BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS | BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE | CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

A		B		C	X

File Number: T 685/91 - 3.3.3

Application No.: 84 301 258.4

Publication No.: 0 154 058

Title of invention: Miscible polyblend and molded article produced therefrom

Classification: C08L 35/06

D E C I S I O N
of 5 January 1993

Proprietor of the patent: ARCO CHEMICAL TECHNOLOGY INC.

Opponent: Stamicarbon bv

Headword:

EPC Articles 54, 56, 123(2) and Rule 27(1)(c)

Keyword: "Novelty (yes)"
"Inventive step (no) - general problem not solved - solution to the limited problem not inventive"
"Auxiliary request - unallowable generalisation"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 685/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 5 January 1993

Appellant : (Opponent)
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Respondent : (Proprietor of the patent)
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Decision under appeal :
Decision of the Opposition Division of the European Patent Office dated 18 June 1991, issued on 10 July 1991 rejecting the opposition filed against European patent No. 0 154 058 pursuant to Article 102(2) EPC.

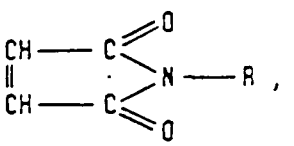
Composition of the Board :

Chairman : F. Antony
Members : C. Gérardin
L.C. Mancini

Summary of Facts and Submissions

I. The mention of the grant of the patent No. 0 154 058 in respect of European patent application No. 84 301 258.4 filed on 27 February 1984 was published on 1 June 1988 on the basis of eight claims, Claim 1 reading as follows:

"A miscible polyblend comprising a first and a second copolymer characterised in that the first copolymer comprises an α,ß-ethylenically unsaturated dicarboxylic acid or its anhydride copolymerized with at least one monovinyl-substituted aryl hydrocarbon monomer and the second copolymer comprises an imide derivative of maleic anhydride and having the general formula:



wherein R represents $-CH_3$, $-C_2H_5$, $-C(CH_3)_3$, a phenyl or substituted phenyl group or a cycloalkyl or substituted cycloalkyl group copolymerized with at least one monovinyl substituted aryl hydrocarbon monomer."

Claims 2 to 8 are dependent claims directed to preferred polyblends according to the main claim.

II. On 23 February 1989 the Opponent filed a Notice of Opposition against the grant of the patent and requested revocation thereof in its entirety for non-compliance with the requirements of Article 100 EPC. Whereas the Opponent argued in the Statement of Grounds of Opposition along the line of lack of inventive step of the claimed subject-matter with regard to the teaching of mainly the following documents:

(1) US-A-4 408 010,
(2) J. Macromol. Sci.-Chem., A11(2), 1977, 267 to 286,

it subsequently took the view that the disclosure of document (1) interpreted in the light of the teaching of document (2) was in fact novelty destroying.

III. By a decision delivered orally on 18 June 1991, with written reasons posted on 10 July 1991, the Opposition Division rejected the opposition on the ground that the objections raised under Article 100(a) EPC were not prejudicial to the maintenance of the patent in unamended form. More specifically, it was first stated in that decision that there was novelty since no document considered in isolation described polyblends within the terms of the patent in suit; as to the late-filed objection of lack of novelty based on a particular interpretation of document (1), it had been considered by the Opposition Division, but disregarded under Article 114(2) EPC. The same applied to the Opponent's experimental report which had been filed at a very late stage. Further, an inventive step could also be acknowledged since, on the one hand, the teaching of document (1) was directed not so much to miscible blends of copolymers as to blends exhibiting improved heat resistance properties, and, on the other hand, the process described in document (2) related to copolymers of N-phenyl maleimides which could not be equated with the copolymers of maleimide to the preparation of which document (1) referred.

IV. The Appellant (Opponent) thereafter lodged a Notice of Appeal on 2 September 1991 and paid the prescribed fee at the same time. In the Statement of Grounds of Appeal filed on 18 November 1991 the Appellant emphasised the objection of lack of novelty. The only difference between the

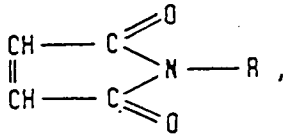
polyblends described in document (1) and those claimed in the patent in suit was the comonomer, namely maleimide in the prior art teaching and N-substituted maleimides in the patent in suit; in reality, that difference was merely formal, since maleimide was a collective term representing the unsubstituted as well as the N-substituted compounds. That was supported by document (2) and by a new document ("Maleic Anhydride" by B.C. Trivedi and B.M. Culbertson, Plenum Press, New York, 1982, Chapter 3.4.4.2, Maleimides = document (8)). Further, the claimed subject-matter did not involve an inventive step, since N-substituted maleimides would be regarded by the skilled person as obvious alternatives to maleimide. Moreover, the experimental data filed late in opposition proceedings provided evidence that the claimed polyblends were not always miscible. In addition to these substantive issues the Appellant objected that the introduction of the description of the patent in suit did not comprise a discussion of document (1) and that the minutes of the oral proceedings before the Opposition Division did not mention that point which had been raised during these oral proceedings.

