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**Datasheet for the decision
of 8 July 2025**

Case Number: T 1536/22 - 3.3.10

Application Number: 07824005.8

Publication Number: 2129644

IPC: C07C17/23, C07C17/358,
C07C21/18

Language of the proceedings: EN

Title of invention:

DEHYDROGENATIONHALOGENATION PROCESS FOR THE PRODUCTION OF C3-
C6- (HYDRO) FLUOROALKENES

Patent Proprietor:

Mexichem Fluor S.A. de C.V.

Opponent:

ARKEMA FRANCE

Headword:

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 13(2)

Keyword:

Inventive step - (no)

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1536/22 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 8 July 2025

Appellant: Mexichem Fluor S.A. de C.V.
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 21 April 2022
revoking European patent No. 2129644 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman P. Gryczka
Members: R. Pérez Carlón
L. Basterreix

Summary of Facts and Submissions

- I. The appellant (patent proprietor) lodged an appeal against the opposition division's decision revoking European patent No. 2 129 644.
- II. Notice of opposition had been filed on grounds including lack of inventive step (Article 100(a) EPC).
- III. The following document is relevant to the present decision:

D8: WO 2005/037431 A1

The following experimental evidence is also relevant:

- Exp 1: Annex A received on 3 May 2019 during examination proceedings, corresponding to Annex A filed with the letter of 6 January 2025
- Exp 2: Evidence on pages 4 and 6 of the letter dated 12 December 2019 in examination proceedings. The table in that evidence is labelled Annex A on page 10 of the statement of grounds of appeal
- Exp 3: Annex A received on 31 January 2022 during opposition proceedings, corresponding to Annex C filed with the letter dated 6 January 2025. The results are also summarised as Annex B on page 11 of the statement of grounds of appeal
- Exp 4: Evidence filed as Annex D with the letter dated 6 January 2025

- IV. Claim 1 of the patent as granted, which is the main request in appeal, reads as follows:

"A process for preparing a C₃₋₆(hydro)fluoroalkene comprising dehydrohalogenating a C₃₋₆hydro(halo)fluoroalkane in the presence of a zinc/chromia catalyst, wherein the catalyst is amorphous, or from 0.1 to 50 % by weight of the catalyst is in the form of one or more crystalline compounds of chromium and/or one or more crystalline compounds of zinc, wherein the process is carried out at a temperature of greater than 300°C."

Claim 1 of auxiliary request 1 further stipulates that the process is in vapour phase at a temperature of from 320 to 400 °C. Claim 1 of auxiliary request 2 specifies that the process is for preparing a (hydro)fluoropropene. In claim 1 of auxiliary request 3, the product of the process is 2,3,3,3-tetrafluoropropene; in claim 1 of auxiliary request 4, it is 1,3,3,3-tetrafluoropropene. Claim 1 of auxiliary request 5 stipulates a defined proportion of Zn in the catalyst. Lastly, claim 1 of auxiliary request 6 has the features of claim 1 of auxiliary requests 4 and 5.

- V. The opposition division concluded that document D8 was the closest prior art and disclosed all the features of claim 1 with the exception of the level of crystallinity. The available experimental evidence could not show an effect due to this distinguishing feature for every embodiment of claim 1, and the problem solved by the claimed process was thus to provide an alternative process. The claimed solution, characterised by a catalyst that is either amorphous or has a defined crystallinity level, would have been obvious to a skilled person in view of D8, and the claimed process was thus not inventive. The conclusion did not differ for claim 1 of auxiliary requests 1 to 4. The opposition division did not admit auxiliary

requests 5 and 6 into the proceedings.

VI. The appellant's arguments relevant for the present decision were as follows.

Experimental evidence Exp 4 filed in appeal did not contain new data but was only a recalculation of previously submitted data. It should thus be admitted into the proceedings.

As concluded by the opposition division, D8 was the closest prior art. The claimed process differed from that disclosed in D8 in the crystallinity of the catalyst. The problem underlying the claimed invention was to provide a process for preparing C3-C6-hydro-fluoroalkenes with a higher conversion rate while keeping the selectivity comparable. The problem was credibly solved in view of the available experimental evidence and the claimed solution, characterised by a less crystalline catalyst, would not have been obvious to a skilled person and was thus inventive. The arguments applied analogously to the subject-matter of the auxiliary requests.

VII. The respondent's (opponent) arguments were as follows.

Experimental evidence Exp 4 and the two pieces of evidence filed after the board's communication in preparation for oral proceedings should not be admitted into the proceedings. The appellant did not rely on exceptional circumstances to justify their filing, including on any change in the proceedings.

As the available experimental evidence did not show an effect arising from the crystallinity of the catalyst, the respondent agreed with the reasoning and conclusion

in the appealed decision that the claimed subject-matter was not inventive. By the appellant's own argument, the conclusion should be the same for the subject-matter of the auxiliary requests, regardless of other issues.

VIII. Oral proceedings before the board took place on 8 July 2025.

IX. The parties' final requests were as follows.

The appellant requested that the decision under appeal be set aside and the patent be maintained as granted as its main request. The appellant requested auxiliarily that the patent be maintained with the claims filed as auxiliary requests 1 to 6 underlying the appealed decision.

The respondent requested that the appeal be dismissed.

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

Reasons for the Decision

1. The appeal is admissible.

2. Admissibility of Exp 4 and the documents filed with the letter of 6 January 2025

These pieces of evidence were filed after the board issued its communication in preparation for oral proceedings. Their admission into the proceedings is thus governed by Article 13(2) RPBA and must be justified by exceptional circumstances.

The appellant did not rely on exceptional circumstances. It argued that the data in Exp 4 was a mere analysis of previously submitted data. A skilled person was not presented with data outside the scope of their knowledge, only with numerical data for comparison. The board understands the appellant's argument as considering Exp 4 not to be an amendment of its case.

