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**Datasheet for the decision  
of 26 September 2012**

**Case Number:** T 1949/09 - 3.3.07  
**Application Number:** 00944208.8  
**Publication Number:** 1268055  
**IPC:** B01J 23/26, B01J 23/06,  
B01J 37/03, C07C 19/08,  
C07C 17/21, C07C 17/20

**Language of the proceedings:** EN

**Title of invention:**

A process for the preparation of 1,1,1,2-tetrafluoroethane

**Patent Proprietor:**

Council of Scientific and Industrial Research

**Opponent:**

Ineos Fluor Holdings Ltd.

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56, 111(1), 114(2)  
RPBA Art. 12, 13

**Keyword:**

"Late-filed evidence - not admitted"  
"Late-filed documents - not admitted"  
"Inventive step - main and auxiliary request (no)"  
"Late-filed requests - not admitted"  
"Remittal to the first instance (no)"

**Decisions cited:**

T 1621/09

**Catchword:**

Article 15(3) of the Rules of Procedure of the Boards of Appeal does not go so far as to nullify Article 113(1) EPC (point 3.4).

Documents mentioned in the patent description are not *ipso facto* part of the appeal proceedings (point 4).



Case Number: T 1949/09 - 3.3.07

**DECISION**  
of the Technical Board of Appeal 3.3.07  
of 26 September 2012

**Appellant:** Council of Scientific and Industrial Research  
(Patent Proprietor) Anusandhan Bhavan,  
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**Representative:** Dee, Ian Mark  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 30 July 2009  
revoking European patent No. 1268055 pursuant  
to Article 101(3)(b) EPC.

**Composition of the Board:**

**Chairman:** J. Riolo  
**Members:** D. Semino  
M.-B. Tardo-Dino

## Summary of Facts and Submissions

I. The appeal of the patent proprietor (appellant) lies against the decision of the opposition division announced at the oral proceedings on 21 July 2009 to revoke European Patent 1 268 055. The granted patent comprised 16 claims, claim 1 reading as follows:

"1. A process for the preparation of 1,1,1,2-tetrafluoroethane (HFC-134a) from trichloroethylene (TCE), the said process comprising the steps of:  
a) fluorinating trichloroethylene (TCE) with anhydrous hydrogen fluoride (AHF) by contacting with a co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  catalyst promoted by Zn salt to obtain an intermediate 2-chloro-1,1,1-trifluoroethane (HCFC-133a), and  
b) fluorinating the product of step (a) with anhydrous hydrogen fluoride (AHF) in the presence of co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  catalyst promoted by Zinc salt to yield the required product 1,1,1,2-tetrafluoroethane (HFC-134a), wherein the W/F value is in the range 80-150 g.h/mole and wherein the co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  catalyst promoted by zinc, used in steps a) and b) is obtained by a process comprising co-precipitation of chromium and aluminum metal hydroxides from corresponding trivalent metal salt solutions using  $\text{NH}_4\text{OH}$ ,  $\text{NaOH}$  or  $\text{KOH}$  as a base and followed by calcination to give mixed oxide precatalyst in amorphous form which is impregnated with an activity promoting amount of zinc compound."

II. A notice of opposition was filed against the granted patent requesting revocation of the patent in its entirety on the grounds of lack of novelty, lack of

inventive step and insufficiency of disclosure, in accordance with Article 100(a) and (b) EPC.

III. The decision of the opposition division was based on the claims as granted and was supported *inter alia* by the following documents:

D1: EP-A-0 502 605

D6: Rao et al., Journal of Fluorine Chemistry, volume 95, 1999, pages 177-180

IV. The decision of the opposition division, as far as relevant to the present decision, can be summarised as follows:

The process of granted claim 1 differed from the process disclosed in D1 in the nature of the catalyst and in the W/F ratio. Since no experimental tests were available that would confirm any advantage of the specific catalyst, no effect might be attributed to the selection of the W/F ratio alone and there was no evidence of a synergistic effect related to the two distinguishing features, the problem to be solved was simply the provision of an alternative process. It was already known from D1 that a catalyst comprising zinc, chromium and aluminium oxides was useful for a two step process for the fluorination of TCE to HFC-134a. The skilled person faced with the problem of providing an alternative would consider the use of the catalyst of D6, because D6 related to the second stage of the process and had an overall composition as disclosed in D1, and would routinely select a suitable W/F ratio. For those reasons the process of granted claim 1 was not inventive.

