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**Datasheet for the decision  
of 29 November 2022**

**Case Number:** T 1734/20 - 3.3.10

**Application Number:** 16205166.8

**Publication Number:** 3159328

**IPC:** C07C17/389, C07C21/18,  
C07C17/20, C07C17/25,  
C07C17/383

**Language of the proceedings:** EN

**Title of invention:**

PROCESS FOR PURIFYING (HYDRO) FLUOROALKENES

**Patent Proprietor:**

Mexichem Fluor S.A. de C.V.

**Opponent:**

The Chemours Company FC, LLC

**Headword:**

**Relevant legal provisions:**

EPC Art. 100(b), 83  
RPBA 2020 Art. 12(2), 12(6), 13(1)

**Keyword:**

Sufficiency of disclosure (no)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 1734/20 - 3.3.10

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.10**  
**of 29 November 2022**

**Appellant:** The Chemours Company FC, LLC  
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**Decision under appeal:** **Decision of the Opposition Division of the European Patent Office posted on 25 June 2020 rejecting the opposition filed against European patent No. 3159328 pursuant to Article 101(2) EPC.**

**Composition of the Board:**

**Chairman**            P. Gryczka  
**Members:**            A. Zellner  
                              F. Blumer

## **Summary of Facts and Submissions**

- I. The appellant (opponent) lodged an appeal against the decision of the opposition division rejecting the opposition against the European Patent No. 3 159 328 under Article 101(2) EPC.
- II. Notice of opposition had been filed on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC), insufficiency of disclosure (Article 100(b) EPC), and added subject-matter (Article 100(c) EPC).
- III. The following documents relevant to the present decision were filed:
- D8: Experimental report on the ability of adsorbents to remove (hydro)fluoroalkene impurities from R-1234yf
  - D10: Removal of (hydro)fluoroalkene impurities from R-1234yf using adsorbents (submitted by the respondent on 23 February 2021)
  - D11: Removal of (hydro)fluoroalkene impurities from R-1234yf using adsorbents (submitted by the appellant on 9 November 2021)
  - D12: Declaration of Dr. Xuehui Sun of 24 February 2022
- IV. In its decision, the opposition division came to the conclusion that the patent as granted did not contain subject-matter which extended beyond the content of the earlier application under Article 76 EPC as filed (Article 100(c) EPC). The opposition division further concluded that the subject-matter of claims 1 to 15 of the patent as granted was novel and based on an

inventive step (Articles 100(a), 54 and 56 EPC), and that the opponent's argumentation concerning lack of sufficiency of disclosure of the process according to claims 1 and 15 was not convincing (Article 100(b) EPC). Concerning the latter point, the opposition division was not convinced by the data provided by the opponent with the submission of 24 April 2020, because the adsorbents used in the underlying experiments were used without any drying or activation.

- V. The appellant submitted that the decision of the opposition division was erroneous, because the contested patent was not allowable in view of Articles 100(a), (b) and (c) EPC.
- VI. In reply to the appellant's statement setting out the grounds of appeal, the respondent (patent proprietor) submitted arguments in support of the allowability of its main request (patent as granted) and auxiliary requests 1 to 5, of which auxiliary requests 1 to 3 were as filed during the opposition proceedings, and auxiliary requests 4 and 5 were filed with the reply to the grounds of appeal.
- VII. In a communication under Article 15(1) RPBA the Board informed the parties of its preliminary opinion and about factual issues concerning the ground of opposition under Article 100(b) EPC, which might be discussed during the oral proceedings.
- VIII. Claim 1 of the granted patent (main request) reads as follows:

*"A process for removing one or more undesired (hydro)fluoroalkenes containing a =CF<sub>2</sub> moiety from a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety,*

*the process comprising contacting a composition comprising the hydrofluoroalkene and one or more undesired (hydro)fluoroalkenes with an aluminium-containing absorbent, activated carbon, or a mixture thereof,*

*wherein the or each undesired (hydro)fluoroalkene is present in an amount of from 0.1 to 1000 ppm, based on the weight of the composition comprising the hydrofluoroalkene and one or more undesired (hydro)fluoroalkenes."*

