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D E C I S I O N
of 30 November 2005

Case Number: T 0176/04 - 3.3.10

Application Number: 96903211.9

Publication Number: 0811592

IPC: C07C 19/08

Language of the proceedings: EN

Title of invention:

Process for producing pentafluoroethane and tetrafluorochloroethane

Patentee:

DAIKIN INDUSTRIES, LIMITED

Opponents:

Solvay (Société Anonyme)
RHODIA CHIMIE

Headword:

-

Relevant legal provisions:

EPC Art. 52(1), 56, 123(2)

Keyword:

"Main and auxiliary requests I-VII: Inventive step (no) - improvement not credible - no fair comparative tests - reformulation of problem - obvious alternative"

"Auxiliary request VIII: Amendments (not allowable) - not directly and unambiguously derivable from application as filed"

Decisions cited:

T 0020/81, T 0022/81, T 0270/90, T 0288/92, T 0680/93

Catchword:

-



Case Number: T 0176/04 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 30 November 2005

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 4 December 2003
rejecting the opposition filed against European
patent No. 0811592 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: R. Freimuth
Members: P. Gryczka
P. Schmitz

Summary of Facts and Submissions

I. The mention of the grant of European patent 0 811 592, in respect of European patent application No. 96903211.9, which is based on the International application PCT/JP96/00401 filed on 22 February 1996, was published on 18 July 2001. The patent was granted on the basis of a set of 36 claims containing 8 independent claims. Independent claim 7 read as follows:

"7. A process of producing HFC-125 comprising the steps of:

(1-ii-a) reacting PCE and HF in the presence of catalyst at a reaction temperature in the range between 60 °C and 150 °C in a liquid phase first reaction step so as to obtain a first reaction mixture comprising HCFC-123 and/or HCFC-122,

(1-ii-b) obtaining a first fraction from the first reaction mixture which fraction comprises HCFC-123 and/or HCFC-122 and HCl and a portion of unreacted HF,

(1-ii-c) obtaining a fifth fraction by removing HCl from the first fraction which contains HCl,

(1-ii-d) reacting the fifth fraction, optionally with additional HF, in the presence of catalyst at a reaction temperature in the range between 250 °C and 450 °C in a vapor phase second reaction step so as to obtain a second reaction mixture comprising HCFC-123, HCFC-124, HFC-125, HCl and HF,

(1-ii-e) separating the second reaction mixture into three fractions: a second fraction which comprises most of HCFC-123 and/or HCFC-124 of the second reaction mixture and HF entrained therewith, a third fraction which comprises most of HFC-125 and HCl of the second

reaction mixture, and a fourth fraction which comprises the rest of HF,

(1-ii-f) recirculating the second fraction to the step (1-ii-d) and reacting it together there,

(1-ii-g) recirculating the fourth fraction to the step (1-ii-a) and/or the step (1-ii-d) and reacting it together there, and

(1-ii-h) separating out HFC-125 from the third fraction."

II. Two notices of opposition were filed in which revocation of the patent in its entirety was requested on the grounds of lack of novelty and inventive step (Article 100(a) EPC) and insufficiency of disclosure (Article 100(b) EPC).

Inter alia, the following documents were cited during the opposition proceedings:

(1) EP-A-0 687 660,

(3) US-A-4 967 024 and

(4) US-A-5 315 046.

III. In a decision issued in writing on 4 December 2003, the Opposition Division rejected the oppositions.

The Opposition Division came to the conclusion that the invention was sufficiently disclosed in the patent in suit and that the claimed subject-matter was novel. With regard to inventive step, the object of the invention underlying the patent in suit was seen in the provision of a process for the preparation of HFC-125 or HCFC-124 by fluorination of PCE in which no hot

spots were formed during the reaction, the catalyst remained stable and the yield of the required product was improved. As shown by example 5 and comparative example 1 in the patent specification, this problem was solved by the claimed process which involved a first step in liquid phase for converting PCE with HF to HCFC-122 and/or HCFC-123, followed by a second step in gas phase in which HCFC-122 and/or HCFC-123 formed in the first step were converted to HFC-125 or HCFC-124. This solution was not suggested by the closest prior art illustrated by document (1) which disclosed a process in which the first step was carried out in the gas phase at elevated temperatures and pressures. Document (3) disclosed the preparation of HCFC-123 from PCE in the liquid phase but gave not hint to precise conditions for the further conversion of HCFC-123 to HFC-125. Thus, the invention underlying the opposed patent could be seen in the finding that the single stage reaction in the liquid phase disclosed in example 1 of document (3), could be used to improve the gas phase process of document (1). Therefore, the claimed process involved an inventive step.