V. In the Counterstatement of Appeal filed on 21 May 1992 and in a subsequent statement the Respondent underlined that in document (1) reference was made to maleimide as a single component. As to document (2), it was mentioned in document (1) merely as a publication providing information on how to prepare the second copolymer of document (1). Further, miscibility of polymers was rather an exception, even between copolymers of the same monomer. Regarding the experimental report submitted by the Appellant, the method of determining the glass transition temperatures was not the same as the one used in the patent in suit and the results, therefore, should not be compared; moreover, in view of the small compositional differences between the

copolymers used in the Appellant's experimental report and the copolymers used in the examples of the patent in the suit, the totally different behaviour of the blends in terms of miscibility should be regarded as questionable. In any case, it was not possible to conclude from the results of two or three experiments whether the claimed polyblends were miscible only by accident or whether there was merely an occasional lack of success. From a more formal standpoint, in view of the lateness of some objections raised and evidence provided by the Appellant, the corresponding issues should be disregarded and an award of costs be made.

VI. Alternatively the Respondent asked the Board to consider as a first auxiliary request the maintenance of the patent in suit on the basis of the set of seven claims submitted on 13 June 1991, wherein Claim 1 reads as follows:

"A miscible polyblend comprising a first and a second copolymer characterised in that the first copolymer is a non-equimolar copolymer containing less than 50 mole percent of maleic anhydride and more than 50 mole percent of a monovinyl-substituted aryl hydrocarbon monomer and the second copolymer comprises an imide derivative of maleic anhydride and having the general formula:



wherein R represents a phenyl or substituted phenyl group copolymerised with at least one monovinyl substituted aryl hydrocarbon monomer."

Claims 2 to 7 are directed to preferred polyblends according to the main claim.

Further, in order to overcome possible objections arising from the Appellant's experimental data, three alternative sets of claims A to C were filed on 4 November 1992 as second, third and fourth auxiliary requests, which have in common that the first copolymer contains less than 50 mole% of maleic anhydride and more than 50 mole% of a monovinyl-substituted aryl hydrocarbon monomer. Additionally, in set A the amount of the second copolymer represents 20 to 50 % by weight of the polyblend; in set B the imide derivative forms 47 to 59 % by weight of the second copolymer; in set C these two requirements are combined.

VII. In a communication sent in preparation to the oral proceedings which had been scheduled for 5 January 1993, the Board expressed serious doubts that the auxiliary requests A to C met the requirements of Article 123(2) EPC.

On 31 December 1992 the Respondent informed the Board that it would not attend the oral proceedings which were held as scheduled.

In these oral proceedings the Appellant explained that, as far as miscibility of polymers was concerned, one should distinguish homopolymers from copolymers. In the case of copolymers having the same major component, thus in a situation corresponding to the claimed polyblend wherein the copolymers A and B each contained more than 50 mole percent of styrene, there was an area of miscibility or miscibility window, which could be determined by changing the comonomer as well as the relative amount thereof. That a polyblend of specific copolymers might be miscible could not therefore be regarded as surprising. As to the polyblend according to the first auxiliary request, neither the amount of styrene, nor the use of a maleimide

substituted by an aromatic group could be regarded as inventive features. First, the requirement that styrene should be the major component was self-evident, since homopolymerisation of maleic anhydride did not readily occur; secondly, in view of the beneficial influence of aromatic structures on glass transition temperature, the skilled person would certainly consider an aryl-substituted maleimide as a comonomer.

VIII. The Appellant requested that the decision under appeal be set aside and that the patent be revoked. Further, it was requested that the Board of Appeal take a decision on the question that the most relevant prior art must be discussed in the patent specification as published and that even in an opposition procedure such an omission has to be corrected; alternatively, it was requested to submit this question to the Enlarged Board of Appeal.

The Respondent requested that

- the appeal be rejected or, alternatively, that the patent be maintained on the basis of one of the four sets of claims filed as auxiliary requests;

- the objections raised and evidences provided late by the Appellant be disregarded under Article 114(2) EPC;

- and an appropriate award of costs be made.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is admissible.

2. The first points to be decided are whether the late-filed objections and technical evidences, in particular the Appellant's objection of lack of novelty and experimental report which had not been submitted together with the Statement of Grounds of Opposition, should be admitted into the proceedings.

