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Datasheet for the decision of 14 December 2023

Case Number: T 2712/19 - 3.3.10

Application Number: 12178198.3

Publication Number: 2546221

IPC: C07C17/25, C07C21/18

Language of the proceedings: EN

Title of invention:
Method for producing fluorinated organic compounds

Patent Proprietor:
Honeywell International Inc.

Opponent:
ARKEMA FRANCE

Headword:

Relevant legal provisions:
EPC Art. 123(2), 76(1), 56

Keyword:
Main request - allowable

Decisions cited:

Catchword:

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Case Number: T 2712/19 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 14 December 2023

Appellant: (Opponent)	ARKEMA FRANCE Département Propriété Industrielle 420, rue d'Estienne d'Orves 92700 Colombes (FR)
Representative:	Arkema Patent Arkema France DRD-DPI 420, rue d'Estienne d'Orves 92705 Colombes Cedex (FR)
Respondent: (Patent Proprietor)	Honeywell International Inc. 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:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 6 August 2019 concerning maintenance of the European Patent No. 2546221 in amended form.**

Composition of the Board:

Chair M. Kollmannsberger
Members: R. Pérez Carlón
F. Blumer

Summary of Facts and Submissions

I. The appellant-opponent lodged an appeal against the interlocutory decision of the opposition division on the maintenance of European patent No. 2 546 221 in the form of the main request then pending.

II. Notice of opposition had been filed on the grounds of added subject-matter (Article 100(c) EPC) and lack of novelty and inventive step (Article 100(a) EPC).

III. The following documents are relevant to the present decision:

D2 Burgin *et al.* Unimolecular Reaction Kinetics of $CF_2ClCF_2CH_3$ and $CF_2ClCF_2CD_3$: Experimental evidence for a Novel 1,2-Rearrangement Pathway, J. Phys. Chem. A **2001**, *105*, 1615-1621

D3 Heard *et al*. 1,2-FCl Rearragement as an Intermediate Step in the Unimolecular 1,3-HCl Elimination from Chlorofluoropropanes, J. Phys. Chem. A **2001**, *105*, 1622-1625

D4 WO 2005/012212 A2

D5 WO 2005/042451 A2

D6 US 2,996,555

D7 Zhu *et al.* Rate Constants and Kinetic Isotope Effects for Unimolecular 1,2-HX or DX (X=F or Cl) Elimination from Chemically Activated $CF_3CFClCH_3$-d_0, -d_1, -d_2, and -d_3 *J. Phys. Chem. A* **2006**, *110*, 1506-1517, filed with the statement of grounds of appeal.

IV. Claim 1 of the main request in appeal, filed by a letter dated 22 July 2021, corresponds to claim 1 of

the main request before the opposition division and reads as follows:

"A method for producing fluorinated organic compounds comprising converting 1,1,1,2-tetrafluoro-2-chloropropane (HCFC-244bb) into 2,3,3,3-tetrafluoro-1-propene (HFO-1234yf);

wherein the reaction is carried out in a gas phase in the presence of a catalyst selected from the group consisting of carbon and/or metal based catalyst, nickel based catalyst, and palladium based catalyst, and wherein the reaction temperature is from 200°C to 800°C."

V. The appellant-opponent does not contest the opposition division's conclusion that the claimed method was sufficiently disclosed for it to be carried out by a skilled person and novel.

The opposition division also concluded that the claims of the main request found the required basis in the application as originally filed and the parent application.

D6 was the closest prior art. The problem underlying the claimed invention was to provide a process for the preparation of 1234yf which avoided the use of HF. The claimed solution was characterised by the choice of starting material and by requiring the product to be formed by dehydrochlorination. The prior art did not hint at that solution, which was thus inventive.

VI. The appellant-opponent's arguments were as follows.

The synthesis of 1234yf from 244bb was disclosed in the application as originally filed and in the earlier application only in the context of a multistep process. As the other steps were not required by claim 1, it contained added subject-matter.

Neither the application as originally filed nor the earlier application disclosed the temperature set by claim 1 in connection with the specific reaction. For this reason too, claim 1 contained added subject-matter.

Document D7 was filed as a direct reply to the board's communication in preparation for oral proceedings on the issue of whether 244bb was detected in D2. It should thus be admitted into the proceedings.

