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**D E C I S I O N**  
of 22 January 1998

**Case Number:** T 0270/94 - 3.3.1  
**Application Number:** 88305956.0  
**Publication Number:** 0298662  
**IPC:** C07C 19/08

**Language of the proceedings:** EN

**Title of invention:**  
Gas-phase fluorination process

**Patentee:**  
E.I. Du Pont De Nemours and Company

**Opponent:**  
Ausimont S.p.A.  
Solvay (Société Anonyme)

**Headword:**  
Fluorination process/DU PONT DE NEMOURS

**Relevant legal provisions:**  
EPC Art. 54, 56, 99(4), 113(1), 114(2), 123

**Keyword:**  
"Opponent not to be prevented from commenting on an opposition  
ground duly submitted by another opponent"  
"Support of amendments in the originally filed application  
(yes)"  
"Novelty (yes)"  
"Inventive step (yes) - unobvious solution"

**Decisions cited:**  
G 0010/91

**Catchword:**  
-



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Boards of Appeal

Chambres de recours

Case Number: T 0270/94 - 3.3.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 22 January 1998

**Appellant 01:** Ausimont S.p.A.  
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**Appellant 02:** Solvay (Société Anonyme)  
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**Representative:** -

**Respondent:** E.I. Du Pont De Nemours and Company  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 28 February 1994  
rejecting the opposition filed against European  
patent No. 0 298 662 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** A. J. Nuss  
**Members:** J. M. Jonk  
S. C. Perrymann

## Summary of Facts and Submissions

I. The Appellants (Opponents) lodged an appeal against the decision of the Opposition Division by which the opposition based on Article 100(a) EPC, which had been filed against the European patent No. 0 298 662 (European patent application No. 88 305 956.0) as a whole, was rejected.

II. The opposition was supported by several documents including:

- (1) EP-A-0 282 005,
- (2) DE-B-1 246 703, and
- (3) GB-A-1 000 485.

III. The decision was based on two sets of claims as granted. Claim 1 of the first set of claims for the Contracting States CH, DE, ES, FR, GB, LI, NL, SE and IT read as follows:

"A process for the preparation of 1,1,1-trifluoro-dichloroethane and 1,1,1,2-tetrafluorochloroethane by fluorination of a tetrahaloethylene,  $C_2Cl_{4-x}F_x$ , wherein  $x = 0$  to 3, comprising contacting in the gaseous phase at 300°C to 450°C said tetrahaloethylene and HF with a catalyst comprising at least one metal in an oxidation state greater than zero, said metal selected from the group consisting of chromium, manganese, nickel and cobalt, wherein in the case of chromium it is present in the form of chromium fluoride or chromium oxyfluoride, on a support comprising aluminium, oxygen

and fluorine in such proportions that the fluorine corresponds to an  $AlF_3$  content of at least 90% by weight of the catalyst composition exclusive of the metal, said  $AlF_3$  content being obtained by pretreatment with HF."

Claim 1 of the second set of claims for the Contracting States AT, BE, LU and GR read as follows:

" A process for the preparation of 1,1,1-trifluorodichloroethane and 1,1,1,2-tetrafluorochloroethane by fluorination of a tetrahaloethylene,  $C_2Cl_{4-x}F_x$ , wherein  $x = 0$  to 3, comprising contacting in the gaseous phase at  $300^\circ C$  to  $450^\circ C$  said tetrahaloethylene and HF with a catalyst comprising at least one metal in an oxidation state greater than zero, said metal selected from the group consisting of chromium, manganese, nickel and cobalt, on a support comprising aluminium, oxygen and fluorine in such proportions that the fluorine content corresponds to an  $AlF_3$  content of at least 90% by weight of the catalyst composition exclusive of the metal, said  $AlF_3$  content being obtained by pretreatment with HF."

