

**Internal distribution code:**

- (A) [ - ] Publication in OJ  
(B) [ - ] To Chairmen and Members  
(C) [ - ] To Chairmen  
(D) [ X ] No distribution

**Datasheet for the decision  
of 26 June 2018**

**Case Number:** T 0995/16 - 3.3.10

**Application Number:** 08850470.9

**Publication Number:** 2209759

**IPC:** C07C17/38, C07C17/354,  
C07C19/08, B01J23/745,  
B01J23/75, B01J23/755,  
B01J23/72

**Language of the proceedings:** EN

**Title of invention:**

MANUFACTURE OF 1,1,1,2,3,3-HEXAFLUOROPROPANE AND 1,1,1,2-  
TETRAFLUOROPROPANE VIA CATALYTIC HYDROGENATION

**Patent Proprietor:**

Honeywell International Inc.

**Opponent:**

ARKEMA FRANCE

**Headword:**

**Relevant legal provisions:**

EPC Art. 100(a), 123(2), 123(3), 83, 56  
RPBA Art. 12(2), 13(1)

**Keyword:**

Grounds for opposition - lack of patentability (yes) - main request, first to third auxiliary requests  
Late-filed request - justification for late filing (no) - fourth auxiliary request  
Fifth auxiliary request:  
Amendments - added subject-matter (no)  
Sufficiency of disclosure - enabling disclosure (yes)  
Inventive step - (yes)

**Decisions cited:**

T 0837/09

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

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

Case Number: T 0995/16 - 3.3.10

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.10**  
**of 26 June 2018**

**Appellant:** ARKEMA FRANCE  
(Opponent) Département Propriété Industrielle  
420, rue d'Estienne d'Orves  
92700 Colombes (FR)

**Representative:** Dang, Doris  
ARKEMA France  
Département Propriété Industrielle  
420, rue d'Estienne d'Orves  
92705 Colombes Cedex (FR)

**Respondent:** Honeywell International Inc.  
(Patent Proprietor) 115 Tabor Road  
Morris Plains, NJ 07950 (US)

**Representative:** Crooks, Elizabeth Caroline  
Kilburn & Strode LLP  
Lacon London  
84 Theobalds Road  
London WC1X 8NL (GB)

**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 23 February  
2016 rejecting the opposition filed against  
European patent No. 2209759 pursuant to Article  
101(2) EPC.**

**Composition of the Board:**

**Chairman** P. Gryczka  
**Members:** R. Pérez Carlón  
T. Bokor

## Summary of Facts and Submissions

- I. The appellant (opponent) lodged an appeal against the decision of the opposition division rejecting the opposition against European patent No. 2 209 759.
- II. Notice of opposition had been filed on the grounds of added subject-matter (Article 100(c) EPC), insufficiency of disclosure (Article 100(b) EPC) and lack of inventive step (Article 100(a) EPC).
- III. The documents filed during the opposition proceedings include the following:
- D1: WO 94/27940
  - D2: EP 0 644 173 A1
  - D3: US 2007/0179324
  - D4: US 5,136,113
- IV. The opposition division concluded that the claimed subject-matter found the required basis in the application as originally filed, and that the patent in suit contained sufficient information allowing the skilled reader to carry out the invention. Document D3 was the closest prior art, and the problem underlying the claimed invention was how to provide an alternative process for producing 1,1,1,2,3,3-hexafluoropropane or 1,1,1,2-tetrafluoropropane. The solution, which was characterised by the catalyst required by claim 1, was inventive having regard to the prior art.
- V. With the response to the grounds of appeal, the respondent (patent proprietor) filed first to seventh auxiliary requests, of which the fourth to seventh were later renumbered as fifth to eighth respectively.

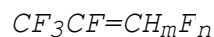
Eighth to twenty-third auxiliary requests, later renumbered respectively as ninth to twenty-fourth, were filed under cover of a letter dated 2 January 2018.

Lastly, the fourth auxiliary request was filed during the oral proceedings before the board, which took place on 26 June 2018.

