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Datasheet for the decision of 27 April 2018

Case Number: T 0199/15 - 3.3.10

Application Number: 06827293.9

Publication Number: 1948579

IPC: C07C17/25, C07C17/383, C07C21/18

Language of the proceedings: EN

Title of invention:
AZEOTROPE COMPOSITIONS COMPRISING 1,2,3,3,3-PENTAFLUOROPROPENE AND HYDROGEN FLUORIDE AND USE THEREOF

Patent Proprietor:
The Chemours Company FC, LLC

Opponent:
Arkema France

Headword:
AZEOTROPE COMPOSITIONS / The Chemours Company

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - obvious solution

Decisions cited:

Catchword:

Europäisches Patentamt
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Beschwerdekammern

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Case Number: T 0199/15 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 27 April 2018

Appellant: (Opponent)	Arkema France DRD/Département Propriété Industrielle 420, rue d'Estienne d'Orves 92705 Colombes Cedex (FR)
Respondent: (Patent Proprietor)	The Chemours Company FC, LLC 1007 Market Street Wilmington DE 19801 (US)
Representative:	Matthews, Derek Peter Dehns St Bride's House 10 Salisbury Square London EC4Y 8JD (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 November 2014 rejecting the opposition filed against European patent No. 1948579 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	P. Gryczka
Members:	J. Schmid
	T. Bokor

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the decision of the Opposition Division rejecting the opposition against European patent No.1 948 579, independents claims 1 and 6 thereof reading (after corrections of printing errors by a communication of the Opposition Division dated 15 October 2013), as follows:

"1. An azeotrope or near-azeotrope composition comprising from 61.0 mole percent to 78.4 mole percent Z-HFC-1225ye (Z-1,2,3,3,3-pentafluropropene) and from 39.0 mole percent to 21.6 mole percent hydrogen fluoride, wherein said composition is characterized by a difference between dew point pressure and bubble point pressure that is less than or equal to 3%, based upon bubble point pressure."

"6. A process for the separation of Z-HFC-1225ye (Z-1,2,3,3,3-pentafluropropene) from HFC-236ea (1,1,1,2,3,3-hexafluoropropane) comprising:

(a) forming a mixture of Z -HFC-1225ye, HFC-236ea, and hydrogen fluoride; and
(b) subjecting said mixture to a distillation step from which is formed a column distillate composition comprising an azeotrope or near-azeotrope composition of hydrogen fluoride and Z-HFC-1225ye essentially free of HFC-236ea, wherein said column distillate composition is characterized by a difference between dew point pressure and bubble point pressure that is less than or equal to 3%, based upon bubble point pressure."

II. The Appellant filed an opposition requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC) and insufficiency of disclosure of the invention (Article 100(b) EPC). *Inter alia*, the following documents were submitted in the opposition proceedings:

(4) US-B-6 369 284 and
(5) US-A-5 396 000.

In its decision the Opposition Division held that the invention was disclosed in a manner sufficiently clear for a skilled person to carry out the invention. Novelty of the subject-matter of the claims of the patent as granted was acknowledged. Starting from either of documents (4) or (5) as closest prior art the Opposition Division found that the subject-matter of the claims of the patent as granted involved an inventive step. The opposition against the patent was thus rejected.

III. According to the Appellant, the invention as defined in the claims was not disclosed in a manner sufficiently clear and complete to be carried out by a skilled person. *Inter alia,* the subject-matter of claim 6 of the patent as granted lacked novelty with respect to document (4) and document (5), since the claimed process was the inevitable result of carrying out the distillation of the reaction mixture obtained after dehydrofluorination of HCC-236ea, as taught in these documents. If novelty were recognised, it would thus lack an inventive step.

IV. During the oral proceedings before the Board, the Respondent defended the maintenance of the patent in suit on the basis of the claims of the main request

(corrected claims of the patent as granted), and subsidiarily on the basis of an auxiliary request filed with the letter dated 23 March 2018. Claim 6 of the auxiliary request differed from claim 6 of the main request in that it was added at the end of the claim that "said azeotrope or near-azeotrope composition comprises from 61.0 mole percent to 78.4 mole percent Z-HFC-1225ye and from 39.0 mole percent to 21.6 mole percent hydrogen fluoride, and is characterized by a difference between dew point pressure and bubble point pressure that is less than or equal to 3%, based upon bubble point pressure."