- IV. The Opposition Division held that the subject-matter of the disputed patent was novel in view of the cited documents. Regarding document (1) they considered that according to this document a catalyst comprising chromium oxide was applied, whereas in accordance with Claim 1 of the patent in suit the catalyst comprised chromium in the form of chromium fluoride or chromium oxyfluoride only and, therefore, did not include chromium oxide. Furthermore, concerning documents (2) and (3) they considered that these documents disclosed

the use of lower temperatures, i.e. temperatures up to 290°C, and a catalyst comprising a support having a lower AlF<sub>3</sub> content, i.e. an AlF<sub>3</sub> content obtained by fluorinating 70% to 80% of the alumina.

They also held that the subject-matter of the claims involved an inventive step. In particular they considered that the technical problem underlying the patent in suit was the provision of a process for selectively producing 1,1,1-trifluorodichloroethane (R123) and 1,1,1,2-tetrafluorochloroethane (R124), while minimising the formation of pentafluoroethane (R125), and that the solution of this problem by using reaction temperatures of 300°C to 450°C and a catalyst comprising an AlF<sub>3</sub> content of at least 90% could not be derived from the cited prior art. In this context, they considered that it was apparent from document (3) that by applying high reaction temperatures and/or an excessively fluorinated alumina support, i.e. a support having an AlF<sub>3</sub> content of more than 70-80%, the activity of the catalyst was impaired.

In view of the fact that Appellant 01 (Opponent 01) based his opposition solely on the ground of lack of novelty under Article 54(3) EPC for Claims 1 to 6 and 8 to 10 as granted for the designated state IT and the states corresponding to those designated in document (1), and having regard to Article 114(2) EPC, the Opposition Division did not allow him to advance his objections with respect to the issue of inventive step.

V. Oral proceedings before the Board were held on 22 January 1998.

VI. In order to meet objections under Article 100(a) EPC put forward by the Appellants, the Respondent (Patentee) submitted during these oral proceedings two sets of claims. Claim 1 of the first set for the Contracting States CH, DE, ES, FR, GB, LI, NL, SE and IT read as follows:

"A process for the preparation of 1,1,1-trifluorodichloroethane and 1,1,1,2-tetrafluorochloroethane by fluorination of a tetrahaloethylene,  $C_2Cl_{4-x}F_x$ , wherein  $x = 0$  to 3, comprising contacting in the gaseous phase at 300°C to 450°C said tetrahaloethylene and HF with a catalyst comprising at least one metal in an oxidation state greater than zero, said metal selected from the group consisting of chromium, manganese, nickel and cobalt, wherein in the case of chromium it is present in the form of chromium fluoride or chromium oxyfluoride, on a support comprising aluminium, oxygen and fluorine in such proportions that the **support contains  $AlF_3$ , in an amount** of at least 90% by weight of the catalyst composition exclusive of the metal, said  $AlF_3$  content being obtained by pretreatment of **alumina impregnated with at least one compound of the metal with HF.**"  
(Bolds added in order to indicate the differences with respect to Claim 1 as granted).

Claim 1 of the second set of claims for the Contracting States AT, BE, LU and GR corresponded to Claim 1 as granted for the same States, except that it contained the amendments as indicated in bolds in Claim 1 of the new first set of claims.

VII. The Appellants argued that the subject-matter of these new main claims did not meet the requirements of Article 123(2) EPC, since the originally filed patent application did not disclose the now claimed feature that the catalyst support contained  $AlF_3$  in an amount of

at least 90%. Moreover, Appellant 01 also raised objections under Article 100(b) EPC by contending that the patent as granted did not disclose the preparation and the use of catalysts comprising chromium in the form of chromium trifluoride and chromium oxyfluoride only, so that a person skilled in the art could not carry out the invention as claimed.

