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**Datasheet for the decision
of 7 June 2021**

Case Number: T 1263/18 - 3.3.06

Application Number: 07853043.3

Publication Number: 2091897

IPC: B01J37/26, B01J23/26,
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C07C17/25, C07C17/35,
C07C19/08, C07C21/18

Language of the proceedings: EN

Title of invention:

PROCESSES FOR THE PRODUCTION OF FLUOROPROPANES AND
HALOPROPENES AND AZEOTROPIC COMPOSITIONS OF 2-CHLORO-3,3,3-
TRIFLUORO-1-PROPENE WITH HF AND OF 1,1,1,2,2-
PENTAFLUOROPROPANE WITH HF

Patent Proprietor:

The Chemours Company FC, LLC

Opponents:

ARKEMA France
Mexichem Fluor S.A. de C.V.
Daikin Industries, Ltd.

Headword:

Chemours/HCFC

Relevant legal provisions:

RPBA Art. 12(4)

EPC Art. 123(2), 83, 56

Keyword:

Late-filed request - admitted (yes)

Amendments - allowable (yes)

Sufficiency of disclosure - reproducibility (yes)

Inventive step - (yes)

Decisions cited:

G 0001/03

Catchword:



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Case Number: T 1263/18 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 7 June 2021

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
26 March 2018 concerning maintenance of the
European Patent No. 2091897 in amended form.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: S. Arrojo
C. Heath

Summary of Facts and Submissions

- I. These appeals were filed by the patentee and opponent 1 against the interlocutory decision of the opposition division to maintain European patent No. 2 091 897 on the basis of auxiliary request 3 filed during oral proceedings on 31 January 2018.
- II. Opponents 2 and 3 are parties as of right under Article 107 EPC, 2nd sentence.
- III. With its statement of grounds of appeal dated 3 August 2018 the patentee filed a main request or auxiliary requests 1-26 along with five new documents (D63a, D64b, D69, D70 and D71) and requested to set aside the decision and to maintain the patent on the basis of one of these requests.
- IV. In their replies, the opponents requested not to admit these late filed documents and requests.
- V. In its statement of grounds of appeal, opponent 1 requested to revoke the patent in its entirety for non-compliance with the requirements of Articles 83, 54 and 56 EPC.
- VI. With its reply dated 12 December 2018, the patentee submitted additional auxiliary requests 27 and 28 and a new document D72.
- VII. In its preliminary opinion, the board informed the parties that the main and 1st to 20th auxiliary requests did not appear to meet the requirements of Article 83 EPC, that the claims of the main request and auxiliary requests 1-24 and 26 were not novel in view

of document D43 (WO 2007/053736 A2), that auxiliary request 25 was not admissible and that the claims of auxiliary request 27 (which corresponded to the version upheld by the opposition division) appeared to meet the requirements of the EPC.

- VIII. With a letter dated 5 May 2021, the patentee withdrew the main request and auxiliary requests 1-11, 13-15, 17, 19-20, 22-23 and 26, and renumbered auxiliary requests 12, 16, 18, 21, 24, 25, 27 and 28 respectively to its main request and auxiliary requests 1-7.
- IX. With two letters dated 7 and 28 May 2021, opponent 2 requested not to admit these requests and it filed new objections under Articles 83, 84 and 123(2) EPC.
- X. At the oral proceedings, before a decision was announced, the patentee withdrew its appeal (and implicitly therewith the main and 1st to 5th auxiliary requests, all of which were broader than auxiliary request 6, corresponding to the claims as upheld by the opposition division). The patentee thus became respondent and opponent 1 (from now on "the appellant") remained as the sole appellant in the proceedings. Before the debate was closed, the parties' requests were the following:
- The appellant requested to revoke the patent in its entirety
- The respondent requested to dismiss the appeal and to maintain the patent on the basis of auxiliary request 6 filed as 27th auxiliary request on 12 December 2018.
- XI. Independent claims 1 and 7 of auxiliary request 6 read as follows:

"1. A process for making at least one product compound selected from the group consisting of CF_3CF_2CH , $CF_3CF=CH_2$ and $CF_3CCl=CH_2$, comprising:

reacting at least one starting material of the formula $CF_3CHClCH_2Cl$ (HCFC-243db), with HF in a reaction zone, in the vapor phase, in the presence of a fluorination catalyst, the fluorination catalyst comprising at least one chromium-containing component selected from the group consisting of crystalline alpha-chromium oxide where from 0.05 atom % to 6 atom % of the chromium atoms in the alpha-chromium oxide lattice are replaced by trivalent cobalt atoms, and crystalline alpha-chromium oxide where from 0.05 atom % to 6 atom % of the chromium atoms in the alpha-chromium oxide lattice are replaced by trivalent cobalt atoms which has been treated with a fluorinating agent, to produce a product mixture comprising HF, HCl, $CF_3CF_2CH_3$, $CF_3CF=CH_2$ and $CF_3CCl=CH_2$, wherein the molar ratio of HF to total amount of starting material fed to the reaction zone is at least stoichiometric; and recovering said at least one product compound from the product mixture."

"7. A process for making at least one product compound selected from the group consisting of $CF_3CH_2CHF_2$, $CF_3CH=CHF$ and $CF_3CH=CHCl$, comprising:

reacting at least one starting material of the formula $CF_3CHClCH_2Cl$ (HCFC-243db), with HF in a reaction zone, in the vapor phase, in the presence of a fluorination catalyst, the fluorination catalyst comprising at least one chromium-containing component selected from the group consisting of crystalline alpha-chromium oxide where from 0.05 atom % to 6 atom % of the chromium atoms in the alpha-chromium oxide lattice are replaced by trivalent cobalt atoms, and crystalline alpha-chromium oxide where from 0.05 atom %

to 6 atom % of the chromium atoms in the alpha-chromium oxide lattice are replaced by trivalent cobalt atoms which has been treated with a fluorinating agent, to produce a product mixture comprising HF, HCl, CF₃CH₂CHF₂, CF₃CH=CHF and CF₃CH=CHCl, wherein the molar ratio of HF to total amount of starting material fed to the reaction zone is at least stoichiometric; and recovering said at least one product compound from the product mixture."

Reasons for the Decision

1. Auxiliary request 6 - Admittance

1.1 The appellant argued that this request should not be admitted under Article 12(4) RPBA 2007, because while corresponding to the request upheld by the opposition division, it had been filed together with higher ranking requests which were divergent.

1.2 The board cannot follow this argumentation, because the discretion to hold a request inadmissible under Article 12(4) RPBA 2007 is limited to requests "which could have been presented or were not admitted in the first instance proceedings". Auxiliary request 6 corresponds to the request upheld by the opposition division, so it is apparent that it was both presented and admitted during first instance proceedings. There is thus no legal basis for the board not to admit it into the appeal proceedings.

2. Auxiliary request 6 - Amendments

The board came to the conclusion that the amendments to the claims of this request do not extend beyond the content of the application as filed and so meet the

requirements of Article 123(2) EPC for the following reasons:

- 2.1 The subject-matter of independent claim 1 at issue is based on a combination of claims 1, 14 and 15 as filed, wherein the starting material has been restricted to HFC-243db based on the passage on page 6, lines 28-30 of the description as filed.
- 2.2 Similarly, the subject-matter of independent claim 7 at issue is based on a combination of claims 16, 27 and 28 as filed, wherein the starting material has been restricted to HCFC-243db based on the passage on page 6, lines 28-30 of the description as filed.
- 2.3 The appellant argued that there was no basis for combining the subject-matter of the above claims as filed with the selection of HCFC-243db as starting material, because there was no indication in the specification that a link existed between this substance in particular and the process claims. The examples in the application as filed could also not be used as basis for the selection of HCFC-243db as starting material, because the catalyst used therein was pre-fluorinated and described in terms of a preparation method, which implied that the process of the examples did not necessarily fall within the scope of claims 1 and 7.
- 2.4 The board disagrees with the appellant, because it is apparent from the examples 1-5 (all of which use HCFC-243db as starting material) of the application as filed that HCFC-243db is the most preferred starting material for the reactions of the invention. There is also no evidence on file to conclude that the catalyst in the examples does not fall within the scope of

claims 1 and 7, in particular considering that both catalysts are chromium/cobalt catalysts, and that the definition of the catalyst in claims 1 and 7 at issue has arguably been drafted as a broader version of the specific catalysts in the examples. The board therefore concludes that the application as filed provides a clear basis for defining HCFC-243db as the sole starting material in the processes of independent claims 1 and 7 at issue.