- V. The patent proprietor (appellant) appealed that decision. With the statement setting out the grounds of appeal the patent as granted was maintained as main request and a set of claims was submitted as auxiliary request (indicated as "subsidiary" request). Claim 1 according to the auxiliary request corresponded to claim 1 as granted with the addition of the feature "wherein the Cr:Al molar ratio is in the range 1:3 to 1:10". The statement included additional tests carried out on catalysts according to D1.
- VI. In the reply to the statement setting out the grounds of appeal the opponent (respondent) countered the arguments of the appellant and questioned the relevance of the tests filed with the statement of grounds.
- VII. In a communication sent in preparation to oral proceedings the Board summarised the objections of the respondent and without raising any new point with respect to the appealed decision and the arguments of the parties summarised the relevant steps of the application of the problem-solution approach to the present case.
- VIII. With letter of 10 September 2012 (15 days before the convened oral proceedings) the appellant filed a declaration by one of the inventors and 9 sets of claims as auxiliary requests 2 to 10 (indicated as "subsidiary" requests 2 to 10).

The declaration included a further test to assess the mechanical strength of catalysts according to D1 and

according to the patent in suit and some arguments regarding document D6.

Claim 1 of auxiliary request 2 corresponded to granted claim 1 with the specification that "in step (b) the mole ratio AHF:HCFC-133a is in the range of 4:1 to 15:1". Claim 1 of auxiliary request 3 corresponded to granted claim 1 with the specification that "in steps (a) and (b), the fluorination is carried out in the pressure range of  $4.83 \cdot 10^5$ - $1.45 \cdot 10^6$  Pa gauge (70 to 210 psi g.)". Claim 1 of auxiliary request 4 corresponded to granted claim 1 with the specifications that the catalyst used in step (a) is "activated with HF", "in step (a) the mole ratio of AHF and TCE is in the range of 6:1 to 12:1", "in step (b) the mole ratio AHF:HCFC-133a is in the range of 4:1 to 15:1" and "in steps (a) and (b), fluorination is carried out in the temperature range of 275-400°C". Claim 1 according to auxiliary requests 5 to 10 was obtained by starting from granted claim 1 and adding various combinations of some of the additional features of claim 1 according to the first 4 auxiliary requests together with other minor adjustments.

IX. Oral proceedings were held on 25 September 2012 in the announced absence of the opponent. During the oral proceedings the appellant introduced a new line of argumentation about inventive step and filed the following documents:

D7: EP-A-0 641 598  
D8: US-5 155 082  
D9: US-A-4 792 643  
D10: WO-A-92/16480

D11: WO-A-92/16481

X. The arguments of the appellant (patent proprietor) in the statement of grounds were limited to the lack of inventive step of the main and the auxiliary request and can be summarised as follows:

(a) The process of the invention differed from the process of D1, taken as the closest prior art, in that a specific catalyst (an amorphous  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  co-precipitated oxide, impregnated with zinc) was used and a specific W/F value of between 80 and 150 was chosen in step (b). The objective problem was the provision of a new process of preparing HFC-134a from TCE with a high conversion and selectivity and with the possibility to conduct the process under pressure. The skilled person aiming at solving this problem would not be led to use the specific catalyst and to choose the specific W/F value in view of the available prior art, as D6, which was the sole document which disclosed the catalyst used in the invention, did not contain any information which might suggest that this catalyst might be especially suitable for the preparation of HFC-134a from TCE and that it might lead to an especially high conversion and selectivity. Nor could any hint be derived from D1, because, on the contrary, if the skilled person had tested the catalysts exemplified in D1, he would have found that those comprising aluminium in addition to zinc and chromium lead to a lower selectivity and conversion than the catalysts not containing aluminium. This was made evident by tests led in the conditions of example 5 of the



opposed patent which were run while using the catalysts of examples 1, 3 and 15 of D1. Moreover, when implementing bulk chromia or catalysts according to examples 1, 3 and 15 of D1 in the conditions of example 5 of the opposed patent, choke had been systematically observed, while clogging difficulties were not encountered with a zinc impregnated co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  as used in the claimed process. This was shown by further results related to clogging observed with different catalysts tested in the conditions of example 5 of the opposed patent. On that basis the presence of an inventive step had to be acknowledged for claim 1 according to the main request.

- (b) The process of claim 1 according to the auxiliary request was inventive *a fortiori*, since the Cr:Al molar ratio of the catalysts disclosed in D6 was out of the range added to the claim.

