

Internal distribution code:

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

**Datasheet for the decision
of 3 May 2022**

Case Number: T 1742/18 - 3.3.10

Application Number: 12732259.2

Publication Number: 2661419

IPC: C07C17/20, C07C19/10,
C07C21/18, C07B39/00, C07C17/25

Language of the proceedings: EN

Title of invention:

HIGH PURITY E-1-CHLORO-3,3,3-TRIFLUOROPROPENE AND METHODS OF
MAKING THE SAME

Patent Proprietor:

Honeywell International Inc.

Opponents:

ARKEMA France
Mexichem Fluor S.A. de C.V.
Goldbach, Klara

Headword:

Relevant legal provisions:

EPC Art. 100(b), 100(a), 54(2), 54(3), 56

Keyword:

Grounds for opposition - lack of patentability (no) -
insufficiency of disclosure (no)

Decisions cited:

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 1742/18 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 3 May 2022

Appellant: 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)

Appellant: Goldbach, Klara
(Opponent 3) Leopoldstrasse 4
80802 München (DE)

Representative: Grünecker Patent- und Rechtsanwälte
PartG mbB
Leopoldstraße 4
80802 München (DE)

Party as of right: ARKEMA France
(Opponent 1) 420 Rue d'Estienne d'Orves
92700 Colombes (FR)

Representative: Bandpay & Greuter
30, rue Notre-Dame des Victoires
75002 Paris (FR)

Party as of right: Mexichem Fluor S.A. de C.V.
(Opponent 2) Eje 106 (sin número)
Zona Industrial
C.P. 78395
San Luis Potosi, S.L.P. (MX)

Representative: Potter Clarkson
The Belgrave Centre

Talbot Street
Nottingham NG1 5GG (GB)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
24 April 2018 concerning maintenance of the
European Patent No. 2661419 in amended form.**

Composition of the Board:

Chair P. Gryczka
Members: R. Pérez Carlón
 T. Bokor

Summary of Facts and Submissions

- I. The patent proprietor and opponent 3 appealed against the decision of the opposition division to maintain European patent No. 2 661 419 in the form of the first auxiliary request then pending.
- II. Three notices of opposition had been filed on the grounds set out in Articles 100(a) and (b) EPC. Opponent 1 withdrew its opposition. Opponent 2 did not make substantive submissions in the appeal proceedings.
- III. The prior art documents filed include the following:

D6 EP 2 103 587 A2
D12 WO 2011/103035 A2
D14 J. M. Douglas, *Conceptual Design of Chemical Processes*, 1988, pages 406 and 407
D15 WO 2008/045910 A1
D17 US 5,710,352
D20 EP 0 939 071 A1
D26 US 2003/0018225 A1
D29 Safety Data Sheet 1300709 for
2-chloro-3,3,3-trifluoropropene

The experimental evidence filed includes the following:

D19 Evidence 1 (E1) filed by opponent 2 with its notice of opposition
D30 Reproductive Experiment of EP939071 filed by opponent 3 as Annex 2 before the opposition division
D31 Annex 1 to the appellant-opponent 3's grounds of appeal

IV. With its statement setting out the grounds of appeal, the appellant-patent proprietor filed its main request, corresponding to the claims of the patent as granted. It also filed nine auxiliary requests, corresponding to those filed before the opposition division. The first auxiliary request corresponds to the request found allowable by the opposition division.

V. Claim 1 of the main request reads as follows:

"A method for producing E-1-chloro-3,3,3-trifluoropropene from 1,1,1,3,3-pentachloropropene and/or 1,1,3,3-tetrachloropropene and/or 1,1,1,3-tetrachloropropene mixture comprising the steps of:

(a) feeding at least one reactor feed stream containing 1,1,1,3,3-pentachloropropene and/or 1,1,3,3-tetrachloropropene and/or 1,1,1,3-tetrachloropropene mixture to a [sic] least one fluorination reactor and

(b) ensuring that said at least one feed stream contains not more than 0.2% by weight of 1,1,1,2,3-pentachloropropene and/or 1,1,2,3-tetrachloropropene, and/or 2,3,3,3-tetrachloropropene mixture."