- IV. The Appellants 1 and 2 (Opponents 1 and 2) lodged an appeal, respectively, on 11 February 2004 and 28 January 2004, against the above decision.

- V. With a letter dated 1 December 2004, the Respondent (Proprietor of the patent) filed an experimental report (25) and seven sets of claims as auxiliary requests I to VII.

Claim 7 as granted was also present in auxiliary requests I to III and in auxiliary requests IV and VI in form of claims 6 and 1, respectively.

Claim 6 of auxiliary request V and claim 1 of auxiliary request VII differed from claim 7 as granted only by the addition in step (1-ii-a) of a list of particular catalysts to be used in the liquid phase first reaction step, i.e. "a catalyst selected from antimony fluoride, titanium fluoride, tin fluoride, antimony fluoride chloride, titanium fluoride chloride, tin fluoride chloride".

During the oral proceedings held on 30 November 2005, the Respondent filed a further set of claims as auxiliary request VIII. Claim 6 of said request read as follows:

"6. A process of producing HFC-125 comprising the steps of:

(1-ii-a) reacting PCE and HF in the presence of catalyst at a reaction temperature in the range between 60°C and 150°C in a liquid phase first reaction step so as to obtain a first reaction mixture comprising HCFC-123 and/or HCFC-122,

(1-ii-b) obtaining a first fraction from the first reaction mixture which fraction comprises HCFC-123 and/or HCFC-122 and HCl and a portion of unreacted HF **but no PCE**,

(1-ii-c) obtaining a fifth fraction by removing HCl from the first fraction which contains HCl,

(1-ii-d) reacting the fifth fraction, optionally with additional HF, in the presence of catalyst at a

reaction temperature in the range between 250°C and 450°C in a vapor phase second reaction step so as to obtain a second reaction mixture comprising HCFC-123, HCFC-124, HFC-125, HCl and HF,

(1-ii-e) separating the second reaction mixture into three fractions: a second fraction which comprises most of HCFC-123 and/or HCFC-124 of the second reaction mixture and HF entrained therewith, a third fraction which comprises most of HFC-125 and HCl of the second reaction mixture, and a fourth fraction which comprises the rest of HF,

(1-ii-f) recirculating the second fraction to the step (1-ii-d) and reacting it together there,

(1-ii-g) recirculating the fourth fraction to the step (1-ii-a) and/or the step (1-ii-d) and reacting it together there, and

(1-ii-h) separating out HFC-125 from the third fraction." (**emphasis** added by the Board).

VI. The Appellants challenged the sufficiency of disclosure of the present invention and objected to the novelty of the process defined in independent claims 1 and 9 as granted. Whereas the process defined in claim 7 of the patent as granted and in the corresponding claims of the auxiliary requests I to VII was considered to be novel, the Appellants, in essence, brought forward the following arguments with regard to inventive step:

As acknowledged in the patent specification, the steps of the claimed process were known *per se* and no interaction between the steps was required by the claims. The process disclosed in document (1) should be considered as the closest prior art, although a negative outcome for the assessment of inventive step

could also be reached when starting from other documents on file. Since the comparative tests reported in the patent in suit and in the test report (25) did not reproduce the process of the closest prior art document (1), it could not be concluded that the claimed process resulted in improved technical effects, namely in term of yield, selectivity, hot spots and catalyst life time. Thus, the problem underlying the patent in suit could only be defined as the provision of an alternative process for preparing HCF-125 or HCFC-124. Confronted with that problem, the skilled person would, with regard to the high yields of HCFC-123 disclosed in document (3), find an incentive to carry out the first step of the process disclosed in document (1) in liquid phase. In addition, the purification, separation and recycling steps defined in the independent claim 7 of the patent as granted and in the corresponding claims of the auxiliary requests I to VII were known from document (1) or were inherent to a process involving a step in liquid phase followed by a step in vapor phase. Thus, the juxtaposition of the steps as defined in claim 7 of the patent as granted and in the corresponding claims of the auxiliary requests I to VII was obvious for a skilled person and could not involve an inventive step.