Furthermore, they argued that the subject-matter of Claim 1 of the present first set of claims lacked novelty in view of documents (1) and (3). In this respect, they argued in particular that the catalysts in accordance with document (1) did not only contain chromium oxide but also chromium trifluoride and chromium oxyfluoride and that the catalysts comprising chromium as claimed in present Claim 1 of the patent in suit - as demonstrated by the test-report filed by Appellant 01 on 24 June 1994 - inevitably contained chromium oxide in addition to chromium trifluoride and chromium oxyfluoride. Moreover, they emphasised with respect to document(3) that the  $AlF_3$  content in the catalyst support of 70 to 80% obtained by the pre-fluorination step and the temperature range of 200°C to 400°C represented only preferred ranges, so that the  $AlF_3$  content of at least 90% and the temperature range of 300°C to 450°C as claimed in the patent in suit did not render the claimed subject-matter novel. In this context, Appellant 02 emphasised that during the fluorination process of document (3) the  $AlF_3$  content of the catalyst support increased - as demonstrated in his test-report filed on 29 December 1993 - to values of at least 90%. Furthermore, Appellant 02 contended by referring to document

(4) US-A-3 755 477

that under the reaction conditions as disclosed in document (3) not only the compound R123 was formed as suggested in Table 4, but also the compound R124.

The Appellants also argued that, if the subject-matter of the present claims were novel, it would not involve an inventive step in the light of document (4) in combination with document (2) or document (3) and the test-report filed by Appellant 02 on 29 December 1993.

In this context, Appellant 01 submitted that, contrary to the opinion of the Opposition Division, he was entitled to present his objections with respect to inventive step, since Article 114(2) EPC related to late filed facts or evidence and not to argumentation. He also considered in this respect that, otherwise, Article 107 EPC, indicating that any party to opposition proceedings who did not appeal should be a party as of rights to the appeal proceedings, would be meaningless.

VIII. The Respondent argued that the amendments of the claims were unambiguously supported by the originally filed patent application.

Moreover, by referring to the decision of the Enlarged Board of Appeal in case G 10/91, he did not give his approval to introduce the fresh ground for opposition based on Article 100(b) EPC as put forward by the Appellant (1) into the present appeal proceedings.

Furthermore, the Respondent denied that the subject-matter of the claims lacked novelty in view of documents (1) and (3). In particular he argued with respect to document (1) that this document neither disclosed the use of a catalyst comprising chromium in the form of chromium trifluoride and chromium oxyfluoride only, nor the use of a catalyst comprising



a support having an  $\text{AlF}_3$  content of at least 90%, which  $\text{AlF}_3$  content was obtained by pretreatment of alumina with hydrogen fluoride. In this context, he submitted that the forming of  $\text{Cr}_2\text{O}_3$  in the catalyst could be avoided by removing any moisture from the catalyst and the reactor and that the results of the test-report as provided by Appellant 01 suggesting the forming of  $\text{Cr}_2\text{O}_3$  could not be verified. Concerning document (3) he emphasised, that the skilled person in reading this document was clearly taught to refrain from carrying out the reaction at temperatures above about  $250^\circ\text{C}$  and by using a catalyst having a support containing more than 80% of  $\text{AlF}_3$ . He also observed that according to document (3) - as in the case of document (1) - the catalyst was treated by air and steam in order to convert the impregnated metal halide to the corresponding metal oxide.

Furthermore, the Respondent fully agreed with the reasoning of the Opposition Division regarding inventive step. In this context, he submitted that the technical problem underlying the patent in suit involving the preparation of both compounds R123 and R124 differed from that of documents (2) and (3), which only disclosed the preparation of the compound R123. Moreover, he emphasised that these documents clearly taught that the  $\text{AlF}_3$  content of the catalyst support should not be more than 70 to 80% and that they did not give any pointer to select a temperature range for the present reaction of 300 to  $450^\circ\text{C}$ .