According to the Respondent, document (4) represented the closest prior art to the invention. The problem to be solved was to separate the reaction mixture comprising *inter alia* the starting reactant HFC 236ea and the reaction products HFC-1225ye and HF. The claimed solution was to use azeotropic distillation based on the presence of an unexpected azeotrope, or near azeotrope, as claimed in claim 1 of the main request. The solution was inventive because azeotropic distillation was merely one among many techniques to separate reaction mixtures, such as absorption, scrubbing into water, absorption into sulfuric acid, adsorption onto solids, neutralization with a base, regular distillation and decantation. Should the skilled person wish to consider azeotropic distillation then the problem of identifying an azeotrope arose. And even if an azeotrope was found, whether it could be used effectively was further unpredictable. The invention had identified an azeotrope which could in fact be used successfully in that the distillation could be effectively tuned for the separation of Z-HFC-1225ye from HFC-236ea. The claimed subject-matter involved an inventive step, in that it related to a

successful and unexpected solution to the problem set out above. This solution was neither taught in document (4) itself, nor by any of the cited prior art documents.

V. The Appellant 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 or, subsidiarily, that the patent be maintained on the basis of the auxiliary request filed with the letter dated 23 March 2018.

VI. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible

Main request: claims as granted

2. Inventive step

2.1 Closest prior art

As acknowledged by the parties, document (4) represents the closest prior art. This document discloses a process in which HCF-236ea is dehydrofluorinated producing a mixture of *inter alia* Z-HFC-1225ye, HFC-236ea, and hydrogen fluoride. Document (4) suggests recovering HFC-1225ye (including the cis and trans isomers) from the reaction product and unreacted hydrofluoropropane by conventional procedures such as

distillation (see column 1, lines 55 to 58; column 4, lines 6 to 11; 28 to 31 and 45 to 50).

2.2 Problem to be solved

Starting from document (4), the problem underlying the patent-in-suit can be seen in the provision of a process to separate Z-HFC-1225ye free from HFC-236ae from the reaction mixture.

2.3 Solution

The solution proposed by the patent-in-suit is the process of claim 6, wherein the mixture comprising Z-HFC-1225ye, HFC-236ea, and hydrogen fluoride is subjected to a distillation step from which is formed a column distillate composition comprising an azeotrope (or near-azeotrope) composition of Z-HFC-1225ye and hydrogen fluoride, which is substantially free of HFC-236ae.

2.4 Success

It was recognized in the patent-in-suit that an azeotrope mixture of Z-HFC-1225ye is obtained during distillation of the reaction mixture. This finding was not contested by the Appellant. The Board therefore is satisfied that the process of claim 6 of the patent as granted provides a solution to the technical problem as defined above.

2.5 Obviousness

Document (4) teaches that HFC-1225ye may be recovered from the reaction products and the unreacted

hydrofluoropropane by conventional procedures such as distillation.

The Board deems it to fall within the technical expertise and skills of the skilled person to elaborate the practical operating conditions for the distillation of a reaction product mixture obtained by the dehydrofluorination of HFC-236ea as disclosed in document (4). Thus, by doing so, the skilled man would have necessarily obtained an distillate having the boiling point of the azeotrope comprising hydrogen fluorine and Z-HFC 1225ye, without first necessarily knowing the exact nature of this distillate. However, as a matter of routine, he would have analysed this distillate and would have realized that this distillate comprises an azeotrope mixture of hydrogen fluorine and Z-HFC 1225ye, substantially free of the HCC 236ea. He would thus have arrived at the subject-matter of claim 6 of the main request without the exercise of inventive skill.

Consequently, the subject-matter of claim 6 lacks an inventive step.

According to the Respondent, the proposed solution was inventive because azeotropic distillation was merely one among many techniques of separation which the skilled person would be aware of.

However, document (4) advises the skilled person to carry out a distillation to recover HFC-1225ye, see column 4, lines 24-31. Moreover, choosing distillation among several methods of separation lies within the routine activity of the skilled person. Therefore, the Respondent’s argument cannot succeed.

3. According to the Respondent, inventive step resided in that it was unexpectedly found that an azeotrope was formed. The discovery of that unexpected azeotrope permitted to tune the distillation for separating Z-HFC-1225ye from unreacted HCC-236ea.

However, the question of whether a person skilled in the art carrying out a distillation as suggested in document (4) would - as the respondent asserts - be surprised at the results does not contribute to an inventive step, since it is without consequence for determining whether the skilled person would have arrived at the claimed subject-matter following routinely work.

Hence, this argument also does not convince the Board that the subject-matter of claim 6 involves an inventive step.

Auxiliary request

4. Claim 6 has been amended to focus on the feature that the distillate is the azeotrope composition as claimed in claim 1 of the main request.

However, the azeotrope composition that the skilled man would necessarily have obtained by distilling the reaction product obtained by the process in document (4) is precisely a composition according to claim 1 of the main request.

Accordingly, the auxiliary request shares the fate of the main request in that it is not allowable either for lack of inventive step pursuant to Article 56 EPC, for the same reasons as explained above for the main request.

5. Under these circumstances, it is unnecessary to take a decision on the other objections raised by the Appellant.

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. Rodríguez Rodríguez P. Gryczka

Decision electronically authenticated