2.5 The subject-matter of dependent claims 2-6 and 8-11 are respectively based on claims 2 and 3, 4, 7, 10, 13, 17, 18, 19 and 21 as filed. These claims are thus supported by the content of the application as filed.

3. Auxiliary request 6 - Article 83 EPC

The requirement of sufficiency of disclosure is met for the following reasons:

3.1 The appellant referred to experimental report D57, arguing that it demonstrated that the catalyst described in the patent could not be reliably reproduced. In particular, the particles obtained in said report - following the steps indicated in the patent - were significantly smaller than the +12 mesh described in the patent. Consequently, an extra step of heating to 85°C over a period of 16 hours was added in order to promote particle growth. The particles thus obtained were pelletised to the required size. The extra heating step was required before compacting/pelletising because the particles were otherwise so fine that they could not have been used or treated in any useful way to obtain the required particle size. As shown in table 1 of D57, the resulting catalyst did not consistently lead to the desired reaction products,

which implied that the requirements of Article 83 EPC were not complied with even when the invention was restricted to its most detailed and preferred version.

The appellant also argued that even if the process in D57 were regarded as different from that of the examples in the patent, it would still fall within the scope of the claims, which implied that the invention could not be carried out throughout its entire scope.

Finally, it argued that claims 1 and 7 required recovering the substances, which would not be possible when these were in trace amounts.

- 3.2 The board is not convinced with this argumentation and rather agrees with the opposition division in that the process to produce the catalyst in D57 is not a representative repetition of that proposed in the patent in suit. The appellant has not successfully justified that the additional step of heating to 85°C was indeed necessary, because it is not apparent why the pelletising step could not have been carried out using conventional compacting/pelletising steps with the catalyst powder as initially obtained, regardless of how fine the particles were. In any case, the board notes that the processes of claims 1 and 7 are not restricted to any specific amount of reaction products, so even when the catalyst of D57 is used, table 1 indicates that the products in claim 1 are consistently obtained under all tested conditions, and those of claim 7 are detected in 7 out of the 10 tested conditions. It is also noted that Article 83 EPC does not require that the invention should be reproducible under any conditions implicitly encompassed by the claims. In particular, the fact that the catalyst in D57 is implicitly encompassed by the claims is not

considered to lead to a problem under Article 83 EPC, because the skilled person would attempt to reproduce the invention following the teaching of the patent, and would not reasonably expect all possible variations to work simply because they are not explicitly excluded by the wording of the claims. The appellant's additional argument that substances obtained in trace amounts could not be recovered as defined in claims 1 and 7 is also not convincing, because these claims require that "at least one product compound" is recovered (i.e. not all three of them).

3.3 In a second line of argumentation, the appellant indicated that the claimed invention required that "the molar ratio of HF to total amount of starting material fed to the reaction zone is at least stoichiometric". While the concept of "stoichiometric molar ratio" was further explained in paragraph [0016] of the opposed patent, the calculation of the "stoichiometric" conditions required knowing in advance the proportions of the reaction products which would be obtained. It was however not possible to pre-determine the reaction products which would be obtained under stoichiometric conditions, if such stoichiometric conditions could not be calculated in advance.

3.4 The board is also not convinced by this argument, because the alleged problem would only affect processes being performed at the edge of the scope of protection, namely those intending to use stoichiometric concentrations of HF or slightly higher. In other words, the skilled person would have no problem reproducing processes with HF molar ratios clearly above the stoichiometric proportions, as this would simply require assuming that the most fluorinated product is obtained at 100% and working at the

corresponding HF molar ratio or higher. It is the prevailing opinion among the boards that problems of demarcation (i.e. problems to determine whether a given embodiment falls within the scope of protection or not) concern the question of clarity under Article 84 EPC but not that of sufficiency of disclosure under Article 83 EPC (BoA Case Law, 9th ed., II.C.6.6.4).