IX. The Appellants requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of the Claim 1 submitted at the oral proceedings on 22 January 1998 and Claims 2 to 10 as granted for

the Contracting States CH, DE, ES, FR, GB, LI, NL, SE and IT and on the basis of the set of claims for the Contracting States AT, BE, LU and GR also submitted at the oral proceedings on 22 January 1998.

- X. At the conclusion of the oral proceedings the Board's decision was pronounced.

### Reasons for the Decision

1. The appeal is admissible.

2. *Procedural issues*

2.1 Having regard to Article 114(2) EPC the Opposition Division did not give Respondent 01 (Opponent 01), who based his opposition solely on the ground of lack of novelty under Article 54(3) EPC, the opportunity to advance his comments with respect to the objection of lack of inventive step which had been raised as the sole ground of opposition by Respondent 02 (Opponent 02). They considered in this respect that the introduction by Respondent 01 of objections concerning inventive step, i.e. a new ground of opposition, for the first time in the oral proceedings, would have been an abuse of the proceedings and a breach of the principles of "good faith".

However, according to Article 99(4) EPC opponents shall be parties to the opposition proceedings as well as the proprietor of the patent, so that it is clear from this provision that several admissible oppositions do not initiate a corresponding number of parallel opposition proceedings. Furthermore, in the present case, the grounds of opposition forming the legal and factual framework within which the substantive examination of

the opposition shall be conducted (see G 10/91, OJ 1993, 420) were both novelty and inventive step, whereas one Opponent (Appellant 02) requested the revocation of the patent in suit in its entirety. Therefore, in the Board's judgment, the prevention of Opponent 01 from commenting to an opposition ground **duly** submitted by Opponent 02 and communicated to **all the parties** according to Rule 57(2) EPC is contrary to the requirement of Article 113(1) EPC in that the decisions of the EPO may only be based on grounds or evidence on which **the parties concerned have had an opportunity to present their comments.**

In this context, the Board observes that Article 114(2) EPC, relied on by the Opposition Division, is not applicable, since it only indicates that the EPO may disregard **late filed facts or evidence**, whereas in the present case **arguments** were submitted by one of the parties to the proceedings with respect to a ground of opposition, which was **submitted in due time** by another party.

- 2.2 Concerning the Respondent's 01 objection under Article 100(b) EPC, which was raised for the first time in the statement of grounds of appeal as an entirely fresh ground of opposition, the Board notes that in accordance with the established jurisprudence of the boards of appeal such a ground of opposition may be considered in appeal proceedings only with the approval of the patentee (see G 10/91 referred to above). Nor can the objection be considered to be justified by any amendments made, because the objection would also have been applicable to the patent exactly as granted. Thus, in view of the fact that in the present case such approval was refused by the Patentee (see his letter dated 14 November 1994 under point 3), this fresh ground of opposition cannot be admitted into the appeal proceedings.

3. *Amendments under Article 123(2) and (3) EPC*

3.1 The Appellants argued that the subject-matter of the new main claims did not meet the requirements of Article 123(2) EPC, since the originally filed patent application did not support the claimed feature that the catalyst support contained  $\text{AlF}_3$ , in an amount of at least 90%, whereas the Respondent contested this objection.

3.2 It is true, that according to the originally filed patent application the catalyst support consists essentially of aluminium, oxygen, and fluorine in such proportions that **the fluorine content corresponds to an  $\text{AlF}_3$  content of at least 90% by weight of the catalyst composition exclusive of the supported metal, said  $\text{AlF}_3$  content being obtained by pretreatment with HF** (see page 3, last paragraph, page 4, second paragraph, page 4, line 12, concerning the expression "supported metal", and Claim 1). However, in the light of the disclosure of the application as a whole, the Board cannot accept the Appellants' interpretation of this definition of the catalyst support such that the  $\text{AlF}_3$  content of 90% by weight was only indicated in order to define the **fluorine content** of the support. In this context, the Board notes (i) that - as indicated above - the definition of the catalyst support clearly refers to  $\text{AlF}_3$ , by stating that **"said  $\text{AlF}_3$  content being obtained by pretreatment with HF"**, and (ii) that, following on a preceding passage in the originally filed application in which the fluorine content of the support is defined as **corresponding to at least 90% by weight . . . . . , preferably 95 weight percent  $\text{AlF}_3$  or more** (page 4, second paragraph, and the first two lines of the third paragraph), it is clearly specified that **the high  $\text{AlF}_3$  content support can be prepared in situ by . . . . .** Thus, in the Board's judgment, according to