The board does not admit Exp 4 and the two accompanying pieces of evidence into the proceedings. Exp 4 includes the allegedly "true" contact time but does not specify how it is calculated or measured; what relevance it has for the purpose of the claimed invention; or why previously filed data were wrong, irrelevant or incomplete. The filing of Exp 4 data is thus an amendment of the appellant's case, and any argument relying on them at the oral proceedings before the board would come as a surprise to both the respondent and the board. Absent exceptional circumstances, which are not even alleged by the appellant, neither Exp 4 nor the two documents filed with it are admitted into the appeal proceedings (Article 13(2) RPBA).

3. Inventive step

3.1 The claimed invention

Claim 1 of the patent as granted relates to a dehydrohalogenation process for preparing a C3-C6-hydrofluoroalkene over a zinc/chromia catalyst at more than 300 °C. The catalyst is either amorphous or contains from 0.1 to 50% by weight in the form of one or more crystalline compounds of chromium and/or one or more crystalline compounds of zinc.

3.2 Closest prior art

The parties saw document D8 as the closest prior art. This was also the opposition division's conclusion, and the board sees no reason to differ.

It was also not disputed that the process in D8 differed from that in claim 1 by the degree of crystallinity of the catalyst. Experimental evidence Exp 2 shows that the catalyst in example 1 of D8 is 65% crystalline; Exp 1 shows the catalyst in example 2 of D8 to be 55% crystalline.

3.3 Problem underlying the claimed invention

At the oral proceedings in appeal, the appellant defined the problem underlying the claimed invention as to provide a process for preparing C3-C6-hydrofluoroalkenes with a higher conversion rate while keeping the selectivity comparable.

3.4 Solution

The claimed solution is the dehydrohalogenation process over a zinc/chromia catalyst in claim 1, characterised by the catalyst being less than 50% by weight crystalline.

3.5 Success of the claimed solution

The appellant relied on the data filed as Exp 1 to Exp 3 to show that the claimed method credibly solved the problem in the preceding point.

Exp 1 compares the process for producing 1,3,3,3-trifluoropropene (1234ze) over two catalysts having 10% Zn

on chromia. LP171 is an amorphous catalyst; LP160 is 55% crystalline. In table 1, only entries 5 to 8 can be used for comparison as all the others relate to a temperature below the threshold in claim 1.

The comparison of entries 7 and 8 indeed shows a better conversion with the catalyst in claim 1, even for a shorter contact time.

However, entries 5 and 6, relating to a longer contact time, do not show that effect. The catalyst of the invention performed worse than that of the prior art.

Exp 2 compares the same process over two catalysts having 1.9% Zn on chromia. The data in Exp 2 shows a better conversion with the amorphous catalyst (compare entries 3 with 7 and 4 with 8). However, the comparative entries 7 and 8 applied shorter contact times. It cannot be excluded that the increase in conversion arises from a longer contact time.

The appellant argued that contact times were difficult to reproduce and only one of the factors affecting the reaction. Other parameters such as catalyst surface area and reactor residence time were also relevant.

However, if the appellant argues that the claimed process is unexpectedly advantageous with respect to that in D8, it is incumbent on the appellant to credibly show the alleged effect, to submit experimental evidence supporting it if considered necessary, and to choose the experimental conditions which show that it arose from the crystallinity of the catalyst. Arguing that the comparison could have been done differently does not convince the board, which can only decide on the evidence before it. If other

relevant parameters such as catalyst surface or residence time were relevant, they should have also been provided.

Exp 3 discloses reactions over catalysts having 6.8% Zn by weight, being 4 and 40% crystalline, but does not allow a direct comparison with the process of the closest prior art D8.

The appellant argued that while it had filed a number of pieces of experimental evidence, the respondent had filed none. However, the question is whether the available data support an increased conversion arising from the crystallinity of the catalyst, and this is not the case. Under these circumstances, the burden of proof has not been reversed so that it would be on the respondent to show that the alleged effect has not been achieved.

In summary, Exp 1 shows both better and worse conversion. Exp 2 shows better conversion but for non-comparable contact times. Exp 3 does not provide a comparison with D8. Thus, the problem as defined by the appellant cannot be considered credibly solved by the claimed process.

3.6 Reformulation of the technical problem

As the problem of providing a process with better conversion is not considered credibly solved, it has to be reformulated to provide an alternative dehydrohalogenation process for producing C3-C6 hydrofluoroalkenes. In view of the available evidence, this problem has been credibly solved by the claimed process.

3.7 Obviousness

At the oral proceedings, the appellant did not dispute that if the problem underlying the claimed invention were to be seen as the mere provision of an alternative process, the solution would have been obvious to a skilled person in view of D8 alone.

D8 (page 1, lines 33 and following) discloses catalysts containing merely one third of crystalline alpha-chromium oxide as 67% of the chromium in the catalyst is in the form of zinc chromite. Seeking an alternative, a skilled person would have considered these catalysts with a low crystallinity and would thus have arrived at the claimed process in an obvious manner.

3.8 The process of claim 1 of the patent as granted is thus not inventive (Article 56 EPC), and the ground for opposition in Article 100(a) EPC prejudices the maintenance of the patent as granted.

3.9 Auxiliary requests

The appellant did not dispute that the conclusion on inventive step would not differ for the auxiliary requests. No arguments were filed, either in writing or at the oral proceedings, other than those relevant for the subject-matter of the patent as granted, which the board found not convincing for the reasons given above regarding the main request.

None of the auxiliary requests is thus allowable, regardless of whether they were admissible.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



K. Boelicke

P. Gryczka

Decision electronically authenticated