In any case, the board also considers that the estimation of a stoichiometric proportion as proposed in the patent in suit (par. [0016]) could be performed without undue burden using an iterative process (i.e. pre-estimation of HF stoichiometric molar ratio, determination of reaction products and subsequent re-estimation of HF stoichiometric molar ratio).

- 3.5 Lastly, the appellant argued that the process claims 1 and 7 did not specify the reaction conditions required to obtain the products defined therein. A skilled person trying to reproduce the invention would therefore consult the description of the patent, which in particular taught (par. [0046]) that the invention could be carried out at temperatures ranging from 120°C to 500°C. While this paragraph also referred to more preferred temperature ranges, these were presented as more favourable options rather than as a requirement to obtain the desired products. Contrary to this teaching, example 2 of the patent demonstrated that the process of claim 7 could not be carried out at 275°C. The invention could therefore not be carried out throughout the entire scope of protection. It was furthermore unclear whether this problem would be solved by increasing the temperature, because as shown in example 10 of D64b, higher temperatures were not necessarily correlated with higher concentrations of the most fluorinated products such as HCFC-245fa.

- 3.6 The board notes that according to G 1/03, (§2.5.2) an effect defined in a claim might lead to a problem of insufficiency of disclosure when i) the claim encompasses non-working embodiments (i.e. embodiments which do not provide the defined effect) and ii) the specification does not "include sufficient information on the relevant criteria for finding appropriate alternatives over the claimed range with reasonable effort".
- 3.7 In the present case, it is clear that the formation of the products defined in claims 1 and 7 represents an effect, and that example 2 constitutes a non-working embodiment falling within the scope of protection of the claims. However, the board agrees with the patentee's argument that the patent contains sufficient information on the relevant criteria to identify, without undue burden, alternatives which would provide the defined effect. More specifically, a skilled person reading the patent at issue would readily recognise that some of the products defined in the claims would only be obtained using higher temperatures. While it is true that paragraph [0046] refers to a broad temperature range of 120°C to 500°C as "suitable for the vapor-phase reaction" of "the invention", it is clear in view of the preceding paragraphs that this "invention" is significantly broader than that defined in claims 1 and 7, encompassing processes (par. [0018]-[0030]) to produce a variety of products, including embodiments in which only a single reaction product is obtained, and also including (par. [0039]-[0054]) a variety of pre-treatment steps, starting materials, pressures, catalysts, HF proportions, etc. Consequently, a skilled person reading the patent would understand that the broad temperature range of 120°C-500°C does not apply to the specific processes in

claims 1 and 7 but to the broadest version of the invention as described in the specification. It follows that at least the condition ii) set out in G 1/03 (see point 3.6) is not fulfilled in the present case

Furthermore, to reproduce the invention in the claims, a skilled person would look for the specific teachings concerning the processes defined in the claims, and in doing so, it would learn from par. [0046] that temperatures from 300°C-350°C and 350°C-450°C are appropriate for respectively carrying out the invention in claims 1 and 7. Within this context, example 2 of the patent would be regarded as a further indication that temperatures of 275°C or lower are not appropriate for carrying out the reaction defined in claim 7 (i.e. at least for obtaining HCFC-1233zd). Additionally, the board also agrees with the patentee in that the results shown in example 10 of D64b are not relevant for the underlying discussion, because the processes described therein were not performed with a catalyst falling within the scope of the claims (i.e. a chrome/cobalt catalyst) but with a chrome catalyst.

3.8 It follows from the above considerations that the patent contains sufficient information to enable the skilled person to carry out the claimed invention without undue burden.

4. Auxiliary request 6 - Article 56 EPC

The requirement of inventiveness is met for the following reasons:

4.1 Closest prior art

In the written proceedings, the appellant considered that either document D39 (US 2005/228202) or D25 (US 2,996,555) could be regarded as the closest prior art.

Document D39 discloses the use of the same Cr/Co catalyst as the invention in fluorination reactions of saturated compounds such as $C_3H_3Cl_2F_3$ (par. [0009] and [0049]-[0066]), a substance with the same overall formula as HCFC-243db ($CF_3CHClCH_2Cl$) (i.e. HCFC-243db is one isomer falling within this formula).

Document D25, on the other hand, discloses (claim 1) the synthesis of 1234yf using a fluorination reaction.