both main claims the catalyst support must contain  $AlF_3$  in an amount of at least 90% by weight. This point of view is supported by the fact that, in the written appeal submissions, both appellants understood the claims in this same way (see the letter filed by Opponent 01 on 24 June 1994, e.g. page 5, paragraphs 4 and 5, and the letter submitted by Opponent 02 on 8 July 1994, in particular page 5, last paragraph, to the end of page 6).

3.3 The amendment in the last two lines of both main claims indicating that the pretreatment with HF concerns a treatment of **alumina impregnated with at least one compound of the metal** is based on page 5, third paragraph, of the originally filed patent application.

3.4 The only objection raised by the Appellants under Article 123(2) EPC concerned the  $AlF_3$  content, and the Board sees no reason to raise other objections to the claims in relation to said Article.

3.5 Furthermore, it is immediately clear that said amendments do not extend the scope of protection of the claims.

3.6 Thus, all the claims of the new sets of claims according to the present request comply with the requirements of Article 123(2) and (3) EPC.

#### 4. *Novelty*

4.1 After examination of the prior art documents, the Board has reached the conclusion that the now claimed subject-matter is novel.

4.2 It is true, that the Appellants disputed the novelty of the claimed subject-matter in view of documents (1) and (3).

4.3 However, document (1), which is in accordance with Articles 54(3) to be considered as comprised in the state of the art for the contracting states CH, DE, ES, FR, GB, LI, NL, SE and IT, relates to a process for preparing 1,1,1-trifluorodichloroethane by hydrofluorination of perchloroethylene in the presence of a catalyst comprising **chromium oxide** supported on  $AlF_3$  in the gamma and/or beta form (see page 2, line 51, to page 3, line 10). Moreover, it discloses that the catalyst can be prepared by (i) impregnating the  $AlF_3$  support with a solution of e.g.  $CrCl_3 \cdot 6H_2O$ , (ii) partially drying, and (iii) further by an activation treatment **in order to convert chromium to the oxide form** (see page 3, lines 11 to 17, and e.g. Example 1).

Therefore, in the Board's judgment, the process as disclosed in document (1) differs from that as claimed in the main claim for the contracting states CH, DE, ES, FR, GB, LI, NL, SE and IT in that it is performed in the presence of a catalyst comprising chromium oxide as the essential chromium component, whereas according to the present Claim 1 for these contracting states the process is carried out in the presence of a catalyst comprising chromium fluoride or chromium oxyfluoride, essentially excluding chromium oxide.

In this context, the Board observes that, in view of Article 54(3), document (1) does not represent prior art with respect to the subject-matter of the present claims for the contracting states AT, BE, LU and GR.