VI. Claim 1 of the patent as granted, which is the respondent's main request, reads as follows:

*"A catalytic hydrogenation process for producing 1,1,1,2,3,3-hexafluoropropane or 1,1,1,2-tetrafluoropropane comprising:*

*contacting hydrogen with a compound represented by the following formula:*



*wherein m is 0 or 2; n is 0 or 2; and m + n=2; wherein the hydrogenation catalyst is selected from the group consisting of Fe, Co, Cu, Cr, Ru, Ag, Os, Ir, Au, Sn, and any combination thereof."*

Claim 1 of the first auxiliary request relates to a process for producing 1,1,1,2,3,3-hexafluoropropane by hydrogenating 1,1,1,2,3,3-hexafluoropropene over the catalyst required by claim 1 of the main request.

Claim 1 of the second auxiliary request restricts the subject-matter of claim 1 of the patent as granted by requiring the hydrogenation catalyst to be selected from the group consisting of Co, Cu and Ru.

Claim 1 of the third auxiliary request relates to a

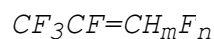
process for producing 1,1,1,2,3,3-hexafluoropropane by hydrogenating 1,1,1,2,3,3-hexafluoropropene over the catalyst required by claim 1 of the second auxiliary request.

Claim 1 of the fourth auxiliary request restricts the subject-matter of claim 1 of the patent as granted by requiring the hydrogenation catalyst to be selected from the group consisting of Cu, Cr, Ag, Au and Sn.

Lastly, claim 1 of the fifth auxiliary request reads as follows:

*"A catalytic hydrogenation process for producing 1,1,1,2,3,3-hexafluoropropane or 1,1,1,2-tetrafluoropropane comprising:*

*contacting hydrogen with a compound represented by the following formula:*



*wherein m is 0 or 2; n is 0 or 2; and m + n=2; wherein the hydrogenation catalyst is Cu."*

VII. The arguments of the appellant where relevant for the present decision were as follows:

Document D3 was the closest prior art. Example 1 of D3 disclosed all the features of claim 1 of the **main request** with the exception of the required catalyst. The problem underlying the claimed invention was merely how to provide an alternative synthesis of 1,1,1,2,3,3-hexafluoropropane or 1,1,1,2-tetrafluoropropane. The solution, which was characterised by using a hydrogenation catalyst selected from the group

consisting of Fe, Co, Cu, Cr, Ru, Ag, Os, Ir, Au, Sn and any combination thereof, was a straightforward choice for a person skilled in the art having regard to the teaching of any of documents D1, D2 or D4. The claimed process was thus not inventive.

This objection should apply in the same manner to the processes of claim 1 of the **first to third** auxiliary requests.

The **fourth** auxiliary request should not be admitted into the proceedings. It could not represent a response to any new, unexpected issue, as lack of inventive step considering document D3 as the closest prior art had been a ground for opposition from the start of the opposition proceedings, and the opposition division had already decided on that issue. In addition, the amendment did not address all the issues on file. Lastly, the subject-matter of this request was not convergent, as the list of catalytic metals required by claim 1 of the previous auxiliary request was more limited than that of the newly filed request.

The claims of the **fifth** auxiliary request did not find the required basis in the application as originally filed, which disclosed only the combined preparation of 1,1,1,2,3,3-hexafluoropropane and 1,1,1,2-tetrafluoropropane. In addition, the claimed subject-matter resulted from an unallowable combination of features selected from two lists. Lastly, not every combination resulting from the multiple dependencies of the claims had been disclosed in the application as originally filed.

In addition, the process of claim 1 of the fifth auxiliary request was not sufficiently disclosed for it



to be carried out by a person skilled in the art, as the patent acknowledged that the reaction would not take place below 200 °C and claim 1 was not restricted in that respect. It further argued that the amount of Cu in the example was too large to be considered "catalytic" and that for that reason too the claimed invention was not sufficiently disclosed.

With respect to the process of claim 1 of the fifth auxiliary request, document D3 was the closest prior art, and the problem underlying the claimed invention was how to provide an alternative process. The solution, characterised by requiring Cu as catalyst, was obvious having regard to document D2, with the consequence that the process of claim 1 was not inventive.

VIII. The arguments of the respondent where relevant for the present decision were as follows:

The respondent agreed with the appellant regarding the choice of the closest prior art and the formulation of the problem underlying the claimed invention. It considered, however, that the skilled person could not find any hint at the claimed solution and thus that the process of claim 1 of the **main request** was inventive.