The board considers that document D25 is clearly further away from the invention than D39, because it does not make any reference to the catalyst of the invention or to the use of HCFC-243db as starting material. It is furthermore noted that at the oral proceedings before the board, the appellant only referred to D39. This document is therefore considered to represent the closest prior art for the inventions defined in independent claims 1 and 7.

The board agrees with the appellant in that claims 1 and 7 differ from this document in the selection of the specific isomer HCFC-243db as the starting material and in the reaction products.

4.2 Problem solved

4.2.1 The appellant argued that the only problem solved by the invention was that of proposing an alternative fluorination reaction.

4.2.2 The board notes however that claims 1 and 7 do not only differ from D39 in aspects related to the reaction as such (i.e. the starting material) but also (as acknowledged by the appellant) in the products obtained therefrom. Thus, the problem solved in view of D39 should be determined taking into consideration that the reactions must be configured to produce mixtures containing the reaction products defined in the above claims.

Consequently, the problem solved cannot simply be that of proposing an alternative fluorination reaction in general, but to propose an alternative fluorination reaction to obtain the product mixtures defined in claims 1 and 7.

4.3 Obviousness

4.3.1 The appellant argued that the use of HCFC-243db as starting material would be an obvious choice for the skilled person, because this was a known isomer of the general formula $C_3H_3Cl_2F_3$ proposed as starting material in paragraph [0058] of D39.

The skilled person was familiar with the reaction mechanisms of saturated halogenated hydrocarbons, and was in particular aware that the fluorination reaction of these substances gave rise to a large number of secondary reaction products encompassing all those defined in claims 1 and 7. These reactions and mechanisms were furthermore known from document D60 (Manzer, L.E. et al., Advances in Catalysis, vol. 39 (1993), p. 329-350). Even if some of the reaction products were present in small/trace amounts, this was irrelevant because the invention was not restricted to any particular concentration range.

At the oral proceedings, the appellant also argued that D39 included an embodiment (par. [0059]) of a reaction leading to a mixture comprising the reaction products defined in claim 7. While the starting product was HCFC-240fa and not HCFC-243db, claim 7 at issue referred to "at least one starting material of the formula $\text{CF}_3\text{CHClCH}_2\text{Cl}$ (HCFC-243db)", so it did not exclude the presence of additional starting materials (e.g. HCFC-243db and HCFC-240fa). Claim 7 was therefore an arbitrary alternative to this embodiment in D39.

Thus, when starting from D39 as closest prior art, the skilled person would arrive at the processes of claims 1 and 7 in an obvious manner.

- 4.3.2 The board does not agree with this argumentation, because the skilled person finds no hint in D39, D60 or any of the other cited documents to select the substance $\text{C}_3\text{H}_3\text{Cl}_2\text{F}_3$ among the ca. 50 alternatives proposed in par. [0058] of D39 as a starting material, let alone to make a further selection of HCFC-243db among all the possible isomers of this formula for the purpose of providing an alternative to obtain the compounds defined in claims 1 and 7.

As to the cited embodiment in par. [0059] of D39, there is also no pointer in the cited prior art which would lead the skilled person to consider HCFC-243db as starting material (together with or instead of the proposed HCFC-240fa) in order to obtain the reaction products described in this example (which correspond to those defined in claim 7).

- 4.3.3 The board therefore concludes that document D39 either alone or in combination with D60 does not render obvious the subject-matter of claims 1 or 7.

- 4.4 The subject-matter of these claims (and by the same token that of claims 2 to 6 and 8 to 11 which depend thereon) is therefore inventive within the meaning of Article 56 EPC.
5. In view of the fact that the present decision has not relied on the content of any of the late filed documents D63a, D64b, D69, D70, D71 or D72, there is no need to decide on the question of their admittance.
6. Since none of the objections presented by the appellant prejudices the maintenance of the patent on the basis of auxiliary request 6 (corresponding to the auxiliary request 3 upheld by the opposition division), the appeal from opponent 1 does not succeed.

Order

For these reasons it is decided that:

The appeal of opponent 1 is dismissed.

The Registrar:

The Chairman:



B. ter Heijden

J.-M. Schwaller

Decision electronically authenticated