Claim 1 of the first auxiliary request contains all the features of claim 1 of the main request, adding that the fluorination is carried out in the vapour phase using anhydrous HF.

VI. The opposition division concluded that claim 1 of the patent as granted was not novel over example 3 of document D12. It also concluded that the subject-matter of the first auxiliary request found a basis in the application as originally filed, and was sufficiently

disclosed, novel and inventive starting from D17, which was the closest prior art.

VII. The arguments of the appellant-opponent 3 relevant to the present decision were as follows:

Neither the patent nor the prior art disclosed how to obtain a feed having less than 0.2% of the compounds listed in part (b) of claim 1. D31 proved that the compounds could not be separated by simple distillation. The claimed invention thus could not be carried out by a person skilled in the art as the starting material of the claimed method could not be obtained.

The claimed method was not novel over example 1 of document D20 and examples 1, 3 and 10 of document D12.

Document D17 was the closest prior art. The claimed method differed from that of D17 in requiring the feed to contain less than 0.2% of the compounds in part (b) of claim 1. Even if the problem of providing a safer process were considered solved, the claimed solution was not inventive as it was known that toxic 1233xf was obtained from 240db under fluorination conditions. To avoid obtaining it by minimising its precursors in the feed would have been obvious to a skilled person.

VIII. The arguments of the appellant-proprietor were as follows:

A skilled person would have had no difficulty in obtaining the feed required by the claimed method, which was thus sufficiently disclosed.

The claimed method was novel over those disclosed in

D12 and D20 as these did not inevitably involve a starting feed as required by claim 1.

Document D17 was the closest prior art. It did not disclose the relative amount of the compounds listed in part (b) of claim 1. The problem underlying the claimed invention was to provide a safer process. The claimed solution, characterised by using a feed having no more than 0.2% by weight of 1,1,1,2,3-pentachloropropane and/or 1,1,2,3-tetrachloropropene and/or 2,3,3,3-tetrachloropropene mixture, would not have been obvious to a skilled person as the toxicity of 1233xf was not known from the prior art. The claimed method was thus inventive.

IX. With a communication in preparation for the oral proceedings, the board informed the parties that it saw no reason to remit the case to the opposition division if inventive step of the main request needed to be discussed.

X. Oral proceedings before the board of appeal took place on 3 May 2022.

XI. The final requests of the parties were as follows:

The appellant-opponent 3 requested that the decision under appeal be set aside and the patent be revoked.

The appellant-patent proprietor requested that the decision under appeal be set aside and the patent be maintained as granted (main request). Auxiliarily, it requested the dismissal of the appeal of opponent 3, i.e. to maintain the patent in an amended form as upheld by the opposition division (auxiliary request 1), or further auxiliarily to maintain the patent in an

amended form on the basis of one of the auxiliary requests 2 to 9 filed with the grounds of appeal dated 4 September 2018. It further requested remittal to the opposition division for examination of inventive step of the main request.

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

Reasons for the Decision

1. The appeal is admissible.
2. *Sufficiency of disclosure*
 - 2.1 Claim 1 relates to a process for producing *E*-1-chloro-3,3,3-trifluoropropene (1233zd(E)) from 1,1,1,3,3-pentachloropropene and/or 1,1,3,3-tetrachloropropene (1230za) and/or 1,1,1,3-tetrachloropropene (1230zd) mixture.
 - 2.2 The appellant-opponent 3 argued that neither the patent nor the state of the art disclosed how to provide a feed complying with feature (b) of claim 1, which requires the level of defined impurities to be below a set threshold. For that reason, the claimed invention could not be carried out by a skilled person.
 - 2.3 In its communication dated 16 April 2020, the board informed the parties that it was inclined to conclude that the claimed invention could be carried out, solely for the reason that experimental evidence D19, supplied by the former opponent 1, disclosed the fluorination of 240fa containing less than 0.2% of the compounds in part (b) of claim 1.