The respondent acknowledged that the arguments with respect to inventive step over the combination of documents D3 and D1 also applied to the process of claim 1 of the **first to third** auxiliary requests, and would not be modified when taking into account the amended description filed on 21 June 2018.

The **fourth** auxiliary request was a reaction to an unexpected development at the oral proceedings. The

amendment merely consisted in deleting some catalysts from those envisaged by claim 1, and the appellant should be prepared to deal with such a modification.

Claim 1 of the **fifth** auxiliary request found the required basis in claim 1 as originally filed. The dependent claims found a basis in claims 4 and 6 to 9 and on page 4, line 27, of the application as originally filed.

The patent in suit provided guidance with respect to the temperature required for the claimed process in paragraph [0024], and the feature "catalyst" did not restrict the amount of catalyst in any manner. For those reasons, the invention as claimed in the fifth auxiliary request was sufficiently disclosed.

The respondent agreed with the appellant that document D3 was the closest prior art for the process of claim 1 of the fifth auxiliary request and the underlying problem of providing an alternative process for producing 1,1,1,2,3,3-hexafluoropropane or 1,1,1,2-tetrafluoropropane. The solution, which was characterised by requiring Cu as catalyst, was not obvious having regard to D2, as it related to a catalyst comprising Cu and Pd, and the presence of the latter was excluded from claim 1. For that reason, the claimed process was inventive.

- IX. The board sent a communication dated 24 October 2017, which did not raise any issue relevant to the present decision not previously on file.
  
- X. The final requests of the parties were as follows:

- The appellant requested that the decision under appeal be set aside and that European patent No. 2 209 759 be revoked.
  
- The respondent requested that the appeal be dismissed or, alternatively, that the patent be maintained in the form of one of the first to twenty-fourth auxiliary requests, the first to third and fifth to eighth having been filed as first to seventh auxiliary requests with the response to the grounds of appeal dated 4 November 2016, the ninth to twenty-fourth auxiliary requests having been filed as eighth to twenty-third auxiliary requests with a letter dated 2 January 2018, and the fourth auxiliary request having been filed during the oral proceedings before the board.

The respondent further requested that the claims of the main request and of the second, fifth, seventh, ninth, eleventh, thirteenth, fifteenth, seventeenth, nineteenth, twenty-first and twenty-third auxiliary request also be considered in combination with the amended description filed with a letter dated 21 June 2018.

XI. At the end of the oral proceedings, the decision was announced.

### **Reasons for the Decision**

1. The appeal is admissible.

Main request, inventive step

2. Claim 1 of the patent as granted relates to a catalytic hydrogenation process for producing 1,1,1,2,3,3-hexafluoropropane (from now on hexafluoropropane) or 1,1,1,2-tetrafluoropropane (from now on tetrafluoropropane) by contacting hexafluoropropene or 2,3,3,3-tetrafluoropropene with hydrogen, wherein the hydrogenation catalyst is selected from the group consisting of Fe, Co, Cu, Cr, Ru, Ag, Os, Ir, Au, Sn and any combination thereof.

3. Closest prior art

The opposition division and the parties considered that document D3 was the closest prior art, and the board sees no reason to differ.

Document D3 discloses a process for producing hexafluoropropane which differs from that of claim 1 only by virtue of the hydrogenation catalyst, which is Pd/C (example 1). This has not been disputed.

4. Technical problem underlying the invention

The respondent defined the technical problem underlying the claimed invention as how to provide an alternative process for producing hexafluoro- and tetrafluoropropane.

5. Solution

The solution to this technical problem is the claimed process, characterised by using a hydrogenation catalyst selected from the group consisting of Fe, Co, Cu, Cr, Ru, Ag, Os, Ir, Au, Sn and any combination

thereof.

6. Success

It was a matter of dispute between the parties whether or not the problem as defined above could be considered credibly solved by the features of claim 1.

In the following, it will be examined whether the subject-matter of claim 1 is inventive, on the assumption that the technical problem as defined above has been credibly solved by the features of claim 1.