XI. During the oral proceedings the appellant took position on further formal issues (admissibility of evidence and requests, remittal to the first instance) and added a new line of arguments regarding inventive steps. The arguments presented at the oral proceedings by the appellant can be summarised as follows:

*Admissibility of late filed evidence*

- (a) The late filing of the test included in the declaration filed with letter of 10 September 2012 was justified by the difficulty in obtaining the approval to perform the test. Moreover, the

results were very relevant to show that it was not possible to use the catalyst of D1 under pressure, while it was possible with the catalyst according to the invention. The rest of the declaration was an evaluation of D6 by one of its co-authors. Neither the test, nor the remaining part of the declaration could take the respondent by surprise, as they supported what was already on file. On that basis, the whole of the declaration should be admitted into the proceedings.

- (b) The documents D7 to D11, copy of which was provided during the oral proceedings, were already in the proceedings, as they were cited in the patent in suit. Therefore, there was no need to decide on their admissibility.

*Inventive step - main and auxiliary request*

- (c) Out of the various embodiments of D1, those of examples 8 to 10 represented the closest prior art, as they were the only examples in which the catalyst was calcined. The key feature of the invention was that a single catalyst was used and the main point which had been disregarded in the decision and in the previous arguments of the parties was that the process of the invention had incredibly high conversion and selectivity in step (a) which had not been obtained before. Documents D7 to D11 confirmed that the conversion and selectivity in step (a) obtained when using known catalysts were much lower than in the claimed process. The examples in D1 in particular showed a very low conversion in step (a) (as low as 40.9%

in example 7). While no tests for the catalysts of examples 8 to 10 of D1 had been accomplished, no relevant difference with respect to the other examples of D1 could be expected; in particular, as those catalysts were based on chromia, the chocking problem could not be avoided as confirmed by D6 (last sentence on page 177). It was true that the bulk chromia tested in the patent in suit had high conversion and selectivity, but it could not be used under pressure. The person skilled in the art looking for a single catalyst to be used in the two-step process with improved conversion and selectivity in particular in step (a) would not consider the disclosure of D6, which dealt only with step (b), and would not select the specific values of the W/F ratio with the expectation of improving both conversion and selectivity. On that basis there was no doubt that an inventive step was present for the process of granted claim 1. The same arguments were valid for the auxiliary request, even if the specific Cr:Al molar ratio did not constitute a further difference with respect to the catalyst of D6.

*Admissibility of auxiliary requests 2 to 10*

- (d) Auxiliary requests 2 to 10 were intended to narrow the scope of the invention in order to save the validity of the patent in case the higher ranked requests were not allowed. They were filed 15 days before the oral proceedings because the approval from the appellant only came at that point. They were aimed at overcoming grounds of opposition, they did not raise any new issue and their

treatment caused no delay in the proceedings. On that basis, they should be admitted into the proceedings.

*Remittal to the first instance*

- (e) The new presentation of the case provided at the oral proceedings fully supported the presence of an inventive step. In case the Board intended to dismiss the appeal, remittal of the case to the first instance was appropriate in view of the new arguments which had not been dealt with in opposition.

XII. The arguments of the respondent (opponent), as far as relevant to the present decision, can be summarised as follows:

*Inventive step*

- (a) The experimental section of the opposed patent provided little or no support for the alleged invention, because none of the examples illustrated a two-step process, most of the examples did not fall within the scope of claim 1 and the examples overall did not show any technical advantage in terms of conversion and selectivity or any advantage in operating under pressure. Moreover, those examples were not representative of D1. The experimental data provided with the grounds of appeal were of no better assistance, as examples 1 and 3 of D1 performed better than the claimed process with regard to conversion and selectivity and only

example 15 was marginally worse. Moreover, it was alleged that the catalyst of D1 exhibited poor mechanical strength, but no corresponding data had been presented for the claimed catalyst. Starting from D1 the skilled person would be motivated to use the catalyst of D6, because D1 disclosed a very similar catalyst to that of D6. The choice of the W/F value which gave the best overall performance would be nothing more than the result of routine trial and experimentation for the skilled person. For those reasons, the process of claim 1 of the main request was not inventive.

- (b) The process of claim 1 of the auxiliary request lacked inventive steps for the same reasons, as a Cr:Al molar ratio in the range 1:3 to 1:10 was also known from D6.

The respondent did not take position on the admissibility of the declaration and of auxiliary requests 2 to 10, all filed with letter of 10 September 2012. Due to the absence at the oral proceedings the respondent did not take position either on the admissibility of documents D7 to D11 and on the remittal to the first instance.