According to Appellant 1 the amendments carried out in the claims of auxiliary request VIII were not supported by the application as filed.

- VII. The Respondent considered that the patent specification and the documents cited therein provided sufficient information to carry out the invention and that the claimed process was novel, since none of the prior art

documents cited by the Appellants disclosed the specific sequence of a liquid phase first reaction step and a vapor phase second reaction step.

With regard to inventive step, the Respondent argued as follows:

The problem underlying the invention over the two-step gas phase process disclosed in the closest prior art document (1) was the provision of a process for the preparation of HFC-125 or HCFC-124 by fluorination of PCE, wherein no hot spots were formed during the reaction, the catalyst life time was longer, less by-products were formed and the yield of the desired products was improved. It could be concluded from example 5 and comparative example 1 of the patent in suit, and also from the experimental report (25) that this problem was effectively solved by the claimed process. In fact, it could be calculated that the yield in example 5 was at least 97%, whereas comparative example 1, in which the whole process was carried out in gas phase, provided 4,8 mol% of by-products and thus less desired product than in example 5. The experimental report (25) showed that higher yields and selectivity for the intermediate product HCFC-123 were achieved when the first step was carried out in the liquid phase. This implied also that higher yields of the final product HCF-125 would be obtained in the second step, since the two steps of the claimed process were interacting so as to give rise to synergistic effects. In addition, the claimed process facilitated the removal of non-reacted PCE and HCl and the products of the first step HCFC-122 and HCFC-123 formed an azeotropic mixture with HF which could be easily

separated from the by-products before carrying out the second step. Since the conditions of the first step were milder, less by-product CFC-115 was produced. The formation of hot spots was avoided in the first and, due to the removal of PCE, also in the second step. Thus, the generation of by-products was lower and a high yield in the desired products could be achieved. These improvements could not be achieved with an overall gas phase reaction.

Since, the Respondent had carried out experiments in order to show that the claimed process resulted in improvements when compared to the closest prior art, the burden of proof that such improvements were not achieved was on the side of the Appellants. However, the Appellants did not file any evidence in support to their allegation that the claimed process could only be seen as an alternative to the closest prior art.

Document (1) did not give any hint that the technical problem underlying the invention could be solved by the claimed process. In fact, it taught that high pressure and high temperatures were effective to increase the conversion of PCE, so that the reaction in the first reaction zone had also to be carried out in vapor phase, preferably at 250 to 400°C. In addition, the skilled person would be deterred from changing the type of phase in the middle of the reaction, in particular since different apparatus had to be used in liquid and vapor phase.

Thus, the claimed subject-matter involved an inventive step over document (1) alone or combined with any of the other cited documents.

From the various separation, recycling and purification steps defined in claim 7 as granted and in the corresponding claims of the auxiliary requests, step (1-ii-b) was an important feature, since the invention underlying the patent in suit was based on the findings that the first fraction obtained after the liquid phase reaction step did not contain the starting compound PCE and could thus be sent to the second reaction step after removal of HCl and without further separation steps.

With respect to the auxiliary requests V and VII, the Respondent argued that the catalysts were defined in the claims in order to overcome the objections of the Appellants with respect to the insufficiency of disclosure.

According to the Respondent, the claims of the auxiliary request VIII were amended to clarify that the first fraction obtained from the first reaction mixture did not comprise PCE. This amendment was supported by the application as filed.

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

The Respondent requested that the appeal be dismissed and the patent be maintained as granted and, subsidiarily, that the patent be maintained on the basis of one of the auxiliary requests I to VII filed with the letter dated 1 December 2004, or on the basis of auxiliary request VIII filed during the oral proceedings before the Board.