Document D6 was the closest prior art. It disclosed the synthesis of 1234yf from a different starting material, at 400°C over a metal catalyst. The problem underlying the claimed invention was to provide an alternative process for preparing 1234yf. The claimed solution, which was characterised by the choice of starting material, would have been obvious to a skilled person in view of any of D2 to D5 and D7. The claimed process was thus not inventive.

VII. The respondent's arguments were as follows.

The features of claim 1 had a basis on page 4, lines 12 to 16 of the application as originally filed and of the parent application. Page 5, lines 15 to 17, disclosed using 244bb as starting material, regardless of how it was prepared; the process of claim 1 was thus not inextricably linked to a multistep procedure. The reaction temperature and catalysts were disclosed on

page 11, lines 5 to 9 and lines 24 to 27, in the context of the same reaction as in claim 1.

Document D7 could and should have filed earlier and was therefore not admissible.

The respondent-patent proprietor agreed with the other party on the choice of D6 as closest prior art and the distinguishing feature. It saw the claimed process as an improvement but if, nevertheless, the problem underlying the claimed invention were to be considered as merely that of providing an alternative, the claimed solution would not have been obvious to a skilled person and was thus inventive.

VIII. The board informed the parties in a communication dated 8 April 2021 of its preliminary view that claim 1 of the main request would appear to have a basis in the application as originally filed, that D6 would appear to be the closest prior art, and that the claimed subject-matter would appear inventive even as the solution to the problem of providing an alternative.

IX. Oral proceedings before the board of appeal took place on 14 December 2023.

X. The parties' final requests were as follows:

The appellant-opponent requested that the decision under appeal be set aside and that the European patent No. 2 546 221 be revoked.

The respondent-patent proprietor requested that the decision under appeal be set aside and that the patent be maintained with the claims of the main request or

one of auxiliary requests 1 to 3, all requests as filed with a letter dated 22 July 2021.

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

Reasons for the Decision

1. The appeal is admissible.

2. Amendments

2.1 Claim 1 of the main request relates to a method for producing fluorinated organic compounds comprising converting 2-chloro-1,1,1,2-tetrafluoropropane (244bb) into 2,3,3,3-tetrafluoropropene (1234yf). The process is carried out in gas phase over a catalyst and at defined temperature.

2.2 Claim 1 finds a basis in the application as originally filed and in the earlier application on page 4, lines 12-16, page 5, lines 15 to 17 and the reaction conditions for dehydrohalogenation of compounds of formula (IB), which included 244bb, on page 11, lines 5 to 9 and line 24.

2.3 The appellant argued that the passage on page 4, lines 12 to 16, disclosed the reaction step of claim 1 only in the context of a multistep process which also included the preparation of 244bb from 1233xf (2-chloro-3,3,3-trifluoropropene), not required by claim 1.

However, the application as originally filed and the earlier application disclose the step in claim 1 as independent too. Page 5, lines 15 to 17, discloses the

use of 244bb as starting material in a general way.

2.4 The appellant-opponent argued that example 7 of the application as originally filed and of the earlier application could not provide a basis for claim 1. The board agrees with the appellant-opponent in this respect. Example 7, however, merely corroborates that the preparation of 1234yf from 244bb is an object of the claimed invention, as disclosed in the passages mentioned in the preceding points.

2.5 In a different line of argument, the appellant argued in writing that the temperature required by claim 1 was not disclosed in combination with the specific reaction in claim 1. The temperature of that reaction was in fact disclosed on page 10, lines 23-28 of the application as originally filed and did not correspond to that required by claim 1.

However, the temperature on page 10 refers to the reactor temperature before introducing the reagents; it does not necessarily correspond to the reaction temperature, which is disclosed on the following page (page 11, line 24) in the context of the reaction involving compounds of the general formula (IB), preferably of formula (IBB), 244bb being the most preferred one (page 4, lines 28 to 30). Lines 25 to 27 of page 11 further provide a basis for the temperature required by the dependent claims.

2.6 The features of claim 1 thus have the required basis in the application as originally filed and in the earlier application (Articles 123(2) and 76(1) EPC).

3. Inventive step

3.1 Claim 1 relates to the preparation of 1234yf from 244bb over a catalyst in gas phase at elevated temperature.

3.2 Closest prior art

The opposition division and the parties considered that document D6 was the closest prior art. The board sees no reason to disagree.