- XIII. The appellant (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained as granted, or, alternatively on the basis of the auxiliary request ("subsidiary" request) filed with the statement of grounds of appeal, or on the basis of one of auxiliary requests 2 to 10 ("subsidiary" requests 2 to 10) submitted with letter of 10 September 2012.

The appellant further requested that the following be admitted in the proceedings:

- the declaration of Mr Narsaiah filed with letter of 10 September 2012 and the test included in this declaration
- auxiliary requests 2 to 10
- documents D7 to D11.

The appellant further requested that the case be remitted to the department of first instance to discuss the invention as presented for the first time at the oral proceedings.

XIV. The respondent (opponent) had requested in writing that the appeal be dismissed.

XV. The decision was delivered on 26 September 2012.

### **Reasons for the Decision**

1. The appeal is admissible.

*Preliminary procedural remarks in respect of the late filed material*

2. Pursuant to Article 114(2) EPC the EPO may disregard facts and evidence not submitted in due time by the parties. As far as the appeal procedure is concerned, the Rules of Procedure of the Boards of Appeal (RPBA) give the general directions as to the way in which the Boards of Appeal have to exercise their power to admit

or disregard the material filed at different stages of the appeal proceedings.

- 2.1 Article 12 delineates the basis of the appeal proceedings, providing that the appeal file should contain one comprehensive submission from each party. The purpose of this provision is that the exchange of the grounds and the reply should effect a defined and controlled initial phase of proceedings providing a moment in time fixed by the rules when a party's case is deemed to be complete, any further material submitted being, in the terms of Article 13 RPBA, an amendment to the party's case.
- 2.2 It is commonplace that amendments to a party's case filed in response to new objections raised by the other party or by the Board, are deemed to be filed in due time within the meaning of Article 114(2) EPC itself.
- 2.3 As to the other amendments (which cannot be deemed to be filed in due time), it is in the Board's discretion to evaluate their admissibility in the light of several criteria, the most common being listed in Article 13(1) RPBA: the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.
- 2.4 Finally, after oral proceedings have been arranged, an additional criterion has to be taken into account: the other party and the Board should be capable of dealing with the new issue without any adjournment of the oral proceedings (Article 13(3) RPBA).
- 2.5 These principles apply in the following paragraphs.

*Admissibility of the declaration of the inventor*

3. The declaration filed with letter of 12 September 2012 includes some tests performed to assay the mechanical strength of some catalysts (section 3 of the declaration) and a review of the content of document D6 (section 4 of the declaration).

3.1 In the light of the preliminary remarks, the Board notices that the tests included in the declaration cannot be deemed to be filed in due time, because they cannot be seen as a reaction to a new situation which was not already present at the time in which the grounds of appeal were filed, as the lack of experimental tests which would confirm an advantage of the specific catalyst was already a crucial point of the decision (see point IV, above), or at the latest after the respondent filed the letter of reply to the statement of grounds, in which a clear position was taken on the tests filed with that statement.

3.2 The only justification put forward for the late filing, namely the time needed to have the tests authorised and performed, cannot justify their filing almost three years after the grounds of appeal, more than two years after the reply of the respondent and only 15 days before the convened oral proceedings, all the more as the appellant never informed the Board of any difficulty in providing further evidence, nor requested additional time to prepare such evidence.

3.3 Apart from the unjustified late filing, the tests raise a number of questions about their significance, which



could not be answered without an adjournment of the proceedings, including in particular the question whether the values of the mechanical strength depend only on the differences between the production method in D1 and in the opposed patent (in particular coprecipitation of chromium and aluminium hydroxides and formation of a catalyst in amorphous form) or on other parameters of the compared catalysts which do not appear in the claims (e.g. their particle size distribution) or on other features of the method of production which are present in other examples of D1, but do not form part of the tests (e.g. the presence of a calcination step as in examples 8 to 10 of D1).

3.4 Finally, Article 15(3) RPBA, which provides that the Board is not obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party, does not go so far as to nullify Article 113(1) EPC. On that basis, the respondent, which chose not to attend the oral proceedings, can rely on the procedural provisions mentioned above, namely that the decision would be made on the basis of the written case in the meaning of Article 12 RPBA and that no significant amendment of the case would be admitted which would go beyond what is foreseen by Article 13 RPBA (see also T 1621/09, unpublished, points 41 to 44).

3.5 For these reasons, the Board on application of the RPBA does not admit the tests included in the declaration filed with letter of 12 September 2012 into the proceedings (section 3 of the declaration).