IX. Oral proceedings were held in the absence of the Appellant 2 who, after having been duly summoned, informed the Board with a letter dated 18 October 2005 that he will not attend. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.
2. *Sufficiency of disclosure*

The Appellants objected to the sufficiency of disclosure of the invention. In view of the negative conclusions with respect to inventive step of the claimed process according to the main request and the auxiliary requests I to VII (see points 5 and 6 below), and since the amendments of the claims according to the auxiliary request VIII are not supported by the application as filed (see point 7 below), a decision of the Board on the issue of sufficiency is not necessary.

Main and auxiliary requests I to IV and VI

3. Claim 7 of the granted patent is also present in the auxiliary requests I to IV and VI (see point V above). Therefore, in view of the multiplicity of requests and independent claims and since the Appellants have requested the revocation of the patent in its entirety, it is appropriate to examine in a first step whether the objections brought forward by the Appellants

prejudice the patentability of the subject-matter of that claim.

4. *Novelty*

The Appellants did not raise any objection with regard to the novelty of the subject matter of claim 7 as granted. The Board on its own does not see any reason to take a different view. Hence, it is unnecessary to go into more details in this respect.

5. *Inventive step*

5.1 For the assessment of inventive step in accordance with the "problem-solution approach", it is necessary to establish the closest prior art in order to determine in the light thereof the technical problem which the invention addresses and solves. The "closest prior art" is normally represented by a prior art document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common (Case Law of the Boards of Appeal of the EPO, 4th. Edition 2001, I.D.3.1).

5.2 The patent in suit is directed to a process for producing HCF-125 and/or HCFC-124 by a process including two steps, namely a step in which PCE and HF are reacted in the presence of a catalyst in a liquid phase first reaction step so as to obtain a reaction mixture comprising HCFC-123 and/or HCFC-122, and a step in which HCFC-123 and/or HCFC-122 obtained in this first step are reacted with HF in the presence of a catalyst in a vapor phase so as to obtain a reaction mixture comprising HCFC-124 and/or HFC-125. This

process can be operated so as to include separation and recycling steps, as defined in claim 7.

- 5.3 The preparation of HCF-125 in a two-step process starting from PCE and involving first the fluorination of PCE and then the fluorination of the obtained HCFC-123 so as to produce HCF-125, belongs to the state of the art, as evidenced by document (1).

Document (1) relates to a two-step method for producing HFC-125 in which the reaction stages are conducted in different regions, a first reaction region wherein mainly PCE reacts with hydrogen fluoride in a vapor phase in the presence of a catalyst, and a second reaction region wherein mainly HCFC-123 and/or HCFC-124 reacts with hydrogen fluoride in a vapor phase in the presence of a catalyst, said first reaction region being kept at a higher pressure than said second reaction region (column 3, lines 22 to 33; claims 1 and 19). The temperature in the first reaction region with high pressure is between 200°C and 450°C and the temperature in the second reaction region with low pressure is between 250°C and 500°C (column 5, lines 40 to 46; claim 8). The process characteristics in the second reaction region correspond to those defined in step (1-ii-d) of claim 7 of the patent as granted.

Both reaction stages may be connected directly. However, if reaction gases flow continuously from the high-pressure-reaction stage to the low-pressure-reaction stage, the HCl gas formed in the high-pressure-reaction stage flows directly in the low-pressure-reaction stage maintained at a high temperature. In this case, HCl present in the gas flow exerts an adverse effect on the

following fluorination reaction. Therefore, it is more advantageous to have a distillation column between the two reaction stages (column 6, lines 9 to 19). The removal of unnecessary gases - necessarily including the detrimental HCl gas - by distillation columns between the high- and low-pressure-reaction stages is considered to be effective to avoid the defects of the continuous inflow of reaction gases (column 6, lines 26 to 31; claim 19). Furthermore, a gas drawn from an area in the distillation column where organic compounds are comprised mainly of HCFC-123 is introduced into the low-pressure-reaction stage after adjusting the content of HF if necessary, which condition reveals that at least a portion of unreacted HF is still present (column 7, lines 9 to 15; claim 19). These features correspond to those defined in steps (1-ii-b), (1-ii-c) and (1-ii-e) of claim 7 of the patent as granted.