IX. Claim 1 of auxiliary requests 1 to 5 differs from claim 1 of the main request as follows:

- claim 1 of auxiliary request 1 contains the additional feature "*... wherein the hydrofluoroalkene is a C<sub>3-7</sub> hydrofluoroalkene, ...*"
- claim 1 of auxiliary request 2 contains the additional feature "*... wherein the hydrofluoroalkene is a trifluoropropene or a tetrafluoropropene, ...*"
- in claim 1 of auxiliary request 3 the hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety is "*... selected from 3,3,3-trifluoropropene (R-1243zf) or or 2,3,3,3-tetrafluoropropene (R-1234yf), ...*"
- claim 1 of auxiliary request 4 relates to a process for removing one or more undesired (hydro)fluoroalkenes containing a =CF<sub>2</sub> moiety "*... from 2,3,3,3-tetrafluoropropene (R-1234yf), ...*" rather than "*... from a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety, ...*"

- in claim 1 of auxiliary request 5 the aluminium-containing absorbent is "... doped with base, either potassium hydroxide or carbonate, ..."

X. The term "absorbent" is used in the claims, although the description of the contested patent, as well as the experimental reports submitted by the parties use the term "adsorbent" in the same context. Since the parties also used the term "adsorbent" in most of their submissions and their argumentation, the term is also used in this decision, unless reference is made to the claims.

XI. The appellant's arguments, as far as they relate to the ground of opposition under Article 100(b) EPC and are thus relevant for this decision, can be summarised as follows:

The skilled person is not able to carry out the processes according to claim 1 without undue burden, in particular not over the whole claimed area. It is not credible that any of the absorbents as defined in claim 1 allowed the removal of any undesired (hydro)fluoroalkene containing a =CF<sub>2</sub> moiety from any hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety. This argument is supported by the examples of the patent, because they only concern specific products, and only with very limited variation of the claimed process. Lack of disclosure of the invention is furthermore supported by experimental data provided with the submission of 24 April 2020 as well as with document D8. These data demonstrate that claimed combinations of features do not lead to the claimed effect of removing undesired (hydro)fluoroalkene compounds containing a =CF<sub>2</sub> moiety. Even the data provided by the respondent in document D10 is not



conclusive and cannot be relied upon, as shown by document D11, which demonstrates that the broad definitions do not allow for a clear distinction between desired and undesired compounds. Document D11 shows that the claimed process also removes desired compounds. The large amount of parameters referred to in the patent presents the skilled person with an undue burden when trying to find appropriate conditions which lead to the claimed effect. Furthermore, a great number of examples show that even the use of preferred adsorber materials leads to an increase in the amount of (hydro)fluoroalkene compounds containing a =CF<sub>2</sub> moiety, rather than a decrease as required by the claims. The skilled person does not get any guidance how to overcome failures. Even combinations of the most preferred parameters, such as desired and undesired compounds, process temperature and time, and adsorbent, do not necessarily lead to working embodiments. The results obtained according to example 3 of the patent (reference is made to the entries 1 and 2 of the table on page 10) show that specific adsorbents either lead to an increase, or a decrease in the amount of the undesired compound 1225zc, but the skilled person is unable to obtain any information on the reason for this difference. A research programme is thus required to establish conditions under which the claimed effect is achieved.

XII. The respondent's arguments, as far as they are relevant for this decision, can be summarised as follows:

The contested patent disclosed examples with different parameters and multiple combinations thereof. These examples demonstrate the claimed removal of undesired (hydro)fluoroalkenes containing a =CF<sub>2</sub> moiety from compositions as defined in the claim (reference is made

to the table on top of page 6). Even a broad claim does not necessarily lead to a lack of sufficiency of disclosure, as argued by the appellant, since the patent provides plenty of working embodiments. The skilled person is even made aware of adsorbents, which should not be used for the removal of 1234yf (reference is made to the table on page 8). This information gives the skilled person a clear guidance. Some degree of variation has to be expected in every invention. Example 3 of the patent was conducted under harsh conditions, non-working embodiments under these conditions have to be expected but this does not lead to a lack of sufficiency. The arguments by the appellant with reference to document D8 are not compelling, because none of the adsorbents used therein are mentioned in the contested patent. Furthermore, only two different contact times with an adsorbent were examined in experiment 3.1 of that document, and only one very short contact time of 2 hours in experiment 3.2, whereas the patent in dispute disclosed a high removal rate especially after a much longer contact time of 16 hours (reference is made to the table on top of page 6). Example 3.3 of document D8 does not fall under the scope of the claimed process at all, since the amount of impurities is greater than 1000 ppm. Document D8 can also not support the alleged lack of sufficiency, it only contains individual non-working embodiments. In case a particular combination of parameters does not lead to the expected removal, as argued by the appellant with reference to example 2 of the contested patent, the patent itself already provides information in paragraph [0056] on how to amend the experiments. The objection of lack of sufficiency of disclosure is thus not justified.