7. It thus remains to be decided whether or not the proposed solution to the objective problem defined above is obvious from the prior art.

The skilled person, starting from D3 and trying to obtain an alternative process for producing hexafluoropropane, would turn to processes for the preparation of similar compounds.

Document D3 (examples 1 and 2) discloses that 1,2,3,3,3-pentafluoropropene and hexafluoropropane can be hydrogenated under the same conditions.

The skilled person thus knows that the reactivity of these fluoroolefins is comparable and, looking for an alternative, would turn to a document such as D1, disclosing the hydrogenation of the former.

Document D1 discloses the preparation of 1,2,3,3,3-pentafluoropropane from 1,2,3,3,3-pentafluoropropene by hydrogenating the latter over a Group VIII metal catalyst (Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt) or rhenium in the presence of HF. The skilled person,

searching for an alternative synthesis of hexafluoropropane, would follow this teaching and would thus arrive at the claimed invention (which requires *inter alia* Fe, Co, Ru, Os or Ir) without using inventive skills.

For this reason, it is concluded that the process of claim 1 is obvious having regard to the prior art and thus not inventive within the meaning of Article 56 EPC, with the consequence that the ground defined in Article 100(a) EPC precludes the maintenance of the patent as granted.

8. The respondent argued that the process of D3 was carried out in the absence of HF, whereas that of D1 required its presence. For that reason alone, the skilled person would not have combined their teaching.

However, claim 1 does not require the absence of HF from the claimed process. Taking into consideration that the problem underlying the claimed invention is the mere provision of an alternative, the skilled person would have considered a process over the catalysts disclosed in D1, either in the presence of HF (page 3, lines 32-33) or in its absence, which is also disclosed therein (page 3, lines 17-18).

This argument is thus not convincing.

9. The respondent also argued that the process of D1, which required HF, was not compatible with the material of the reactor of D3. For this reason too, the skilled person would not have combined the teaching of these documents.

However, even if this would be the case, it is within

the common knowledge of the skilled person to choose a reactor made of a suitable material.

This argument fails to convince the board.

10. The respondent further argued that the process of D1 was carried out over a different olefin and, therefore, the skilled person would not have combined its teaching with that of document D3.

In this respect, the board notes that the examples of the application merely disclose the hydrogenation of hexafluoropropene; the results are applicable to the hydrogenation of tetrafluoropropene (claim 1) having regard to their close chemical similarity.

For the same reason, the skilled person would consider that a process carried out over 1,2,3,3,3-pentafluoropropene can also be carried out with hexafluoropropene, having one fluorine atom more, or with tetrafluoropropene, having one fewer. In addition, examples 1 and 2 of document D3 show the catalytic hydrogenation of hexafluoropropene and 1,2,3,3,3-pentafluoropropene under similar conditions. This argument too is not convincing.

11. Lastly, the respondent argued that document D1, like D3, only contained examples with Pd, which was the preferred catalyst. For that reason, even the combination of D1 and D3 would not lead to the claimed subject-matter.

However, document D1 discloses each metal belonging to Group VIII as a suitable catalyst and thus as an alternative to Pd for the claimed hydrogenation. Thus

the respondent's argument is not convincing.

#### First to third auxiliary requests

12. As the process of claim 1 of these requests requires a Group VIII metal catalyst such as Co and Ru, the conclusion on inventive step applies *mutatis mutandis* to the subject-matter of claim 1 of the first to third auxiliary requests, with the consequence that none of these requests is allowable.

Main request and second auxiliary request in the light of the amended description filed with a letter dated 21 June 2018.

13. The respondent requested that, if the board were minded to consider that the subject-matter of these requests was not inventive, their claims be considered in the light of the amended description filed with the letter dated 21 June 2018.

The amendment consisted in deleting the sentence "for the hydrogenation of 1234yf to 254eb, Pd can also be used as catalyst in addition to the other above referenced metals" from paragraphs [0008] and [0011] of the patent in suit.

As the board has concluded that the claimed subject-matter was not inventive over the combination of documents D1 and D3, the former not disclosing any mixture of Pd with a further metal, the arguments given above still apply, despite the amendment of the description.