Distillation columns can be installed before and after the second reaction region (claim 9). From the distillation column in the high- or low-pressure reaction stages, unreacted raw materials and by-products can be recycled to the corresponding reaction stages (column 6, lines 35 to 39; claim 19). These recycling steps correspond to steps (1-ii-f) and (1-ii-g) of the process in accordance with claim 7 of the patent as granted.

Reaction gases from the low-pressure-reaction stage are returned to an area in the distillation column where organic compounds are comprised mainly of HFC-125 and HCFC-124. From the top of that distillation column, principally HFC-125 and HCl are extracted and sent to the purification process (column 7, lines 28 to 33, 41

to 43). This extraction and purification step corresponds to step (1-ii-h) of the process according to claim 7 as granted.

A process comprising all those steps in combination is disclosed in claim 19.

Document (1) addresses, as advantages of the process, the extension of the catalyst lifetime and the increase of the yield of the final product HFC-125 (column 5, lines 35 to 39).

Therefore, the Board considers, in agreement with all the parties and the Opposition Division, that document (1) represents the closest prior art and starting point in the assessment of inventive step.

- 5.4 Having regard to this prior art, the Respondent submitted that the technical problem to be solved by the subject-matter of the patent in suit was to provide a process for preparing HFC-125 wherein no hot spots were formed during the reaction, the catalyst lifetime was increased, less by-products were formed and the yield of the desired products was improved (letter dated 1 December 2004, page 11, paragraph 4.1).
- 5.5 As the solution to this problem the patent in suit proposes the process according to claim 7, which is characterized by reacting PCE and HF at a reaction temperature in the range between 60°C and 150°C in a liquid phase first reaction step so as to obtain a first reaction mixture comprising HCFC-123 and/or HCFC-122 (step (1-ii-a)).

The Respondent argued that obtaining a first fraction from the first reaction mixture which fraction comprises HCFC-123 and/or HCFC-122 and HCl and a portion of unreacted HF (step (1-ii-b)) characterized the claimed process as well in view of the closest prior art. However, the process described in document (1) already discloses this operational step (see point 5.3 above) with the consequence that it cannot qualify for contributing to any inventive ingenuity vis-à-vis that document.

Furthermore, the Respondent argued that the fourth fraction in step (1-ii-e) and the entraining of HF in the second fraction of step (1-ii-e) distinguished the claimed process from the closest prior art, but declared at the same time that these steps were not essential for performing the claimed invention. This view is supported by the patent specification which does not put any emphasis on these steps. Consequently, these process features are to be disregarded when assessing inventive step (see decision T 22/81, OJ EPO 1983, 226, points 5.7 and 7 of the reasons).

5.6 The Appellants and the Respondent were divided as to whether or not the evidence presented, namely comparative example 1 and example 5 of the patent specification and the test report (25) filed by the Respondent, convincingly showed that the technical problem defined herein above (see point 5.4) was successfully solved by the claimed process.

5.6.1 The process described in comparative example 1 was carried out using a tubular reactor filled with a fluorination catalyst (fluorinated chromium oxide). PCE

and HF were supplied to the reactor heated to a temperature of 350°C and reacted so as to form HFC-125. The reaction was continued for 300 hours and the produced gas from the reactor was treated for the acid removal (patent specification, page 13, line 50 to page 14, line 4).

This comparative example does not reproduce the process disclosed in the closest prior art document (1), since the whole process is operated in a single reaction step and not, as required by document (1), in two different reaction steps under different pressures, i.e. in a first region in which mainly PCE and HF react to form HCFC-123 and in a second region where mainly the fluorination of HCFC-123 takes place so as to form the final product HFC-125 (point 5.3 *supra*). In fact, comparative example 1 reproduces the direct fluorination of PCE to HFC-125 in vapor phase in a single step and thus, reflects prior art which is further away from the claimed process than document (1).

Therefore, comparative example 1 does not truly reflect the closest prior art and does not allow a fair comparison with the claimed invention.