XIII. Oral proceedings before the board of appeal were held on 29 November 2022.

XIV. The appellant (opponent) requests that the decision under appeal be set aside and that the European patent No. 3 159 328 be revoked.

The respondent (patent proprietor) requests that the appeal be dismissed or, as an auxiliary measure, that the patent be maintained on the basis of any one of auxiliary requests 1 to 5; auxiliary requests 1 to 3 as filed with letter dated 25 June 2019, auxiliary requests 4 and 5 as filed with letter dated 23 February 2021.

### **Reasons for the Decision**

*Admissibility in the proceedings of Documents D8, D10 and D11.*

1. Document D8

1.1 Experimental report D8 was filed by the appellant with the statement setting out the grounds of appeal. The appellant argued lack of sufficiency of disclosure based on the content of this document.

1.2 According to Article 12(2) RPBA, a party's appeal case shall be directed to the requests, facts, objections, arguments and evidence on which the decision under appeal was based. Document D8 does not meet this requirement. Article 12(6) RPBA stipulates that the Board shall not admit requests, facts, objections or evidence which should have been submitted in the proceedings leading to the decision under appeal, unless the circumstances of the appeal case justify

their admittance.

In the present case, the circumstances of the appeal case justify the admittance of document D8 for the following reasons:

- 1.2.1 The data provided in the experimental report D8 are identical to the data submitted by the appellant during the opposition proceedings on 24 April 2020, apart from the additional information in document D8 that the adsorbents used in the experiments had been activated at 230 °C under vacuum overnight before use. This was not disputed.
  
- 1.2.2 The report submitted previously - during the opposition proceedings - was filed by the appellant on the last day of the time limit set by the opposition division for making written submissions under Rule 116 EPC. On the same day, the appellant withdrew its request for oral proceedings. The opposition division cancelled the oral proceedings and issued their decision based on the arguments provided with the parties' written submissions. In the contested decision, the opposition division, for their evaluation of sufficiency of disclosure, referred to the experimental data of the report and concluded that they were not suitable to prove the opponent's case, *i.e.* the alleged lack of sufficiency of disclosure. The opposition division argued that, according to these data, the adsorbents were used without any drying or activation. They further argued that the report could thus not prove that the claimed technical effect of removing certain compounds could not be achieved, because the skilled person would have activated the adsorbents before use, and would not have followed the procedure according to the report. The opposition division concluded that it

had thus not been shown that the claimed invention was not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (see point 4.4 of the decision under appeal).

1.2.3 The appellant argued that the opposition division had relied on an incorrect interpretation of the experimental data. According to the appellant, activation of the adsorbents was carried out, even if this had not explicitly been mentioned in the report. The report, however, did also not specify that activation was not carried out. The appellant submitted that - since activation was a standard pre-treatment for adsorbents - it was not deemed necessary to provide this additional information with the experimental report. Having been made aware of this misconception only after the contested decision had been issued, document D8 was filed as early as possible, *i.e.* with the statement setting out the grounds of appeal. This document now explicitly mentioned that the adsorbents had been activated before use. The appellant further referred to document D12, which stated that the results submitted during the opposition proceedings on 24 April 2020 and the results according to document D8 were based on one single set of experiments.

1.2.4 The respondent did not deny that activation of adsorbents is standard practice in the field. It was questioned, however, whether document D8 referred to the same experiments which were submitted on 24 April 2020. The respondent argued that according to point 6 of document D12 the experimental reports were said to be based on a single set of experiments carried out in April 2020. In its view, this statement did not allow the conclusion that the two reports referred to

the same experiment.

1.2.5 The Board is not convinced by this argument. The results presented in the two reports are identical, and there is not reason to doubt the statement of the appellant that the only difference in the submissions is the additional information in document D8 concerning activation of the adsorbents.

1.3 Document D8 is admitted into the proceedings (Article 12(6) RPBA).

2. Document D10

2.1 Document D10 was filed by the respondent as "Annex A" with its reply to the appellant's statement setting out the grounds of appeal. The respondent relied on the experimental data of the document for its argumentation concerning the ground of opposition under Article 100(b) EPC. The respondent argued in particular that the data was of *prima facie* relevance, since it illustrated - in addition to data already disclosed in the contested patent - that sufficiency was given over the entire scope of the claims. It was thus an appropriate and necessary reaction to the appellant's filing of document D8.