- 4.3.1 Appellant 01 submitted by referring to his test-report as filed on 24 June 1994, and in particular to Tests 1 to 4 and 6, that the catalysts of document (1) not only comprised chromium oxide but inherently also chromium fluoride and/or chromium oxyfluoride. Moreover, he emphasised by referring to Tests 1A and 7A, the latter one being prepared according to the patent in suit, that the percent compositions of the catalyst surfaces were exactly the same and that the elements were in the same chemical environment (see under "CHARACTERIZATION OF THE CATALYSTS" on pages 6 to 8, in particular page 7, paragraphs 8 to 10).
- 4.3.2 However, as submitted by the Respondent, this test-report does not provide any information whether the catalysts of document (1) comprise chromium fluoride and/or chromium oxyfluoride in significant amounts.
- 4.3.3 Moreover, the Board cannot accept the Appellant's submission that the catalysts according to Tests 1A and 7A were substantially identical, since according to Tests 1B and 7B of the test-report relating to the fluorination of perchloroethylene using the catalysts of Tests 1A and 7A respectively under comparable reaction conditions gave clearly distinct product streams. In this respect, the Board notes that Test 1B using a catalyst according to Example 1 of document (1) gave a total yield of the desired products 1,1,1-trifluorodichloroethane and 1,1,1,2-tetrafluorochloroethane of 5.1% at a perchloroethylene conversion of 13.1%, whereas Test 1B using a catalyst according to the patent in suit showed a total yield of said products of 12.7% at a conversion of the perchloroethylene of 32%.

4.3.4 In addition, the Board observes that this finding of quite different product streams, rendering it plausible that the catalysts of document (1) substantially differ from those of the patent in suit, is actually confirmed by the experimental results as specified in document (1) and in the patent in suit, which results have not been disputed by the Appellants. According to the Examples 1 to 4 of document (1) the total yields of the desired products were namely 6.3%, 24.8%, 19.6% and 13.4% respectively at conversions of perchloroethylene of 12%, 36%, 29% and 23.3% respectively, whereas the relevant Examples 10 to 13 of the patent in suit showed total yields of said products of 53.6%, 79.3%, 79.3% and 79.4% respectively at conversions of perchloroethylene of 62.1%, 78.3%, 78.1% and 80.3% respectively.

4.3.5 Therefore, these submissions as put forward by the Appellant 01, who in accordance with the established case law of the boards of appeal carries the burden of proof for the facts he alleges, cannot be accepted by the Board in the absence of convincing substantiation.

4.4 Furthermore, document (3) relates to a process for the preparation of organic fluorinated compounds by fluorination of halo-olefins comprising passing in the gaseous phase and at an elevated temperature of preferably 200°C to 400°C a mixture of halo-olefin and hydrogen fluoride over a catalyst consisting essentially of partially fluorinated alumina activated by impregnation with a solution of one or more polyvalent metal halides, said polyvalent metal being selected from the group consisting of chromium, cobalt, nickel and manganese (see page 2, lines 28 to 37, and page 3, lines 40 to 46). Preferably 70% to 80% of the alumina is fluorinated (see page 3, lines 66 and 67 and 81 to 87, and the examples).



- 4.4.1 The catalyst can be prepared by subsequently (i) impregnating a suitable amount of alumina with a solution of one or more of the metal halides, (ii) drying the impregnated alumina, (iii) depositing this dried catalyst material in a reactor, (iv) heating it to a temperature between 500°C and 650°C, (v) passing through the catalyst material a current of air mixed with steam, (vi) lowering the temperature to 250°C to 300°C, (vii) and passing through the catalyst material a slow current of anhydrous hydrogen fluoride in order to obtain a partial (70-80%) fluorination of the alumina (see page 3, lines 70 to 85).
- 4.4.2 Further to this teaching, it is observed in this document that if fluorination is excessive, the activity of the catalyst is impaired, that during its employment the catalyst tends to become exhausted on account of a slow fluorination, and that the higher the reaction temperature, the more rapid is the loss of activity (see page 3, lines 85 to 91).
- 4.4.3 In addition, document (3) discloses in Example 4, which is the only example using a starting compound envisaged in the patent in suit, the hydrofluorination of perchloroethylene under various reaction conditions according to Tests 13, 14 and 15 as indicated in Table 4 in the presence of a catalyst obtained by fluorinating gamma-alumina impregnated with a solution containing chromium fluoride and cobalt chloride in amounts to a total of 2,5% (expressed as oxide) by weight of the alumina in order to obtain 70% to 80% fluorinated alumina. According to said Table 4 the reaction temperatures as used in the Tests 13, 14 and 15 were 220°C, 250°C and 290°C respectively giving yields of the desired 1,1,1-trifluorodichloroethane of 78%, 87% and 81% respectively at conversions of the perchloroethylene of 92%, 93.5% and 84.5% respectively.