- 5.6.2 In the experimental report (25), the liquid phase first reaction step of the process in accordance with the patent in suit (test 1) is compared with a first reaction step carried out in gas phase (test 2). The report specifies that the operating conditions of "test 2" were similar to those used in the first reaction step of example 1 of document (1). However, neither test involves a two-step process. Thus, "test 1" does not reproduce the process of the patent in suit and

"test 2" not that of document (1), since the reaction mixture obtained after the first step is not sent to a second reaction step in which the final product HFC-125 is produced. Therefore, those tests do not allow any conclusion with regard to the technical benefits of the claimed process vis-à-vis the process disclosed in document (1). The Respondent emphasised that the technical effects were achieved by the combination of the two process steps and relied in its argumentation on a synergistic profit resulting from that combination due to an interaction of these steps (patent specification, page 2, lines 38 and 39; letter dated 1 December 2004, section 4.3). Hence, the Respondent's allegation cannot be evidenced by its test report involving only the first step of the two-step process.

Thus, the experimental report (25) neither truly reflects the teaching of the prior art, nor does it reproduce the claimed process. Consequently, this report does not allow a fair comparison between the claimed process and the closest prior art.

5.6.3 The Respondent argued that it had not to carry the onus of proof for the fact that the claimed process achieved the alleged technical benefits over the closest prior art. It was rather on the Appellant 2 to show that the claimed process did not achieve those benefits.

However, according to the established jurisprudence of the Boards of Appeal, each of the parties to the proceedings carries the burden of proof for the facts it alleges (see e.g. decision T 270/90, OJ EPO 1993, 725, point 2.1). If a party, whose arguments rest on these alleged facts, does not discharge its burden of

proof, this goes to the detriment of that party, here the Respondent, and does not shift the onus of proof onto the other party, here the Appellants. In the present case, where the Respondent relies on technical benefits over the process disclosed in document (1) with respect to yield, selectivity, catalyst lifetime and hot spots formation, the burden of proof for those facts lies on its side. Since the Respondent did not present a fair and convincing comparison between the closest prior art and the claimed invention, the purported technical benefits are devoid of corroborating evidence. Hence, the Respondent has not discharged its burden of proof with the consequence that the Respondent's unsubstantiated allegations are not to be taken into consideration by the Board.

5.6.4 Consequently, the alleged advantages of the claimed process over the closest prior art are not adequately supported by the evidence on which the Respondent relies.

5.7 According to the jurisprudence of the Boards of Appeal, alleged but unsupported advantages cannot be taken into consideration for the determination of the problem underlying the claimed invention (see e.g. decision T 20/81, OJ EPO 1982, 217, point 3, last paragraph of the reasons). Since in the present case the alleged advantages, i.e. longer lifetime of the catalyst, less hot spots, higher yield and selectivity, lack the required experimental support, the technical problem as defined above (see point 5.4) needs to be redefined in a less ambitious way, and in view of the teaching of document (1) can merely be seen in providing an alternative process for preparing HCF-125.

5.8 It remains to be decided whether or not the proposed solution to that objective technical problem, namely the process according to claim 7 of the patent in suit, is obvious in view of the state of the art.

5.8.1 The skilled person looking for an alternative to the process disclosed in document (1) would turn its attention to document (3) which belongs to the same technical field of preparing fluorinated hydrocarbons and discloses the reaction of PCE and HF to produce HCFC-123 in liquid phase at a temperature of preferably 60 to 160°C (claims 16 and 19; column 1, lines 51 to 54; column 5, line 31). In addition, document (3) teaches that the intermediate product HCFC-123 is a useful raw material for preparing HCF-125 (column 1, lines 60 to 65). The skilled person is all the more likely to pursue this course since document (3) gives thereby a direct hint to use the intermediate product HCFC-123 produced by the reaction of PCE and HF in liquid phase for preparing HFC-125.

The Board concludes from the above that document (3) gives a clear incentive on how to solve the technical problem underlying the patent in suit of providing an alternative process for preparing HFC-125, namely by operating the first step in the process known from the closest prior art document (1) in liquid phase at a temperature within the claimed range, thereby arriving at the solution proposed by the patent in suit.

For these reasons, the subject matter of claim 7 of the patent as granted turns out to be merely the result of an obvious aggregation of process steps well known from

documents (1) and (3) and thus lacks the required inventive ingenuity.