- 3.6 On the contrary, the review of the content of document D6, which is based on the documents itself and on arguments which were already in the proceedings, (section 4 of the declaration) does not pose any problem with regard to admissibility and is therefore admitted into the proceedings.

*Admissibility of D7 to D11*

4. The contention that documents D7 to D11 were *ipso facto* part of the appeal proceedings only because they were mentioned in the description cannot be followed by the Board for the following reasons.

- 4.1 First of all, such a contention is inconsistent with Article 12 RPBA: to be part of the proceedings and play an active role for a new argumentation the documents should have been singled out in the written submissions as being of possible relevance at some point in time. Having been introduced at the oral proceedings before the Board without any previous indication, they are late filed and subject to a discretionary decision on their admissibility.

- 4.2 This approach is consistent with the case law (Case Law of the Boards of Appeal, VI edition 2010, VII.C.1.7), according to which a document considered during the examination procedure is not automatically scrutinised in opposition or opposition appeal proceedings, even it is quoted and acknowledged in the contested patent. Only the document cited and acknowledged in the description of the contested patent as the closest prior art and on the basis of which the technical problem in the description was formulated remains an

- exception and forms directly part of the opposition or opposition appeal proceedings.
- 4.3 Documents D7 to D11, although cited in the specification of the patent in suit, had been merely acknowledged as conventional background art therein (paragraphs [0009] to [0011] and [0013] in the patent) and were not considered in the patent as essential or as the closest prior art and the starting point of the claimed invention.
- 4.4 The appellant did not provide any justification of their late filing and did not present any of those documents as more relevant than the documents on file, as, in its arguments, D1 remained the closest prior art and none of D7 to D11 was relevant for the analysis of the obviousness of the solution (they were only used as supporting evidence for the acknowledgement of an effect).
- 4.5 Moreover, the respondent absent at the oral proceedings (as already indicated above, see point 3.4) and relying on the rules of procedure, could not have expected a new line of argumentation based on these documents and never announced in the written phase of the proceedings, which could have changed the analysis of the case and its counterarguments.
- 4.6 Therefore, pursuant to Article 13(1) and (3) RPBA the Board considers it appropriate not to admit documents D7 to D11 into the proceedings.

*Main request - inventive step*

5. *Closest prior art*

- 5.1 Document D1 has been considered as the closest prior art both in the appealed decision and in the arguments of the parties. The Board sees no reason to choose a different starting point.
- 5.2 D1 relates to an improved fluorination catalyst and to a process for the production of fluorinated hydrocarbons by the catalysed reaction of hydrocarbons or halogenated hydrocarbons with hydrogen fluoride (page 2, lines 1 to 3). In particular, it discloses a two-step process for the production of 1,1,1,2-tetrafluoroethane from trichloroethylene, in which the first stage is the vapour-phase fluorination of trichloroethylene with hydrogen fluoride (page 4, lines 35 to 38) and the second stage is the preparation of 1,1,1,2-tetrafluoroethane by reaction of 1-chloro-2,2,2-trifluoroethane with hydrogen fluoride (page 4, lines 31 to 33). In both stages use is made of the same promoted catalyst (page 4, lines 38 to 39).
- 5.3 The promoted catalyst of D1 is a chromium containing catalyst which comprises an activity-promoting amount of zinc or a compound of zinc (claim 1; page 2, lines 20 to 21). It preferably contains chromium in the form of chromia, halogenated chromia or chromium oxyfluoride (page 2, lines 30 to 31) and may comprise metal oxides, halogenated metal oxides or metal oxyfluorides other than those based on chromium, including e.g. alumina as metal oxide (page 2, lines 35 to 40), so that the chromium containing catalyst may

comprise an activity promoting amount of zinc or a compound of zinc in and/or on a mixed metal oxide support, such as chromia/alumina (page 2, lines 42 to 46). The catalyst may be prepared among other methods by impregnation of a chromia, halogenated chromia or chromium oxyhalide with a water soluble salt of zinc or by co-precipitation of the hydroxides of the promoter and chromium with subsequent conversion to the oxides (page 3, lines 23 to 29).