- 2.4 In reply to the board's communication, the appellant-opponent 3 argued that experimental evidence D19 could not be relevant in this regard as it was not prior art.

Even if D19 were not relevant, document D36, which was prior art, disclosed a feed containing a level of impurities below the threshold set by claim 1 (paragraph [36], see HCC-240db level in "purified pentachloropropane"). The starting material required by claim 1 was thus obtainable before the filing date of the patent application.

- 2.5 With reference to D31, the appellant-opponent 3 argued that the required level of the compounds in part (b) of claim 1 could not be achieved by distillation.

However, the relative amount of these compounds is low in some of the fractions (see in particular Fraction 1), despite still being above the threshold set by claim 1. Like the opposition division, the board considers that a second distillation, or a distillation in a column with more theoretical plates, would allow a material as required by claim 1 to be obtained. This argument is not convincing either.

- 2.6 The appellant-opponent 3 further argued that claim 1 embraced embodiments in which the amount of one of the compounds in part (b) of claim 1 was below the set threshold and the amount of the other two was not limited. It further argued that this embodiment could not lead to a high yield of 1233zd(E) being obtained.

The board does not agree with the appellant-opponent 3's interpretation of claim 1 in this respect (see point 5.5.2 below). Regardless, claim 1 does not require any specific yield of 1233zd(E). The appellant-

opponent 3's argument is thus not convincing.

2.7 The claimed invention is thus sufficiently disclosed for it to be carried out by a skilled person. The ground for opposition set by Article 100(b) EPC does not preclude the maintenance of the patent as granted.

3. *Novelty*

3.1 Claim 1 of the patent relates to a method for producing *E*-1-chloro-3,3,3-trifluoropropene.

Part (a) of claim 1 requires feeding to at least one fluorination reactor at least one reactor feed stream containing

- 1,1,1,3,3-pentachloropropane and/or
- 1,1,3,3-tetrachloropropene and/or
- 1,1,1,3-tetrachloropropene mixture.

Part (b) of claim 1 further requires ensuring that said at least one feed stream contains not more than 0.2% by weight of

- 1,1,1,2,3-pentachloropropane and/or
- 1,1,2,3-tetrachloropropene and/or
- 2,3,3,3-tetrachloropropene mixture.

3.2 Claim 1 thus relates to a method for preparing 1233zd(E) from 240fa, 1230za, 1230zd or their mixtures (part (a) of claim 1).

The process further requires the feed stream(s) required by part (a) of claim 1 to contain less than 0.2% of 1230xa, 1230xf and 240db (part (b) of claim 1).

3.3 The following technical background was undisputed by the parties.

The starting material of the process, 240fa, is obtained by adding a halogenated compound, such as CCl_4 , to an olefinic compound such as vinyl chloride (see for example D15, lines 18-20). The reaction produces a mixture of 240fa (1,1,1,3,3-pentachloropropane) and its regioisomer 240db (1,1,1,2,3-pentachloropropane). 240fa feeds thus contain variable amounts of 240db.

As shown by paragraph [0037] of D26, crude pentachloropropane feeds may contain 0.37% of 240db. The relative amount of 240db can thus be higher than the limit set by claim 1.

Of the compounds listed in part (a) of claim 1, the two unsaturated ones, 1230za and 1230zd, result from the dehydrochlorination of 240fa. All produce 1233zd(E) under fluorination conditions.

Analogously, the two unsaturated compounds in part (b) of claim 1, 1230xa and 1230xf, are dehydrochlorination products of 240db. All produce 2-chloro-3,3,3-trifluoropropene (1233xf) under fluorination conditions.

If the fluorination of a 240fa feed produces 1233xf, it can be concluded that the feed contains non-negligible amounts of the compounds in part (b) of claim 1.

The relationship between the amount of 1233xf in the final product and the amount of the compounds in part (b) of claim 1 in the starting material is close to linear (Annex 2, filed by the appellant-opponent 3).

The prior art does not explicitly disclose a process according to claim 1 since the level of impurities in the starting feed is not indicated.

