active heteroatoms present per molecule of the reaction modifier, without providing any information as to how this has been established or how it could be verified. Even the only example present in the patent in suit, which in fact is merely a hypothetical example, does not determine any multiplication factors, but uses certain factors given in the patent is suit, for example 1 for ethyl chloride and ethylene, 2 for ethylene dichloride, 1 for vinyl chloride, 1/3 for methyl and 85 for ethane, which, according to the Appellant's own explanation regarding the multiplication factors of the hydrocarbon set out in the preceding paragraph, are not necessarily the same for other catalysts.

For the reaction modifier and hydrocarbons for which a range for the multiplication factors has been provided, the patent in suit also fails to describe the routine experiments which the person skilled in the art should carry out in order to determine the specific

multiplication factor to be used for a particular compound under particular circumstances, i.e. for a particular catalyst.

Furthermore, there is no evidence on file that these multiplication factors were parameters commonly known or used in epoxidation processes of the prior art.

3.7 It follows from the above that in order to be able to perform the invention over the whole claimed scope without undue burden, the person skilled in the art must be able to rely on the statement of the patent in suit regarding the multiplication factor of the reaction modifiers, i.e. being equal to the number of heteroatoms per molecule, and, if there is a range for the value of the multiplication factor for a particular reaction modifier or hydrocarbon, he must be able to select in a reliable way the correct multiplication factor for a specific catalyst system.

3.8 With its response to the statement setting out the grounds of appeal, Respondent 1 provided experimental data comparing the effects of ethyl chloride (ECl) and nitric oxide (NO) as reaction modifiers in an epoxidation process in the presence of a silver catalyst promoted with rhenium (experiment 1 of document (29)). Nitric oxide according to the patent in suit falls within the definition of a nitrate- or nitrite-forming agent (column 5, line 57 - column 6, line 3). In experiment 1 the epoxidation reaction was started with ethyl chloride as reaction modifier. The amount of ethyl chloride was adjusted to obtain optimum values (i.e. 2.7 ppm) and steady state was achieved (days 7-9). Subsequently, the value of Q, which was

determined to be 3.0×10^{-6}, was reduced to 1.5×10^{-6} by reducing the amount of ethyl chloride from 2.7 to 1.35 ppm. The selectivity dropped accordingly. Then NO was added in an amount of 1.35 ppm. If, as taught by the patent in suit, 1 mole NO and 1 mole of ECl have the same effective molar quantity of active species, as both their multiplication factors are 1, then returning to the calculated value of 3.0×10^{-6} with the corresponding increase in selectivity should be accomplished by the addition of 1.35 ppm NO. This was, however, not the case. Rather than recovering, the selectivity of the catalyst dropped still further.

Thus, contrary to the patent in suit, which suggests that the effective molar quantity of active species is the same for one mole nitrate- or nitrite-forming compound and one mole halogen compound, provided that the number of nitrogen atoms and halogen atoms are the same and that they are not methyl compounds, the Respondent's experimental data clearly demonstrates that this premise cannot be relied on, at least not for nitrate- or nitrite-forming compounds. With a calculated value of 1.35 ppm of nitric oxide, which keeps Q essentially the same, the selectivity cannot be preserved. As a consequence, calculations for the concentration of the reaction modifier necessary in the second operating phase in order to avoid variations in the selectivity cannot be correctly and reliably performed over the whole scope of the claims.

3.9 Regarding the determination of the multiplication factors for methyl compounds or hydrocarbons, which are disclosed as ranges and which according to the Appellant depend on the specific catalyst to be used in

the epoxidation reaction, the Appellant argued that "it is common and routine in the science and engineering art that in order to determine a response for one component, it is necessary in a **stable system** to vary just one component and to assess the change" (statement of grounds of appeal, page 6, point 4.4.3, first paragraph; emphasis added by the Board). On page 7 under the heading "ethylene epoxidation" such a procedure is described for the assessment of the multiplication factor of methyl chloride as the reaction modifier and the multiplication factors of hydrocarbons other than ethylene, **the standard system being ethylene epoxidation using ethyl chloride as reaction modifier**.

3.10 Assuming, for the sake of argument, that the type of experiments described on page 7 of the statement of grounds of appeal reflects the routine experiments which the skilled person would have considered in order to determine the relevant multiplication factors, he could have based these routine experiments just as well on an ethylene epoxidation process using nitric oxide as standard system. This, however, will lead to different multiplication factors for methyl compounds or hydrocarbons for the same catalyst system, due to the rather different behaviour of nitric oxide NO as compared to ethyl chloride shown by document (29). A reliable calculation of the required concentration of reaction modifier in response to a change in the hydrocarbons in the feed is thus not possible without knowing exactly which standard system is to be applied in the determination of the multiplication factors. This essential piece of information is, however, not present in the patent in suit, and since neither Q nor

the multiplication factors are commonly known parameters in the epoxidation of olefins, this is also nothing which the skilled person would have "read into" the routine experiments referred to in the patent in suit on the basis of his common general knowledge.

3.11 In summary, since the multiplication factors as stated in the patent in suit cannot be relied on and since there is no information in the patent in suit as to the standard settings under which the routine experiments mentioned in the patent in suit are to be performed, these conditions being indispensable to reliably determine multiplication factors, the patent in suit does not provide the skilled person with sufficient information to carry out the invention over its whole scope, with the intended result of keeping the selectivity constant, without having to resort to trial-and-error procedures.

3.12 Accordingly, the Board concludes that the main request must be refused because the requirement of Article 100(b)EPC is not fulfilled.