5.4 Even if D1 mentions catalysts with the same constituents as the catalyst used in the process of claim 1 of the main request, namely chromium oxide, aluminium oxide and zinc as a promoter, and impregnation and co-precipitation are given as possible process steps for some of the embodiments, none of the embodiments of D1 refers to co-precipitation of  $\text{Cr}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  to give an amorphous mixed oxide precatalyst which is then impregnated with a zinc compound and the respondent has not provided any evidence that the result of any of the embodiments of D1 should necessarily be a catalyst based on co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  in amorphous form. Under such circumstances, it cannot be acknowledged that D1 discloses a catalyst as the one used in the process of claim 1 of the main request.

5.5 The general description of D1 mentions typical contact times for the process reaction steps (page 5, lines 5 to 14). However, no sufficient information is given in the general part of D1 to make it possible to compute the ratio W/F (ratio of catalyst to feed in g.h/mole, paragraph [0024] of the patent). The same holds for the examples of D1, where the quantity of catalyst and the

contact time are given (see e.g. examples 1 to 5, page 5, lines 36-40), but no value of the feed flow rate is available, so that the ratio W/F remains unknown.

6. *Problem solved*

6.1 According to the patent, it is the object of the invention to provide a process for the preparation of HFC-134a by the fluorination of trichloroethylene with a catalyst which achieves high selectivity and possesses enough crushing strength for use under pressure (paragraphs [0016]-[0018]).

6.2 Since D1 concerns the same process and addresses similar issues, it needs to be analysed whether the evidence on file makes it possible to acknowledge the presence of effects or improvements in the relevant properties with respect to the process of D1.

6.3 As far as the first reaction step of the process is concerned, namely the fluorination of trichloroethylene to 2-chloro-1,1,1-trifluoroethane, the Board cannot acknowledge that it has been credibly shown that an improvement in conversion and selectivity is obtained by means of the replacement of the catalysts of D1 with the catalyst used in the process of claim 1.

6.3.1 It is indeed true that in example 7 of D1 a conversion of 40.9% of trichloroethylene to 2-chloro-1,1,1-trifluoroethane is obtained (see page 6, lines 25 to 31 of D1), while in example 1 in the patent in suit (table in paragraph [0059]) catalyst B obtains a conversion of trichloroethylene of 96.5% and a selectivity for

2-chloro-1,1,1-trifluoroethane of 97.5%, as underlined by the appellant.

- 6.3.2 However, these results are obtained for different reactors working under different operating condition, so that it cannot be concluded whether the large differences in conversion and selectivity are related to the catalyst or to the reactor and its operating conditions.
- 6.3.3 In this respect it is noted that the use of chromia under the conditions of example 7 of D1 leads to a conversion of trichloroethylene to 2-chloro-1,1,1-trifluoroethane of 26.7% (page 6, line 31 of D1), while the use of chromia under the conditions of example 1 of the patent in suit (table in paragraph [0059], last column) leads to a conversion of trichloroethylene of 96% and a selectivity for 2-chloro-1,1,1-trifluoroethane of 97.5% (i.e. to results very similar to those of the catalyst used in the claim). These very different results which are obtained with the same material as catalyst make it clear that the influence of the reactor and of the operating conditions is very relevant and that a direct comparison between the results of example 7 of D1 and example 1 of the patent in suit is not appropriate to establish the effect of the choice of a different catalyst on the conversion and selectivity of the first reaction step.
- 6.3.4 This analysis confirms that the data on file do not make possible a reliable comparison between the performance of step (a) conducted with a catalyst according to D1 and the performance of the same step with the catalyst used in the patent in suit. In the

absence of such a direct comparison it cannot be concluded whether an improvement in conversion and selectivity is obtained or not.

6.4 With regard to step (b) of the process of claim 1, namely the fluorination of a product containing 2-chloro-1,1,1-trifluoroethane to 1,1,1,2-tetrafluoroethane, the appellant has provided with the statement of grounds experimental data which are meant to reproduce example 5 of the patent in suit by replacing the catalyst used in the patent with some catalysts according to some examples of D1.

6.4.1 The data in example 5 of the patent in suit are according to the following table (paragraph [0063] of the patent):

Catalyst		Catalyst-B	
Reaction temp. °C	360	360	360
Mole ratio, HF/HCFC-133a	8	6	6
Pressure, psig	70	70	70
W/F, g.h/mole	100	70	50
Conversion of HCFC-133a, %	24.0	22.0	14.4
Selectivity for HFC-134a, %	96.0	88.2	84.5

6.4.2 The data provided by the appellant with the statement of grounds refer to the tests carried out on 3 catalysts of D1, namely catalysts prepared according to the procedure of examples 1, 3 and 15 of D1 in the conditions of example 5 of the patent in suit, and are reproduced in the following table (page 3 of the statement of grounds):