3.4 The appellant-opponent 3 argued that the claimed process was implicitly disclosed by examples 1, 3 and 10 of document D12 and by example 1 of document D20.

3.5 *Document D20*

3.5.1 Example 1 of D20 discloses the hydrofluorination of 1,1,1,3,3-pentachloropropane (240fa) in paragraphs [0058] and [0059]. The reaction product, analysed by gas chromatography (GC), contained 97.9% of 1-chloro-3,3,3-trifluoropropene (1233zd): the *trans* to *cis* ratio was 9/1. The reaction product further contained 1.2% 1,3,3,3-tetrafluoropropene and 0.9% 1,1,1,3,3-pentafluoropropane. 1233xf (2-chloro-3,3,3-trifluoropropene) is not mentioned.

3.5.2 The appellant-opponent 3 argues that, in the absence of 1233xf from the final product, the relative amount of the compounds listed in part (b) of claim 1 in the starting material must necessarily have been less than the claimed threshold. It relied in this respect on the experimental evidence filed as Annex 2.

3.5.3 D20 does not refer to 1233xf. This may indicate, as the appellant-opponent 3 argues, that it has not been obtained. However, it could also mean that it has not been quantified, as argued by the appellant-patent proprietor.

Annex 2 shows that the hydrofluorination of 240fa leads to the formation of a non-negligible amount of

undefined compounds, generally grouped as "others" (see second table on page 4/4). These undefined compounds were obtained in the processes of Annex 2 regardless of the relative amount of 240db, 1230xa and 1230xf in the starting feed. D20 does not disclose having obtained any of these undefined products. For this reason, the interpretation of the appellant-patent proprietor that no side product has been quantified is also plausible. It cannot be concluded that 240db, 1230xa and 1230xf must inevitably have been absent from the feed of D20.

3.5.4 The board thus concludes that D20 does not inevitably disclose the features of claim 1.

3.6 *Document D12*

3.6.1 It was undisputed that document D12 was prior art as defined in Article 54(3) EPC.

Example 1

3.6.2 Example 1 of document D12 resembles example 3 of the patent. There are, however, some differences:

- Example 3 of the patent requires 240fa to be added to the catalyst immediately after fluorination of the latter.
- Example 1 of document D12 does not disclose the amount of 240db present in the feed. Example 3 of the patent uses a feed containing 0.14% 240db.
- Example 3 of the patent does not disclose the reaction temperature or pressure.

The mixtures of compounds obtained in example 3 of the patent and example 1 of D12 are disclosed as being identical when analysed by gas chromatography.

However, the amount of 1233xf in the final product is disclosed neither in example 1 of D12 nor in example 3 of the patent.

3.6.3 According to the parties, the presence of 240db in the starting material of Example 3 of the patent must have led to the formation of some 1233xf, but none is reported, and nor is any reported in the product of example 1 of D12. In the absence of this information, no conclusion as to the content of the compounds listed in part (b) of claim 1 in the starting material of example 1 of D12 can be drawn.

3.6.4 Therefore, example 1 of D12 does not inevitably disclose the feature of claim 1 requiring the amount of impurities in part (b) to be below the threshold set.

Example 3

3.6.5 The opposition division concluded that example 3 of document D12, whose starting material is a mixture consisting of 70% 240fa, 27% 1230za and 3% 1230zd, was an embodiment of claim 1. The wording "consisting of" was to be understood to exclude any other component from the starting material, including those defined in part (b) of claim 1.

3.6.6 It was undisputed that 240db was inevitably present in 240fa feeds. The content of 240db can be reduced, but no purification method can remove every molecule. The wording "consisting of" in combination with the starting material of the process of example 3 cannot thus be read as implying that no 240db is present.

3.6.7 It thus needs to be determined what purity would be understood by the skilled reader by the wording

"consisting of". The issue is whether it would inevitably require the concentration of the compounds in part (b) of claim 1 to be below the threshold set.