4.4.4 With respect to document (3), the Appellants emphasised that the temperature range of from 200°C to 400°C for performing the hydrofluorination and the range of 70% to 80% for the partial fluorination of the alumina are both clearly indicated as preferred ranges, so that the teaching of this document does not exclude the use of a reaction temperature of 300°C to 450°C and a catalyst comprising a support containing  $AlF_3$  in amount of at least 90% as claimed in the present two main claims of the patent in suit.

4.4.5 However, according to the established jurisprudence of the boards of appeal, in assessing novelty the question is whether a disclosure as a whole directly and unambiguously makes available to a skilled person as a technical teaching the subject-matter for which protection was sought.

4.4.6 According to the specification of document (3), as indicated above under point 4.4, the hydrofluorination of halo-olefins can indeed be performed at reaction temperatures of preferably 200°C to 400°C in the presence of a catalyst comprising a alumina support which is preferably fluorinated to a degree of 70% to 80%. However, as indicated above under point 4.4.3, Example 4 of document (3), i.e. the only example relating to a starting compound falling under the scope of the patent in suit, discloses in particular that the hydrofluorination of perchloroethylene in the presence of a catalyst being preferred regarding the fluorination degree of its support of 70% to 80% at a temperature of 290°C gives a lower yield of the desired product and also a lower conversion of the perchloroethylene than the same reaction at a temperature of 250°C representing the optimum temperature with respect to conversion and selectivity.

4.4.7 Thus, in view of the teaching in document (3) that the catalyst activity is impaired if fluorination of the alumina support is excessive and that the higher the reaction temperature, the more rapid the loss of catalyst activity is (see page 3, lines 85 to 91), as well as the test-results of Example 4, in the Board's judgment, document (3) does not clearly and unambiguously teach to apply a catalyst having a support containing at least 90% of  $AlF_3$  and a reaction temperature of at least  $300^\circ C$  as claimed in the present main claims of the patent in suit.

5. *Inventive step*

5.1 The remaining issue to be dealt with is whether the subject-matter of the present claims involves an inventive step in the light of the cited prior art documents in the sense of Article 56 EPC, thus excluding document (1).

5.2 The Board considers, in agreement with the Appellants and accepting in their favour that according to Example 4 of document (3) - as supported by the test-report as filed by Appellant 02 on 29 December 1993 (see in particular the Table on page 3, Comparative Example 1) - in addition to the main product 1,1,1-trifluorodichloroethane also a small amount of 1,1,1,2-tetrafluorochloroethane is obtained, that the closest state of the art with respect to the process according to present claims is the disclosure of document (3).

5.3 In the light of this closest state of the art, which - as indicated above under point 4.4.3 - discloses in Tests 13, 14 and 15 of Example 4 the preparation of 1,1,1-trifluorodichloroethane and - as indicated in the preceding paragraph - also 1,1,1,2-tetrafluorochloroethane at selectivities and

conversions being comparable with those of the examples of the disputed patent, the Board sees the technical problem underlying the patent in suit as the provision of an alternative process for the preparation of said compounds, while minimising the production of pentafluoroethanes (see also page 2, lines 39 to 41, of the patent in suit).