The example of D6 discloses the preparation of 1234yf with the aid of a catalyst at 400°C. The starting material, 1,1,1-trichloro-2,2-difluoropropane is however different from the one required by claim 1.

3.3 Technical problem underlying the invention

The parties had different views on the formulation of the technical problem effectively solved by the claimed invention.

In the following, whether the subject-matter of claim 1 is inventive is examined under the assumption that the technical problem underlying the claimed invention is merely that of providing an alternative, as defined by the appellant-opponent.

Since the solution to this problem is not obvious, it is not necessary to examine whether a more ambitious problem is solved too.

3.4 Solution

The solution to this technical problem is the claimed process, characterised by using 244bb as starting material.

3.5 Success

It was undisputed that the problem of providing an alternative process for preparing 1234yf has been credibly solved.

3.6 Obviousness

3.6.1 The appellant-opponent argued that documents D2 to D5 and D7 hinted at the claimed solution.

3.6.2 D4 and D5 disclosed a process leading to similar compounds. The appellant-opponent argued that a skilled person would have taken it into consideration and apply the same strategy to the synthesis of 1234yf.

Documents D4 (example 22) and D5 (example 5) disclose the synthesis of a regioisomer of 1234yf, namely of 1234ze (1,3,3,3-tetrafluoropropene) from 244fa (1-chloro-1,3,3,3-tetrafluoropropane) over a supported catalyst (see example 5 of D5).

Even if a skilled person were to have combined the teaching of D4 or D5 with that of D6, they would not have arrived at the claimed invention. D4 and D5 teach dehydrochlorinating a 1-chloro compound, i.e. of a compound which bears a chlorine linked to a primary, terminal carbon atom. If a skilled person were to apply the teaching of D4 and D5 to the disclosure of D6 in order to produce 1234yf, the starting material should thus have been 1-chloro-2,3,3,3-tetrafluoropropane, not 2-chloro-1,1,1,2-tetrafluoropropane as defined in the claim. There is no reason why a skilled person would have taken a starting material having, instead of a chlorine on a primary carbon, a chlorine linked to a different (secondary) carbon atom, as the reaction

mechanism could have been different.

3.6.3 The appellant-opponent also argued that also D2, D3 and D7, which are scientific publications from the same research group, taught the claimed invention.

3.6.4 D2 is a publication which suggests a 1,2-FCl rearrangement in 1-chloro-1,1,2,2-tetrafluoropropane. The rearrangement should lead to the formation of 244bb, which is further dehydrochlorinated. The appellant-opponent argued that a skilled person would have found in D2 a hint towards 244bb as starting material for the preparation of 1234yf.

D2 postulates 244bb as a reaction intermediate, but 1234yf is in fact produced from MeI and 1-chloro-1,1,2,2-tetrafluoro-2-iodoethane, which were photolysed in the presence of HgI with a conversion of about 10% (see experimental section on page 1616, first paragraph). If a skilled person were to have resorted to D2, they would have carried out the process using the same starting materials as D2, not a compound postulated as an intermediate and which was neither detected nor isolated.

3.6.5 Document D3 discloses in silico results relative to the unprecedented 1,2-FCl rearrangement of D2. The conclusion on inventive step thus does not differ.

3.6.6 Document D7 was filed in appeal and its admission into the proceedings, governed by Article 13(1) RPBA, was contested by the respondent-patent proprietor.

Like D2, document D7 discloses the obtention of 1234yf by photolysis, in this case of MeI and CF_3-CFClI. This mixture would thus have been the starting material of

choice if a skilled person were to have consulted D7 seeking an alternative to the process of the closest prior art D6.

Thus, regardless of its admission into the proceedings, D7 would not have taught a skilled person the claimed solution.

3.6.7 The claimed process is thus inventive (Article 56 EPC).

4. At the oral proceedings before the opposition division, the description to the patent was adapted to the claims of the main request then pending, whose sole independent claim corresponds to claim 1 of the main request in appeal. The appellant had no objection in appeal against the adapted description. No further amendment is thus required.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained in amended form as follows:
   - claims 1 to 4, filed as main request on 22 July 2021;
   - description as amended during the opposition proceedings.

The Registrar: The Chair:

C. Rodríguez Rodríguez M. Kollmannsberger

Decision electronically authenticated