Document D26 discloses that 240fa can contain a relative amount of 240db which may be above or below the threshold set by claim 1 (table on paragraph [0037]). Even the most impure feed, containing almost 4000 ppm of 240db and more than 99% of 240fa, "consists" of the latter for most technical purposes. It thus cannot be concluded that the feed of example 3 of D12 inevitably contained no more than 0.2% (2000 ppm) of the compounds in part (b) of claim 1.

Example 3 thus does not disclose a process in accordance with claim 1.

Example 10

- 3.6.8 The appellant-opponent 3 argued that example 10 of D12 was equivalent to example 1 of the patent.

However, the mixture of products obtained by example 10 of D12 differs from that of example 1 of the patent. 1233zd(E) represents 83.0% in the former and 81.4% in the latter. As for 245fa, example 10 discloses 2.06%, and example 1 of the patent, 2.83%. The amount of 3,3,3-trifluoropropyne also differs (0.05% vs. 0.08%).

The relative amounts of the products disclosed in example 10 of D12 do not add up to 100%: little more than 1% is unidentified, and no conclusion as to whether the unidentified content included any 1233xf can be drawn.

Lacking information on how much 1233xf was obtained, it

cannot be concluded that the starting material used in example 10 of D12 must necessarily have contained the relative amount of compounds listed in (b) of claim 1 below the threshold set.

- 3.6.9 The appellant-opponent 3 argued that the yield of 1233zf(E) in example 10 of D12 was better than in example 3 of the patent. A higher yield could only have been obtained at the expense of side reactions leading to undesirable products. These reactions would necessarily have to involve the formation of 1233xf. For this reason, the amount of those compounds listed in part (b) of claim 1 should have been even lower than in example 1 of the patent. Thus example 10 of D12 implicitly disclosed all the features of claim 1.

However, the higher yield of 1233zf(E) in example 10 of D12 could also have been the result of a number of other reasons, such as a catalyst from a different batch, or more efficient control of hot spots. There is no reason why the better yield would inevitably be linked to a starting material according to claim 1. This argument is thus not convincing.

- 3.7 The process of claim 1 is thus novel (Article 54 EPC).

4. *Request for remittal*

- 4.1 The appellant-patent proprietor requested that the case be remitted to the opposition division if the issue of inventive step of the main request needed to be discussed.

- 4.2 The board informed the parties in its communication dated 16 April 2020 that it saw no reason to remit the case for examination of inventive step of the main

request as the conclusion of the division in that respect was already part of the appealed decision.

The analysis of inventive step of claim 1 of the patent as granted does not differ from that of the first auxiliary request when starting, as the opposition division did, from D17 as closest prior art. Claim 1 of the first auxiliary request does not add any distinguishing feature with respect to D17 over those of claim 1 of the patent as granted. The opposition division's reasoning and conclusion on inventive step is thus known to the board and the parties.

4.3 At the oral proceedings before the board, the opponent-patent proprietor did not argue against the board's view in that respect.

4.4 The board thus decided not to remit the case for examination of inventive step.

5. *Inventive step*

5.1 Claim 1 of the patent relates to a method for producing *E*-1-chloro-3,3,3-trifluoropropene (1233zd(E)).

Part (a) of claim 1 requires feeding to at least one fluorination reactor at least one reactor feed stream containing

- 1,1,1,3,3-pentachloropropene (240fa) and/or
- 1,1,3,3-tetrachloropropene (1230za) and/or
- 1,1,1,3-tetrachloropropene (1230zd, in fact 1,3,3,3-tetrachloropropene) mixture.

Part (b) of claim 1 further requires ensuring that said at least one feed stream contains not more than 0.2% by

weight of

- 1,1,1,2,3-pentachloropropane (240db) and/or
- 1,1,2,3-tetrachloropropene (1230xa) and/or
- 2,3,3,3-tetrachloropropene (1230xf) mixture.

5.2 *Closest prior art*

The opposition division and the parties considered document D17 to be the closest prior art. The board sees no reason to differ.

Like the patent, D17 relates to the production of 1233zd(E) from 240fa and its dehydrochlorination products 1230za and 1230zd (column 2, lines 3-13, examples 1-4). It thus discloses part (a) of claim 1.