- 5.4 The patent in suit suggests, as the solution to this problem, a process according to both Claims 1 for the respective contracting states, which is performed at a temperature of 300°C to 450°C and in the presence of a catalyst which is characterised by a **support that contains AlF<sub>3</sub>**, in an amount of at least 90% by weight of the catalyst composition exclusive of the metal, **said AlF<sub>3</sub> content being obtained by pretreatment of alumina impregnated with at least one compound of the metal with HF** as specified in the claims as essential features.
- 5.5 Having regard to the examples of the patent in suit, the Board considers it plausible that the technical problem as defined above has been solved. This was never challenged by the Appellants.
- 5.6 In assessing inventive step the question thus is whether a skilled person starting from document (3) would arrive at something falling within Claim 1 by following the suggestions made in the cited prior art documents, with the exception of document (1) in view of Article 56 EPC.
- 5.7 Although document (3) - as indicated above - relates to a process for the preparation of organic fluorinated compounds by fluorination of halo-olefins, such as perchloroethylene, comprising passing in the gaseous phase and at an elevated temperature of preferably 200°C to 400°C a mixture of halo-olefin and hydrogen

fluoride over a catalyst consisting essentially of partially, i.e. preferably 70% to 80%, fluorinated alumina activated by impregnation with a solution of one or more polyvalent metal halides, said polyvalent metal being selected from the group consisting of chromium, cobalt, nickel and manganese, in the Board's judgment, it does not give any incentive to the skilled person to solve the technical problem as defined above by providing a fluorination process as presently claimed in the patent in suit which is characterised by a reaction temperature of at least 300°C and a catalyst having a support containing at least 90% of  $AlF_3$ , since - as set out above (see in particular points 4.4.6 and 4.4.7) - in the case of a starting compound falling under the scope of the patent in suit, document (3) clearly points away from the solution now claimed by indicating that the catalyst activity is reduced if higher reaction temperatures than 250°C are applied or the fluorination of the alumina support is excessive.

5.8 The disclosure of document (2), which document belongs to the same patent family as document (3), corresponds essentially to that of document (3), except that the partial fluorination of the alumina catalyst support to a degree of 70% to 80% is considered as an essential feature instead of a preferred degree of fluorination (see column 1, lines 19 to 42 and 50 to 52, and Example 4). Thus, the considerations concerning inventive step in the preceding paragraph also apply to document (2).

5.9 Document (4) relates to chromium oxide catalysts, which are useful for the fluorination of halogenated hydrocarbon compounds, such as perchloroethylene (see column 1, lines 20 to 43, and Claims 1 and 14). However, the catalysts according to this document do not comprise a support, let alone a particular support as claimed in accordance with the patent in suit.

Moreover, it is true that according to Example 23 perchloroethylene is fluorinated at a temperature of 360°C, but the applied reaction conditions including the use of such a chromium oxide catalyst lead to unacceptable high amounts of pentafluoroethanes, namely  $\text{CF}_3\text{CF}_2\text{H}$  (30%) and  $\text{CF}_3\text{CF}_2\text{Cl}$  (20%). Thus, also this document does not give any pointer to a skilled person to solve the technical problem as defined above, involving the minimisation of the production of pentafluoroethanes, by providing a process a presently claimed which is characterised by the particular catalyst as claimed.

- 5.10 In conclusion, the Board finds that the processes as claimed in both main claims of the patent in suit for the respective contracting states involve an inventive step in the sense of Article 56 EPC.

Since all the subclaims relate to particular embodiments of the processes as claimed in the main claims, they are also allowable.

**Order**

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

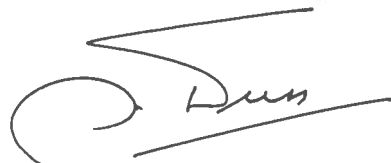
1. The decision under appeal is set aside.
  
2. The matter is remitted to the first instance with the order to maintain the patent on the basis of the Claim 1 submitted at the oral proceedings on 22 January 1998 and Claims 2 to 10 as granted for the contracting states CH, DE, ES, FR, GB, LI, NL, SE and IT, and on the basis of the set of claims for the contracting states AT, BE, LU and GR submitted at the oral proceedings on 22 January 1998, and a description to be adapted.

The Registrar:



P. Martorana

The Chairman:



A. Nuss