#### Admission of the fourth auxiliary request



14. According to Article 12(2) RPBA, the statement of grounds of appeal must contain an appellant's complete case. If, at a later stage, the appellant wants other requests to be considered, admission of these requests into the proceedings is a matter of discretion for the board of appeal (Article 13(1) RPBA).
15. The fourth auxiliary request was filed at the oral proceedings before the board and the appellant objected to its admission into the proceedings.
16. The board fails to see how the filing of this request could be a reaction to any new procedural situation, regardless of its preliminary, non-binding opinion, as the arguments on inventive step over the disclosure of documents D1 and D3 were already part of the decision under appeal.

In addition, by extending the list of possible catalysts, this request again raised the question of sufficiency of disclosure of the claimed invention, which had been already rendered moot by the third auxiliary request.

In these circumstances, the board exercised its discretion under Article 13(1) RPBA and did not admit this auxiliary request into the proceedings.

#### Fifth auxiliary request

17. Amendments
- 17.1 Claim 1 of the fifth auxiliary request finds a basis in claim 1 as originally filed, restricting the process to the preparation of 1,1,1,2,3,3-hexafluoropropane or 1,1,1,2-tetrafluoropropane and the metal catalyst to

Cu.

Dependent claims 2 and 4-7 respectively find a basis in claims 4 and 7-9 as originally filed.

Lastly, claim 3 of the fifth auxiliary request finds a basis on page 4, line 27, of the application as originally filed.

The requirements of Article 123(2) EPC are thus fulfilled.

17.2 The appellant argued that the claimed subject-matter did not find the required basis in the application as originally filed for the following reasons:

17.2.1 The application as originally filed did not disclose a process for producing hexafluoro- or tetrafluoro-propane, as required by claim 1, but for producing both compounds simultaneously, as was apparent from page 1, lines 12-13, and page 3, lines 7-9 thereof, which disclosed that the claimed invention related to the manufacture of hexafluoro- *and* tetrafluoropropane.

However, these passages merely disclose the claimed process as suitable for preparing both compounds, not their simultaneous production. This interpretation is consistent with the teaching of the examples, which disclose the preparation of hexafluoropropane alone, and with claim 2 as filed, directed to the preparation of that compound.

Thus this argument of the appellant is not convincing.

17.2.2 The appellant further argued that the subject-matter of claim 1 could not find a basis in claim 1 as originally

filed, as its subject-matter resulted from the omission of some members of two lists, namely that of the starting materials/products and that of the catalysts. The appellant relied in this respect on decision T 783/09.

T 837/09 merely confirmed the usual practice of the EPO with regard to selections from two lists, namely that deleting some members from a list does not generally result in added subject-matter. This argument too is not convincing.

- 17.2.3 The appellant lastly argued that the features of the dependent claims had not been disclosed in combination in the application as originally filed due to the now-claimed multiple dependencies, not originally present.

The appellant referred to the combination of claims 6, requiring a vapour phase, and claim 7, requiring a liquid phase, with dependent claim 2, which requires a calcination step.

Claim 2 finds a basis in claim 4 as originally filed; claims 6 and 7 in claims 8 and 9, respectively. Despite the lack of cross-reference between the claims directed to the reaction phase and those requiring a calcination, the skilled person would have considered that subject-matter as combined having regard to the whole teaching of the application.

This argument is not convincing, either.

- 17.3 It was not contested that the amendments did not extend the protection conferred by the patent as granted, nor had the board any objection in this respect. The

requirements of Article 123(3) EPC are also fulfilled.

18. Sufficiency of disclosure

The appellant argued that the claimed subject-matter lacked sufficient disclosure. In this respect, it relied on two lines of argument, as follows:

18.1 The appellant argued that the results in Table 1 of the patent in suit showed that, over Cu/C, conversion was already too low (0.2%) at 200 °C. Paragraph [0024], line 18, also disclosed that 10% Cu/C was not active below that temperature. As the process of claim 1 was not limited with respect to the temperature, the skilled person could not carry out the invention in respect of a part of the claimed subject-matter.

However, the passage quoted actually proves that the claimed invention is sufficiently disclosed, as it provides the means for obtaining working embodiments within the ambit of claim 1 with respect to the process temperature. The skilled person, reading the claim, would not have reasonably expected that the process could be carried out at any temperature. For this reason alone, the appellant's argument is not convincing.