	W/F = 100	W/F = 70	W/F = 50
<b>Example 1 of D1</b> Zn on Cr <sub>2</sub> O <sub>3</sub>			
Mole ratio	1:8	1:6	1:6
Conversion (%)	28-30	22-26	25-28
Selectivity (%)	94-95	85-94	94-96
<b>Example 3 of D1</b> Zn on Cr <sub>2</sub> O <sub>3</sub>			
Mole ratio	1:8	1:6	1:6
Conversion (%)	23-25	25	21-25
Selectivity (%)	93-96	96-97	96-97
<b>Example 15 of D1</b> Cr/Zn on Al <sub>2</sub> O <sub>3</sub>			
Mole ratio	1:8	1:6	1:6
Conversion (%)	20	19.7	12.85
Selectivity (%)	91	93.3	85.69

- 6.4.3 These data show that catalysts 1 and 3 according to D1 provide sometimes comparable and often better conversion and selectivity than the catalyst used in the process of claim 1, while catalyst 15 has lower conversion values, but at times better selectivity.
- 6.4.4 These data cannot therefore support the view that the use of a catalyst according to the patent in suit in the process of claim 1 provides better values of conversion and selectivity in step (b) of the claimed process.
- 6.4.5 In this context it is relevant to note that the argument of the appellant that these tests would discourage the skilled person to use a catalyst with aluminium, chromium and zinc because of the worse results of catalyst 15 according to D1 is not relevant in the formulation of the problem solved by the process of claim 1 and can in any case not be followed, because

these data were not available to the skilled person at the time of filing of the patent in suit.

6.4.6 Additionally it is noted that no comparative data are available with regard to examples 8 to 10 of D1, which were considered by the appellant as the best starting point for the analysis of inventive step in the line of arguments followed during the oral proceedings. Therefore, even if that approach were followed, no improvement in selectivity and conversion with respect to the use of those catalysts could be acknowledged.

6.5 With regard to the choice of the range 80-150 g.h/mole for the ratio W/F in step (b) of the process, reference is still made to the data in the table regarding example 5 of the patent in suit (point 6.4.1, above). While it is true that for the value within the range (100) conversion and selectivity are higher than in the other two cases (with W/F equal to 70 and 50 respectively), the W/F ratio is not the only parameter which has been changed in the tests, as the mole ratio HF/HCFE-133a is 8 when W/F is equal to 100 and 6 in the other cases, so that it cannot be concluded which is the difference that determines the improvement in conversion and selectivity. No other data are available to show an effect of the W/F ratio alone.

6.6 As to the operation under pressure, the appellant has provided data with the statement of ground showing that the catalysts according to D1 (examples 1, 3 and 15) as well as bulk chromia used in the pressure conditions of example 5 of the patent in suit exhibit poor mechanical strength with respect to the catalyst used in the patent in suit, so that a clogging phenomenon takes

place (last four paragraphs on page 3 of the statement of grounds and results at the top of page 4).

6.7 As alleged advantages to which the patent proprietor merely refers without offering sufficient evidence, supported by any comparison with the closest prior art, cannot be taken into consideration in determining the problem effectively solved by the underlying invention (Case Law, *supra*, I.D.4.2), no improvement in conversion or selectivity can be acknowledged and that improvement cannot be part of the solved problem. It can only be acknowledged that the process of claim 1 can be operated under pressure (even if that feature is not part of the claim).

6.8 The problem solved by the process of granted claim 1 is therefore the provision of a further process for the preparation of HFC-134a by the fluorination of trichloroethylene which can be operated under pressure. In view of the preceding analysis this conclusion is independent of the specific embodiment of D1 which is taken as the starting point.

7. *Obviousness*

7.1 D6 belongs as D1 and the patent in suit to the field of fluorination catalysts for the fluorination of 2-chloro-1,1,1-trifluoroethane to 1,1,1,2-tetrafluoroethane (see abstract and first paragraph of the introduction of D6). Moreover, therein a base catalyst (co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$ ) is chosen which meets the strength requirements for operation under pressure (last but one sentence of page 177).