3.13 None of the findings above based on the experimental data provided by Respondent 1 was contested by the Appellant. Invited by the chairman to present its comments on these experimental data and the conclusions, which had been drawn from them, the Appellant declared that it did not wish to comment on this issue. It referred to its written submissions, although it was pointed out to it that its written submissions did not contain any observations regarding the experimental data provided by Respondent 1.

First, second, seventh to ninth and eleventh auxiliary requests

4. Admission of requests

4.1 The first and second auxiliary requests were filed during the oral proceedings before the Board. The seventh to ninth were filed with letter of 18 January 2012, more than 2 years after the reply of the Respondents to the statement of grounds of appeal. The eleventh auxiliary request was filed with letter of 8 February 2012, less than a week before oral proceedings.

The Respondents objected to any of these requests being admitted into the appeal proceedings, on the grounds that they were late-filed.

4.2 Admission into the proceedings of requests filed at such a late stage of the appeal proceedings is a matter of discretion for the Boards of Appeal (R 10/09 of 22 June 2010, point 2.1 of the Reasons). That discretion shall be exercised in view of inter alia the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy (Rule 13(1) RPBA). Amendments to a party's case after oral proceedings have been arranged shall not be admitted if they raise issues which cannot be dealt with without adjournment of the oral proceedings (Rule 13(3) RPBA).

4.3 An approach commonly adopted by the Boards of Appeal when exercising its discretion is to consider whether or not the amended claims of late-filed requests are

clearly allowable in the sense that they do not raise new issues and at the same time are apparently suitable to overcome the existing objections (T 87/05 of 4 September 2007, point 2 of the Reasons).

4.4 Claim 1 of the first, seventh to ninth and eleventh auxiliary requests has been amended by making the presence of certain reaction modifiers (first, seventh to ninth and eleventh auxiliary requests) and certain hydrocarbons (eighth, ninth and eleventh auxiliary requests) obligatory (see point XI above). However, the presence of other reaction modifiers, like nitrate- or nitrite-forming compounds, is not excluded in view of the term "**comprising** reaction modifiers selected from...". Moreover, the question of which standard system is to be used in the routine experiments mentioned in the patent is suit would remain unanswered. Accordingly, the objections raised against the main request would still apply, which would necessarily result in the same conclusion that the requirement of Article 100(b) EPC is not fulfilled.

4.5 Accordingly, the Board decided not to admit the first, seventh to ninth and eleventh auxiliary requests, since they were not clearly allowable.

4.6 The second auxiliary request was filed extremely late in the oral proceedings, namely after the issue of sufficiency of disclosure has been discussed and the Board had announced its conclusion that the requirement of sufficiency of disclosure was not met for the main request and had indicated that this would also apply to all the requests currently on file.

4.7 In this request, the reaction modifiers were for the first time during the opposition and appeal proceedings restricted to chlorohydrocarbons, with the additional restriction of comprising one or more of methyl chloride, ethyl chloride, ethylene dichloride and vinyl chloride. It was filed by the Appellant as an attempt to overcome the objections regarding sufficiency of disclosure based on the experimental data provided by Respondent 1. However, unlike the objection under Article 123(2) EPC, with which the Appellant was confronted for the first time during oral proceedings, the experimental data of Respondent 1 were submitted with the reply to the statement of grounds of appeal in July 2009 more than two and a half years ago. The Appellant did not respond to any of the submissions of the Respondents and chose not to file an auxiliary request in reaction to the Respondents attack. Shortly before the oral proceedings, in reply to the summons, the Appellant filed a new main request and nine auxiliary requests, none of them however restricted to the subject-matter presently claimed. In addition, no justification for the late filing and no explanations as to the relevance of the amendments for the issue of sufficiency of disclosure were provided in the accompanying letter.

4.8 This conduct on the part of the Appellant was at variance with the purpose of fair appeal proceedings, in which each party must be afforded a reasonable opportunity to present its case under conditions that do not place it at a substantial disadvantage vis-à-vis the other party. In the present case, admitting the second auxiliary request at this very late stage in the appeal proceedings would have required the adjournment

of the oral proceedings in order to allow the Respondents, in particular Respondent 1, to adequately react to this situation, for example by providing further experimental evidence demonstrating that similar results as with nitrate- and nitrite-forming compound would be obtained with chlorohydrocarbons. This could have been done at an earlier stage of the proceedings, if the Appellant had contested in a timely manner the experimental data provided by Respondent 1 or, if it did not wish to do so, filed an adequately restricted auxiliary request in good time. Procedural economy, therefore, clearly spoke against the admission of this very late-filed second auxiliary request.

4.9 The Appellant argued that experimental data concerning chlorohydrocarbon could have been provided earlier by the Respondents, because this feature was present in a dependent claim of the patent in suit which was also opposed by the Respondents.

4.10 This was not convincing for the following reasons:

Respondent 1 provided experimental data which in its opinion clearly demonstrated that the patent in suit did not provide sufficient information for the skilled person to be able to carry out the invention over the whole scope of the claims. No comments, observations or arguments with regard to this data were provided by the Appellant in the written procedure. Apparently, the Appellant did not wish to contest the experimental data. Nor did the Appellant file an auxiliary request restricted to chlorohydrocarbons as a precautionary measure, which would have allowed Respondent 1 to reconsider its position and optionally file further

data. Respondent 1 could, therefore, rely on the data it had filed and had no reason before the oral proceedings to file further data in support of its case.

Nor does the fact that the Respondents had opposed all claims in their notices of opposition give the Appellant a right to make such amendments at the very last minute. Parties must be aware that if they do not present their case as early and completely as possible, they do so at their own risk, depending on the Board's evaluation of the situation on a case-by-case basis.

4.11 For the reasons set out above, the Board, in the present case, decided not to admit the second auxiliary request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Schalow P. Ranguis