According to the appellant, the report was late-filed, lacked any relevance and was incomplete.

2.2 The Board admits the document into the proceedings. The document was submitted with the respondent's reply to the appellant's statement setting out the grounds of appeal and addresses issues in response to the appellant's arguments based on document D8 (Article

12(4) RPBA).

3. Document D11

3.1 Document D11 is also an experimental report. It was filed by the appellant in reply to the respondent's filing of document D10 and differs from that document in that the table "Results" contains one additional column which is entitled "1234ze-E (%w/w)". The appellant argued the document had been submitted as a direct reaction to document D10 in order to show inconsistencies of the experimental data provided therewith. According to the appellant, filing of the document could not come as a surprise to the respondent either, who had filed the same document itself in a parallel case before the Boards of appeal. This was not disputed.

3.2 The Board admits the document into the proceedings (Article 13(1) RPBA).

*Main request - patent as granted*

4. *Sufficiency of disclosure (Article 100(b) EPC)*

4.1 Claim 1 of the main request is directed to a process for removing one or more undesired (hydro)fluoroalkenes containing a =CF<sub>2</sub> moiety from a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety.

The process comprises contacting a composition comprising the hydrofluoroalkene and the one or more undesired (hydro)fluoroalkenes with an aluminium-containing absorbent, activated carbon, or a mixture thereof.

Each of the undesired (hydro)fluoroalkene is present in an amount of from 0.1 to 1000 ppm, based on the weight of the composition comprising the hydrofluoroalkene and one or more (hydro)fluoroalkenes.

- 4.2 In order to carry out the claimed process, the skilled person has to be able to provide a composition comprising a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety (a desired compound), and one or more undesired (hydro)fluoroalkenes containing a =CF<sub>2</sub> moiety (the undesired compound(s)), wherein (each of) the undesired compound(s) is/are present in a certain amount, *i.e.* from 0.1 to 1000 ppm.

Furthermore, the skilled person has to contact such a composition with an aluminium-containing absorbent, activated carbon, or a mixture thereof.

It was undisputed that the skilled person is able to follow these steps. The Board agrees. The description of the contested patent discloses general information and examples for the selection of hydrofluoroalkenes that do not contain a =CF<sub>2</sub> moiety (see paragraphs [0011] to [0016]), for (hydro)fluoroalkenes containing a =CF<sub>2</sub> moiety (see paragraphs [0017] to [0019]), as well as for aluminium-containing adsorbents and activated carbon and methods for their pre-treatment (see paragraphs [0021] to [0037]). The description also discloses conditions under which the claimed process is typically conducted (see paragraph [0038]).

- 4.3 The claim additionally requires that a technical effect be achieved by contacting the composition with the absorbent, the activated carbon, or both. The effect to be achieved is that the one or more undesired (hydro)fluoroalkene(s) containing =CF<sub>2</sub> moiety is/are



removed from the composition. For the invention to be sufficiently disclosed, this claimed effect has to be achieved essentially over the entire claimed scope.

The parties disagreed on whether the skilled person can, following the teaching of the contested patent and using the common general knowledge, achieve the effect without undue burden over the whole claimed scope.

4.4 The Board comes to the conclusion that this is not the case. The reasons are as follows:

4.4.1 Example 2 of the patent under dispute describes the treatment of a commercially available sample of R-1243zf, *i.e.* a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety (a preferred desired compound, see paragraph [0013] and claim 3) and that contains several impurities, with different adsorbents (see paragraph [0053]). The table on page 8 of the patent discloses that, depending on the nature of the adsorbent, the original amount of the undesired compound R-1225zc (7.4 ppm wt/wt, see the Table in paragraph [0051]) either decreases, or increases within the treatment period. An increase is observed in case the adsorbents Carbon 207C, 13-X Sieve, and AW 500 are used. The claimed effect of removing the undesired compound is thus not observed for these adsorbents, whereas it is achieved - at least in part, since no impurity is completely removed - for other carbon based adsorbents (Carbon ST1X, Carbon 209M). Furthermore, the amount of compound R-1234yf, a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety and which is thus a desired compound according to claim 1, also decreases from initially 26 to 25 ppm wt/wt when particular adsorbents are used (BASF AL0104 and Carbon 207 EA). All of the adsorbents used in example 2 are encompassed

by the definition of claim 1.