18.2 The appellant further argued that the amount of Cu used in the examples was too high for Cu to be considered a "catalyst". The patent in suit did not contain any information on how to carry out the claimed process over catalytic amounts of Cu, which were required by claim 1.

However, the board considers that the feature "catalyst" in claim 1 does not limit the amount but

relates to the role of a chemical which is neither consumed nor produced during the reaction, and serves to reduce the activation barrier and thus to facilitate the process.

Whether or not the amount of catalyst is sub-stoichiometric or low enough to be a "catalytic" amount is thus irrelevant for the issue of sufficiency of disclosure, as this is not required by claim 1.

#### Inventive step

19. Claim 1 of the fifth auxiliary request is directed to a catalytic process for producing hexafluoro- or tetrafluoropropane comprising contacting hydrogen with hexafluoropropene or 2,3,3,3-tetrafluoropropene, wherein the hydrogenation catalyst is Cu.

At the oral proceedings, it was common ground that claim 1 excluded from its subject-matter processes carried out over mixtures of Cu and a second hydrogenation metal catalyst.

20. Closest prior art

The opposition division and the parties considered that document D3 was the closest prior art; the board sees no reason to differ.

It has not been disputed that document D3 discloses a process for producing hexafluoropropane by hydrogenating hexafluoropropene which differs from that of claim 1 only by virtue of the hydrogenation catalyst, which is Pd/C in D3 instead of Cu as required by claim 1.

21. Technical problem underlying the invention

The technical problem underlying the claimed invention is how to provide an alternative process for producing hexafluoro- and tetrafluoropropane. This has not been disputed.

22. Solution

The solution to this technical problem is the claimed process, characterised in that the hydrogenation catalyst is Cu.

23. Success

The results provided in Table 1 of the patent in suit prove that hexafluoropropane is produced by hydrogenation of hexafluoropropene over Cu/C. Due to its similar structure and reactivity, there is no apparent reason why 2,3,3,3-tetrafluoropropene would not be hydrogenated under these conditions. The problem as defined above has thus been credibly solved by the features of claim 1.

24. It remains to be decided whether or not the proposed solution to the objective problem defined above is obvious from the prior art.

The appellant argued that document D2 hinted at the claimed solution. D2 disclosed the hydrogenation of 1,2,3,3,3-pentafluoropropene over a catalyst comprising a combination of Pd/C and Cu (embodiment 15; see also Table 6). On page 5, lines 19-20, D2 disclosed that an alloy catalyst was generally considered to show the characteristics of each constituent element according to its composition. From this passage, the appellant

concluded that document D2 disclosed Cu as a suitable catalyst for the claimed hydrogenation.

The board, however, considers that even if the skilled person had combined the teaching of documents D2 and D3, it would not have arrived at the present invention, as document D2 also requires the presence of Pd, which is excluded from claim 1.

The appellant argued that the passage in D2 on page 5, lines 19-20, cited above taught that not only Pd but also any second metal in the catalyst, such as Cu, had a catalytic activity *per se*.

However, this is not the only reading of that sentence in D2, which merely refers to "characteristics" in general. This sentence could also refer, for example, to physical properties of the catalyst, which are crucial for an industrial process, and not necessarily to the catalytic ability, and thus fails to disclose Cu as hydrogenation catalyst, contrary to the appellant's argument.

For these reasons, the board concludes that the subject-matter of claim 1 of the fifth auxiliary request is inventive within the meaning of Article 56 EPC.

25. Remittal

The description of the patent as granted contains subject-matter not within the scope of the claims of the fifth auxiliary request (see for example paragraph [0008]) and thus requires amendment (Article 84 EPC). The board decided to exercise its discretion and remit

the case to the opposition division for the description to be adapted (Article 111(1) EPC).

## 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 with the order to maintain the patent on the basis of claims 1 to 7 of the fourth auxiliary request filed with the response to the grounds of appeal dated 4 November 2016, now the fifth auxiliary request, and a description yet to be adapted.

The Registrar:

The Chairman:



C. Rodríguez Rodríguez

P. Gryczka

Decision electronically authenticated