2.1 Documents (1) and (2) were both cited in the Statement of Grounds of Opposition; it was stated there that the content of the article identified as document (2) in the present proceedings was incorporated in the disclosure of document (1) by reference. From that combined teaching it followed that the claimed subject-matter did not involve an inventive step (page 3, paragraph 3 to page 4, paragraph 2). Only in the reply received on 12 January 1991, thus nearly two years after submission of the grounds of opposition, the Appellant took the view that the teaching of documents (1) and (2) considered in combination was in fact novelty destroying (page 3, paragraph 4).

In the Statement of Grounds of Appeal the Appellant followed the same line in support of its objection of lack of novelty. As pointed out by the Respondent, that objection must in fact be regarded as a new approach to the original objection under Article 100(a) EPC; since the issue of novelty is irrelevant for the ultimate outcome of the present case, as will appear hereinafter, the Board decides thus to disregard that objection under Article 114(2) EPC.

2.2 The above experimental data were submitted by the Appellant on 16 May 1991, thus about one month prior to the oral proceedings before the Opposition Division. As objected by the Respondent in its letter received on 5 June 1991, such a short period was clearly insufficient

to carry out counter-experiments involving the synthesis of polymers, the preparation of blends and the determination of the properties of these blends; under these circumstances, the Opposition Division rightly decided not to admit that new evidence into consideration.

The situation is different now, since the same comparative data have been submitted together with the Statement of Grounds of Appeal in support of the objection of lack of inventive step raised initially in the Statement of Grounds of Opposition. As such, thus, they do not represent a new line of argumentation. Moreover, that technical report did not take the Respondent by surprise since it has had ample time and opportunity to carry out its own experiments; it actually did too and provided together with the Counterstatement of Appeal the results of its own tests of miscibility of polymers.

The requirements of Article 113(1) EPC being met and the results of the Appellant's report being relevant for the purpose of the present decision, the Board decides to admit that technical evidence into the procedure. Self-evidently, the same applies to the Respondent's test report.

2.3 Further, the citation identified above as document (8) and produced for the first time in the Statement of Grounds of Appeal has been duly examined. Since the content of this document does not go beyond the teaching of document (2), there is no reason to admit this late-filed citation into the procedure; this citation will thus be disregarded hereinafter (Article 114(2) EPC).

Main request and first auxiliary request

3. The current wording of the claims does not give rise to any objections under Article 123 EPC.

This applies self-evidently to the set of claims according to the main request, since the claims as granted are identical with the claims as filed originally.

In the set of claims according to the first auxiliary request, Claim 1 differs from the above main claim by (i) a more specific definition of the first copolymer of the polyblend and (ii) by the choice of particular groups as substituents in the molecule of maleimide. Feature (i), i.e. the requirement that the first copolymer is a non-equimolar copolymer containing less than 50 mole percent of maleic anhydride and more than 50 mole percent of a monovinyl-substituted aryl hydrocarbon monomer, combines the amounts of the two monomers according to Claim 2 as granted and filed originally with the choice of maleic anhydride mentioned in Claim 3 as granted and filed originally; feature (ii) can be regarded as the selection of the two aryl groups within the broader definition of R in the main claim as granted. As to the dependent Claims 2 to 7, they correspond to Claims 3 to 8 as granted and filed originally, with their numbers and, where appropriate, appendancies adjusted.

4. The patent in suit concerns a miscible polyblend and the moulded articles produced therefrom. Such polyblend is disclosed in document (1) which the Board, like the Opposition Division, regards as the closest state of the art. More specifically, this citation describes mixtures of two copolymers, the first one consisting of an α,ß-ethylenically unsaturated dicarboxylic acid or its anhydride copolymerised with at least one monovinyl-

substituted aryl hydrocarbon monomer, and the second one consisting of maleimide copolymerised with at least one monovinyl-substituted aryl hydrocarbon monomer (column 1, lines 11 to 18). The polyblend described in Example IV in conjunction with Example II and column 2, lines 44 to 47, contains 5 parts by weight of Dylark 290, which is a styrene/maleic anhydride copolymer in the weight ratio 83/17; and 1 part by weight of a styrene/maleimide copolymer in the weight ratio 52.2/47.8. This specific polyblend exhibits a single glass transition temperature of 158°C; this feature, which reflects the complete miscibility of the two polymer components, is a highly desirable property.

On that basis the technical problem underlying the patent in suit may thus be seen to be the provision of further polyblends exhibiting a single glass transition temperature.