- 5.8.2 The Respondent argued in support of inventive step that the invention was to be seen in the finding that the first fraction defined in step (1-ii-b) did not contain PCE and could thus be used as such in the second reaction step for further reaction with HF to produce HCF-125.

The Board notes that the wording of claim 7 as granted does not exclude the presence of PCE in the first fraction defined in step (1-ii-b). Since the patent in suit foresees explicitly the removal of PCE from the reaction mixture obtained from the liquid phase reaction step (see patent specification, page 8, paragraphs [044] and [045]), that reaction mixture necessarily contains PCE which may be eliminated by an additional removal step. Even this optional elimination of PCE is not complete since up to 10% thereof may remain in that reaction mixture after removal (patent specification, page 8, line 41 in combination with page 3, line 54). Therefore, the Respondent's argument cannot convince the Board.

The Respondent brought also forward that document (1) taught that high pressure and high temperature increased the conversion of PCE so that the skilled person was deterred from applying the liquid phase reaction known from document (3) since it operated at lower temperatures.

However, that argument is devoid of merit since this teaching of document (1) is confined to the gas phase

reaction, the operational conditions thereof necessarily diverging essentially from those to be used in liquid phase. Therefore, even if that teaching of document (1) was considered discouraging the skilled person of lowering the pressure and the temperature in the gas phase, it was never deterred thereby from following the clear avenue indicated in document (3) of operating the first reaction stage in a different phase, i.e. the liquid phase.

- 5.9 To summarize, the process according to claim 7 as granted does not involve an inventive step. Since that claim is present in the main and the auxiliary requests I to IV and VI, these requests must be refused.

Auxiliary requests V and VII

6. *Inventive step*

Claim 6 of auxiliary request V and claim 1 of auxiliary request VII comprise in addition to claim 7 as granted a list of particular catalysts to be used in the liquid phase first reaction step.

The Respondent conceded at the oral proceedings before the Board that the particular catalysts do not provide any inventive ingenuity to the claimed process and have only been added to overcome objections raised by the Appellants under Article 100(b) EPC with respect to the sufficiency of disclosure.

Since, the prior art document (4) already discloses the use of antimony fluoride chloride catalysts for the liquid phase fluorination of PCE to produce HCFC-123

(column 4, lines 24 to 49; column 3, lines 40 to 50; column 6, lines 1 to 7), this feature cannot contribute to an inventive step. Therefore, the assessment of inventive step given in point 5 above in respect of the main request is not affected thereby and the conclusions drawn therein still apply.

Thus, the subject-matter of claim 6 of auxiliary request V and claim 1 of auxiliary request VII does not involve an inventive step and, therefore, these requests must also be refused.

Auxiliary request VIII

7. *Amendments (Article 123(2) EPC)*

Claim 6 has been amended in that the first fraction in step (1-ii-b) comprises no PCE.

Article 123(2) EPC prohibits amendments generating "subject-matter which extends beyond the content of the application as filed ". In order to determine whether or not the subject-matter of an amended claim satisfies this requirement it has to be examined whether that amended claim comprises technical information which a skilled person would not have objectively and unambiguously derived from the application as filed (see decisions T 288/92, point 3.1 of the reasons and T 680/93, point 2 of the reasons, neither published in OJ EPO).

The Respondent submitted that the amendment was supported by the passage of the application as filed on page 19, lines 13 to 15. This passage defines the

absence of PCE from the mixture supplied to the vapor phase second reaction step, in other words the inlet stream into this step. In claim 6 as amended a first fraction as defined in step (1-ii-b) is characterized by the absence of PCE. However, the inlet stream into the vapor phase second reaction step is not the first fraction defined in step (1-ii-b) but a different fraction, namely the fifth fraction obtained in step (1-ii-c). The fact that the first fraction which is not supplied as such to the vapor phase second reaction step contains no PCE, as defined in amended claim 6, is a technical information which a skilled person would not have objectively and unambiguously derived from the passage of the application as filed cited by the Respondent.

The Board is not aware of any other part of the application as filed which could support this amendment.

Hence, claim 6 of auxiliary request VIII does not fulfill the requirements of Article 123(2) EPC and, therefore, this request must also be refused.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

C. Moser

R. Freimuth