It is undisputed that document D17 does not disclose a starting material which contains less than 0.2% by weight of the compounds listed in part (b) of claim 1.

5.3 *Technical problem underlying the invention*

The appellant-patent proprietor argued that the technical problem underlying the claimed invention was to provide a safer method for producing 1233zd(E) from 240fa.

5.4 *Solution*

The proposed solution to this technical problem is the claimed method, characterised in that the feed contains not more than 0.2% by weight of 240db and/or 1230xf and/or 1230xa.

5.5 *Success*

- 5.5.1 The parties were divided as to the meaning of the distinguishing feature and thus as to whether it could credibly solve the problem as defined by the appellant-patent proprietor.

The appellant-opponent 3 argued that this feature allowed for one of the compounds in part (b) of claim 1 to be present in a relative amount of 0.2% and the other two in a non-limited amount.

- 5.5.2 This interpretation is, however, not in line with the technical facts of the process.

It was undisputed that 1230xf and 1230xa are dehydrochlorination products of 240db. Part (b) of claim 1 thus does not list unrelated chemicals but a constellation of chemically linked compounds.

The skilled reader would thus consider that claim 1 excludes feeds containing more than 0.2% of 240db, either present as such or in the form of its dehydrochlorination products.

- 5.5.3 It was undisputed that 240db leads to 1233xf being obtained under fluorination conditions. It was also undisputed that the relative amount of the latter is directly linked to that of the former in the starting material.

It was undisputed that 1233xf is toxic, as shown by the Safety Data Sheet filed by the appellant-opponent 3 with its statement of grounds of appeal.

By reducing the amount of a toxic component, the

process is rendered safer.

The problem as formulated by the appellant-patent proprietor is thus considered credibly solved by the process of claim 1.

- 5.6 It thus remains to be decided whether the proposed solution to the objective problem defined above would have been obvious to the skilled person in view of the prior art.
- 5.6.1 The appellant-opponent 3 argued that 1233xf was known to be toxic. The skilled person, seeking a safer process, would thus seek to avoid its production. A number of documents on file, such as D6, disclosed that 1233xf was obtained from 240db under fluorination conditions. It would thus have been obvious to the skilled person to avoid the presence of 240db in the starting material.
- 5.6.2 The appellant-patent proprietor, however, did not concede that 1233xf was known to be toxic before the filing date of the patent.

The sole evidence on file in this respect is the Safety Data Sheet of that compound filed by the appellant-opponent 3 (D29). The appellant-patent proprietor considered it published on 26 March 2012, therefore after the filing date. The board notes that this date refers to the format required by the Data Sheet, and that its date of issue is 2017. Be that as it may, it is not prior art for the claimed invention.

No other document proves the toxicity of 1233xf to be known before the filing date.

5.6.3 Since the toxicity of 1233xf is considered by the board as not known, the skilled person, seeking a safer method, had no motivation to use a starting material lacking the compounds which could produce it.

5.6.4 The appellant-opponent 3 also relied on document D14 in the context of inventive step. D14 taught using a starting material which was as pure as possible. By doing so, the skilled person would have arrived at the claimed invention without any inventive skill.

However, whether the skilled person would favour a process with very pure starting material or would prefer to carry out a process using a not-so-pure feed depends on the specific chemistry involved and factors such as the ease of separation of the reagents and the products, to mention just some variables. In fact, D14, Table 13.1.2 "design decisions for continuous processes" puts the question to the reader "Should we purify the raw material streams before they are fed to the reactor?" (level 2.1): the answer must not always be affirmative. Thus, not every chemical process would inevitably be carried out using the purest available feed, and D14 teaches that this is a question that must be answered for every process. This argument is thus not convincing.

5.7 The claimed method is thus inventive (Article 56 EPC).

6. *Conclusion*

6.1 None of the grounds for opposition precludes maintenance of the patent as granted.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The patent is maintained as granted.

The Registrar:

The Chair:



C. Rodríguez Rodríguez

P. Gryczka

Decision electronically authenticated