According to Claim 1 of the main request and the first auxiliary request this problem is to be solved by using as second component in the blends a copolymer of at least one monovinyl-substituted aryl hydrocarbon monomer with a N-substituted maleimide.

5. Without disputing the fact that the specific polyblends described in Examples III to V of the patent in suit exhibited a single glass transition temperature and, thereby, that the corresponding combination of features provided an effective solution to the above-defined technical problem, the Appellant has demonstrated that other compositions within the terms of Claim 1 of these two requests did not correspond to miscible copolymers.

5.1 Annex 2 of the Statement of Grounds of Appeal reports the properties of blends which have been made from (a) various

copolymers of styrene and maleic anhydride differing by the weight ratio of the two monomers, namely 93:7, 82:18 and 62:38, and (b) the same copolymer of styrene and N-phenylmaleimide, wherein the two monomers were present in the weight ratio 56.4:43.6; in the three experiments the weight ratio of the two polymer components was 50:50. From Table 1 it appears that in the first two cases the resulting polyblends exhibit two different glass transition temperatures which correspond practically to those of the two separate components; this is evidence that the two copolymers are immiscible. By contrast, in the third case one observes a single glass transition temperature, which reflects complete miscibility of the two components.

5.2 It is true, as pointed out by the Respondent, that the method used in that report to determine the glass transition temperature is not the same as the one mentioned in the patent in suit. Whereas that parameter was determined by dynamic mechanical analysis (DMA) in the patent in suit, the Appellant relied on differential scanning calorimetry (DSC) for its comparative tests. However, the comparison of the figures obtained for practically identical copolymers of styrene and maleic anhydride shows that the influence of the method of measurement on the actual value of that parameter is relatively little. The measurement of glass transition temperature by DSC of a copolymer wherein the monomers are in the weight ratio of 82:18 leads to a value of 147°C (Annex 2, Table 1), whereas the measurement by DMA of a copolymer wherein the monomers are in the weight ratio of 83:17 leads to a value of 148°C (patent in suit, page 4, Table). This means that the figures provided by the two methods are consistent and that, consequently, a comparison of the values of glass transition temperature in the patent in suit and in the Statement of Grounds of Appeal is legitimate.

This applies in particular to the comparison between the copolymers of styrene and N-phenylmaleimide in Annex 2 of the Statement of Grounds of Appeal (weight ratio of 56.4:43.6) and in the patent in suit (Examples III and IV, weight ratio of 53:47), which are said to have a glass transition temperature respectively of 219 and 212°C. In the Board's view, such a relatively small difference in glass transition temperature is fully in line with the relatively small difference in the composition of the two copolymers.

5.3 In fact, in view of the definition of the technical problem to be solved, the actual figures regarding the glass transition temperature of the single copolymers and the blends thereof are less important than the conclusions regarding the miscibility. In that respect, it is significant that the positive results in terms of miscibility mentioned in Examples III to V of the patent in suit are not disputed by the Appellant, that conversely the negative results obtained by the Appellant are not disputed by the Respondent, and further that both parties agree that miscibility between two polymers is rather the exception than the rule, in other words that it is a property which cannot be predicted. The test report submitted by the Respondent together with the Counter-statement of Appeal, which demonstrates that two copolymers which only differ by the weight ratio of their two monomers are not miscible, merely supports this conclusion.

In the Board's view, there is no doubt that the specific mixtures in Examples III to V of the patent in suit correspond to miscibile blends; by contrast, the Appellant has provided evidence that compositions within the terms of Claim 1 of the main request and the first auxiliary request do not meet that requirement of miscibility. It

follows that the claimed subject-matters do not provide a general solution to the above-defined technical problem and that the latter consequently has to be defined in less ambitious terms.

6. On the basis of that conclusion the technical problem underlying the patent in suit can be defined as the provision of further similar blends comprising copolymers of styrene and maleic anhydride, irrespective of their homogeneity. There is no doubt that this less ambitious problem is effectively solved.

Document (2) basically concerns the free-radical copolymerisation of N-phenyl maleimide with three specific comonomers, in particular with styrene, as well as some properties of the resulting copolymers (pages 267 to 269, Abstract and Introduction). From the subsequent discussion of the copolymerisation behaviour (pages 277 and 278, Results and Discussion), it appears that the system N-phenyl maleimide/styrene has a tendency toward alternation implying the participation of a charge transfer complex between the two monomers and that, in that respect, maleimide, N-phenyl maleimide and N-alkyl maleimides are not different. These various copolymers, whose similarity of structure involves a similarity of properties, can thus be regarded as analogous compounds. Quite clearly, the skilled person looking for a broader class of blends based on the model of the blend of a copolymer of styrene and maleic anhydride with a copolymer of styrene and maleimide, as known from document (1), would consider the above compounds and arrive thereby without inventive contribution at the definition of the blends according to the main request.