- 7.2 In the experimental part the production of a number of catalysts is disclosed, including in particular the production of catalyst B which is obtained through impregnation of a co-precipitated  $\text{Cr}_2\text{O}_3/\text{Al}_2\text{O}_3$  (using  $\text{NH}_4\text{OH}$  followed by calcination) with zinc chloride (see page 178, Experimental, in particular sections 2.1.1 and 2.1.2). It was not contested by the appellant that catalyst B of D6 exactly corresponds to the catalyst used in the process of claim 1 of the main request, which is corroborated by the fact several of the authors of D6 are among the inventors of the patent in suit.
- 7.3 The skilled person looking for a further process for the preparation of HFC-134a by the fluorination of trichloroethylene which can be operated under pressure would therefore take into consideration the replacement of the catalysts of D1 with any of the catalysts proposed in D6, which address the same issues and contain the same main constituents, including in particular catalyst B.
- 7.4 Moreover, the skilled person would choose the appropriate operating conditions, including the quantity of catalyst and the flowrates of reactants as part of his normal skills.
- 7.5 In summary the skilled person addressing the posed problem would choose both any catalyst according to D6 (in particular catalyst B) and appropriate values of the W/F ratio without any inventive skills.
- 7.6 For these reasons the process of claim 1 of the main request does not involve an inventive step.

*Auxiliary request - inventive step*

8. The same arguments developed in detail for the process of claim 1 of the main request apply equally to the process of claim 1 of the auxiliary request for the reasons which follow.
- 8.1 The specification of the range for the Cr:Al molar ratio (1:3 to 1:10) for the catalyst used in the two-step process is not associated with any further effect or advantage with respect to the process of claim 1 of the main request. Indeed no evidence is available to show any relevance of the further feature and no different arguments have been submitted by the appellant in this respect.
- 8.2 Once the problem is formulated as above (point 6.8) and it is solved by means of the teaching of D6 (point 7.3), the additional feature is automatically included, as catalyst B of D6 has a Cr:Al molar ratio in the range 1:3 to 1:10 (as computed on the basis of the composition of catalyst B as given in Table 1 of D6). That point was initially contested by the appellant (point X (b), above), as a weight ratio was wrongly computed, but later accepted by both parties (points XI (c) and XII (b), above).
- 8.3 On that basis the process of claim 1 of the auxiliary request does not involve an inventive step.

*Auxiliary requests 2 to 10 - admissibility*

9. The Articles of the RPBA concerning the basis of the proceedings and the amendment of a party's case (Articles 12 and 13 RPBA), whose content has been summarised above (see points 2.1 to 2.4), make it clear that admission into the proceedings of late filed amendments will be the exception more than the rule, even more if the amendments are filed after arrangement of the oral proceedings.

9.1 There is nothing in the present case which could justify such exception with regard to the admissibility of auxiliary requests 2 to 10 filed with letter of 10 September 2012 (15 days before the oral proceedings) in view of the following facts:

- (a) The grounds against the requests on file and the evidence used to support these grounds have remained the same as in the decision under appeal.
- (b) The appellant has not provided any justification for the late filing.
- (c) The appellant has not provided any reasons for the inventiveness of the main claims of those requests which go beyond the reasons already provided for the higher ranked requests.
- (d) The amendments do not converge to a clearly identifiable amended form of the main claim, but introduce several alternative features into claim 1 of the patent as granted to be taken alone

or in all possible combinations (see point VIII, above).

9.2 Under such circumstances, auxiliary requests 2 to 10 on application of Articles 12(2) and 13 RPBA are not admitted into the proceedings.

*Request of remittal*

10. The Board decided on the main request (patent as granted) and on the auxiliary request with regard to a ground of opposition (lack of inventive step) which was fully dealt with in the appealed decision and on the basis of the same documents (D1 and D6) as used in such a decision.

10.1 In this case the new arguments presented for the first time at the oral proceedings, although somewhat surprising, did not change the situation of the case to such an extent that the Board was not in the position of deciding on the issue, as can be seen from the reasons regarding lack of inventive step, which take full account both of the arguments of the appellant provided with the statement of grounds and of the new line of argumentation provided at the oral proceedings (see points 5 to 7, above). This is also why the question of admissibility of this new argumentation, which could have brought forward an alternative case, did not arise (as was the case e.g. in T 1621/09, cited under point 3.4, above, see points 2 to 37 of the reasons of that decision, in particular the conclusion in point 37(a)).

10.2 Under such circumstances, the Board does not see any reason which could justify a remittal of the case to the first instance (Article 111(1) EPC). The request of remittal of the appellant is therefore refused.

*Conclusion*

11. Since claim 1 according to all the admissible requests on file does not involve an inventive step, there is no need for the Board to decide on any other point and the appeal is dismissed.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar

The Chairman

S. Fabiani

J. Riolo