- 4.4.2 Therefore, the example 2 of the patent shows that a specific undesired compound can only be removed from a composition comprising the desired compound R-1243zf if specific adsorbents are used, or it cannot be removed at all, but rather accumulates during the treatment period. The skilled person does not receive any information as to why the claimed effect of removing the undesired compound can only be achieved with certain adsorbents, but not with others. There is also no information as to why some adsorbents also remove the desired compound from the initial composition, and how to avoid this from happening. The patent therefore provides the skilled person only with specific and selective information concerning which of the tested combinations of adsorbent, desired and undesired compound allows to achieve the claimed effect.
- 4.4.3 This finding is confirmed by document D8. This document describes experiments, wherein compositions comprising the preferred desired compound R-1234yf and further comprising the undesired compound R-1225zc in an amount of 279 or 277 ppm wt/wt (see Table 1) are treated with two different adsorbents falling under the definition of claim 1 of the contested patent (5Å molecular sieve or 1/8 inches pellets alumina). According to the results disclosed in Tables 3 to 5 of the document, the undesired compound R-1225zc is not removed. Document D8 thus confirms that not every claimed combination of adsorbents, desired, and undesired compounds leads to success.
- 4.4.4 Example 2 of the patent, as well as the examples of document D8, therefore show that the claimed process cannot be performed over the whole claimed range. This

even applies to preferred embodiments of the claimed process. The contested patent does further not provide the skilled person with a selection rule to apply in case of such failure, but merely discloses individual examples of working and non-working embodiments.

The skilled person can thus only find out by trial and error whether or not a particular choice of compounds and conditions will provide a satisfactory result. However, even though a reasonable amount of trial and error is permissible when it comes to sufficiency of disclosure, as argued by the respondent, the skilled person has to have at its disposal, either in the specification or on the basis of common general knowledge, adequate information leading necessarily and directly towards success through the evaluation of initial failures. The absence of any selection rule, as in the present case, amounts to an undue burden of conducting further research (see the "Case Law of the Boards of Appeal of the EPO", 10th ed. July 2022, chapter II.C.6.7, page 412).

- 4.4.5 The respondent relied on additional experiments filed with document D10. These experimental data can, however, not overcome the lack of sufficiency of disclosure identified above.

Document D10 describes another example of the treatment of a composition comprising 1234yf and 1000ppm of 1225zc with different adsorbents. The example shows, as does example 2 of the contested patent, that by using specific adsorbents under specific conditions, the undesired (hydro)fluoroalkene containing a =CF<sub>2</sub> moiety (1225zc) can be removed from a composition predominantly comprising 1234yf. The teaching of the document does, however, not go beyond the experimental

data of the patent itself.

Furthermore, document D11 shows that the procedure according to document D10 also removes part of 1234ze from the composition, *i.e.* a hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety and thus a desired compound according to claim 1 of the main request.

- 4.5 The main request does thus not meet the requirements of Article 83 EPC.
5. Since the main request is already not allowable for lack of sufficiency of disclosure, none of the other objections of the appellant has to be considered for this decision.

*Auxiliary requests*

6. Auxiliary requests 1 to 4 limit the desired hydrofluoroalkene that does not contain a =CF<sub>2</sub> moiety to a C<sub>3-7</sub> hydrofluoroalkene (auxiliary request 1), a trifluoropropene or a tetrafluoropropene (auxiliary request 2), R-1243zf or R-1234yf (auxiliary request 3), or to R-1234yf (auxiliary request 4).

Auxiliary request 5 defines the aluminium-containing absorbent in that it is doped with a base, either potassium hydroxide or carbonate.

7. The respondent did not provide further arguments in support of sufficiency of disclosure for the auxiliary requests, but submitted that the arguments provided for the main request also applied to the auxiliary requests.

8. The Board does not consider any of these limitations appropriate to overcome the objections brought forward by the appellant either, since they were already addressed in the arguments concerning the main request.
9. The Board concludes that the auxiliary requests are not allowable either (Article 83 EPC).
10. None of the respondent's requests therefore fulfill the requirements of sufficiency of disclosure. The ground of opposition under Article 100(b) EPC thus prejudices the maintenance of the contested patent.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



C. Rodríguez Rodríguez

P. Gryczka

Decision electronically authenticated