It follows that the subject-matter of Claim 1 of the main request does not involve any inventive step.

7. The same considerations apply to the subject-matter as defined in Claim 1 of the first auxiliary request, since features (i) and (ii) cannot be regarded as inventive.

On the one hand, the definition of the first copolymer of the polyblend corresponds to non-equimolar products commercially available under the trademark Dylark, in particular Dylark 290 which is a copolymer of styrene and maleic anhydride in the weight ratio of 83:17 mentioned in document (1) as particularly suitable (column 2, lines 32 to 46); moreover, the skilled person would hardly consider a copolymer of styrene and maleic anhydride containing less than 50 mole percent of styrene, since the preparation thereof would involve a certain degree of homopolymerisation of maleic anhydride, which he knows does not readily occur. On the other hand, in view of the well known correlation between aromaticity and glass transition temperature and, thereby, some specific properties of polymers and blends thereof, the choice of an aryl-substituted maleimide as a comonomer must be regarded as obvious.

For these reasons the subject-matter of Claim 1 of the first auxiliary request does not involve an inventive step either.

8. Claim 1 of the main request and the first auxiliary request not being allowable, the same applies to the dependent claims of the two sets of claims which are directed to preferred polyblends according to the main claims and thus fall with them.

Second, third and fourth auxiliary requests

9. Although the compositional features of the main claim according to the three auxiliary requests A to C are all

individually mentioned in the application as originally filed, their combination cannot be regarded as adequately supported by the original disclosure.

As pointed out by the Respondent (statement filed on 4 November 1992, page 2, paragraphs 1 to 3), the basis of these new main claims is to be found in the examples describing blends of the two copolymers. A common feature of these exemplified mixtures is the composition of the copolymer of styrene and maleic anhydride, which is said to be the product "Dylark 290" identified as containing 83 weight% of styrene and 17 weight% of maleic anhydride (patent in suit, page 2, lines 57 to 59). The other features in the examples, in particular the amounts of styrene and imide in the second copolymer as well as the relative amounts of the two copolymers in the blends, have thus been disclosed in connection with that specific copolymer. The definition of the polyblends according to the auxiliary requests, which does not incorporate the composition of "Dylark 290", must thus be regarded as a generalisation which is particularly objectionable in the present case since, as agreed by both parties, miscibility of copolymers is unpredictable to a large extent.

It follows that the wording of Claim 1 according to the second, third and fourth auxiliary requests is contrary to Article 123(2) EPC, so that these requests cannot be admitted.

Procedural matters

10. In view of the above conclusions regarding the non-patentability of the subject-matter as defined in the main request and the first auxiliary request, and further the non-compliance of the second to fourth auxiliary requests

with the requirements of Article 123(2) EPC, which must lead to the revocation of the patent in suit, the auxiliary request submitted by the Appellant under Rule 27(1)(c) EPC need not be considered. For this reason alone, the Appellant's request to submit that question to the Enlarged Board must be rejected.

Regarding the objection raised by the Appellant that the minutes of the oral proceedings before the Opposition Division did not say anything about that point which allegedly was discussed therein, the Board is not in the position to appreciate to what extent these minutes represent a fair summary of the arguments presented by the parties.

11. Similarly, the Respondent's request for an award of costs justified by the lateness of the objection of lack of novelty as well as the late filing of the technical report by the Appellant must be rejected.

The Board notes that both the said objection and the said technical report were submitted in the Statement of Grounds of Appeal and that both had already been submitted during the opposition procedure, admittedly at an undesirably late stage. To deal with the objection of lack of novelty based on the interpretation of the teaching of documents (1) and (2) as a single disclosure did not require extensive work from the Respondent, since these two documents had been introduced into the proceedings together with the Statement of Grounds of Opposition and had already been combined in the framework of the initial objection of lack of inventive step. As to the single experiment carried out by the Respondent, wherein two copolymers produced by that company were used, it did not involve more than blending these two copolymers and

measuring the glass transition temperature(s) of the resulting mixture. Thus, the work involved with the submission of the Counterstatement of Appeal and the Annex thereto did not exceed what can normally be expected from a Patentee defending its patent.

For these reasons, the Respondent's request for an apportionment of costs under the provisions of Article 104 and Rule 63(1) EPC is rejected.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

3. The Appellant's request to refer a question to the Enlarged Board of Appeal is rejected.

4. The Respondent's request for an apportionment of costs is rejected.

The Registrar: The Chairman:

E. Görgmaier F. Antony