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D E C I S I O N
of 4 July 1994

Case Number: T 0051/91 - 3.3.3

Application Number: 82111496.4

Publication Number: 0084643

IPC: C08G 81/00

Language of the proceedings: EN

Title of invention:
A process for preparing graft and block copolymers

Patentee:
Allied Corporation

Opponent:
Hüls Aktiengesellschaft

Headword:
-

Relevant legal norms:
EPC Art. 54, 56, 114(2)

Keyword:
"Novelty (confirmed) - different operation features leading to different products"
"Inventive step (confirmed) - no bonus effect situation - ex post facto analysis"

Decisions cited:
T 0219/83, T 0192/82

Catchword:
-



Case Number: T 0051/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 4 July 1994

Appellant:
(Opponent)

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Representative:

Respondent:
(Proprietor of the patent)

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office dated 15 October 1990
rejecting the opposition filed against European
patent No. 0 084 643 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: H. H. R. Fessel
M. K. S. Aúz Castro

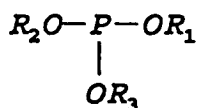
Summary of Facts and Submissions

I. European patent No. 0 084 643 based on European patent application 82 111 496.4, filed on 11 December 1982 and claiming a priority of 7 January 1982 (US 337 800) was granted with 18 claims on 4 March 1987 (Bulletin 87/10).

The only independent Claim 1 reads as follows:

"A process for preparing block and/or graft polymers which comprises:

a. forming an intimate mixture of two or more polymers at least one of said polymers including one or more amino functions and at least one of the remaining polymers including one or more carboxylic acid functions, and an effective amount of one or more phosphite compounds of the formula:



and symmetrical or asymmetrical diphosphite derivatives thereof, wherein:

R₁ is alkyl, haloalkyl or phenyl either unsubstituted or substituted with one or more substituents selected from the group alkyl, halogen, haloalkyl, nitro, cyano, alkylcarbonyl and isocyanato.

R₂ and R₃ are the same or different and are individually metal cation, ammonium cation, hydrogen or R₁; and

b. heating said mixture for a time and at a temperature sufficient to form said block and/or graft copolymer."

Claims 2 to 18 are directed to preferred embodiments of the process according to Claim 1.

II. On 24 November 1987 a Notice of Opposition was filed based on Article 100(a) and (b) EPC.

To support the opposition the following document still relevant in the appeal proceedings was cited:

(1) DE-A-1 940 660 = GB-A-1 230 027.

The Patentee relied, among others, on the following documents:

(4) Polymer Bulletin, 10 (1983), 210 to 214, and

(5) Journal of Polymer Science, 22 (1984), 2567 to 2577.

III. By a decision issued on 15 October 1990 the Opposition Division rejected the opposition and held that the claimed subject-matter was sufficiently disclosed, novel and involved an inventive step.

It was first stated that the chemical terms were properly defined and that the examples in the patent in suit provided a clear illustration of the preferred embodiments enabling reproducibility. Document (1) disclosed a physical mixture of the two polymers, whereas the product of the process according to the patent in suit was a copolymer and thus different. Regarding the issue of inventive step, neither document (1) nor any of the other cited documents contained any hint that the organic phosphorous compounds as specified in the claims promoted the formation of copolymers.

IV. On 14 December 1990 a Notice of Appeal was filed together with payment of the prescribed fee. In the Statement of Grounds of Appeal filed 14 February 1991, the Appellant (Opponent) only maintained its previous objection of lack of novelty and inventive step. It argued that document (1), read in conjunction with US-A-3 369 057 [document (10)] cited therein, disclosed a combination of compositional and operative features which must necessarily lead to a block and/or graft polymer within the terms of the patent in suit.

Further, with regard to the teaching given in (1) there was a one-way street situation as in case T 192/82 since a person seeking to improve colour by the addition of an organic phosphite would, as an extra effect, improve mechanical properties at the same time. This extra effect could thus not amount to evidence for inventive step. The same conclusion arose in view of US-A-3 509 107 [document (8)] and 3 551 548 [document (9)], cited for the first time in appeal proceedings, but referred to in both documents (4) and (5) considered in the opposition proceedings; a person skilled in the art would be aware that the addition of phosphites would lead to an accelerated reaction of terminal amine groups with terminal carboxylic groups. The generalisation and application of said knowledge to an amine group containing first polymer and a carboxylic group containing second polymer was thus self-evident.

V. The Appellant requested that the decision under appeal be set aside and that the patent be revoked on the basis of its written arguments.

The Respondent requested that the appeal be dismissed on the basis of the written record.

Reasons for the Decision

1. The appeal is admissible.
2. The first point to be decided is whether documents (8) to (10), which were cited for the first time in the Statement of Grounds of Appeal, but which have in common to be mentioned as references in documents (1), (4) and (5), should be admitted at all for consideration.

Documents (8) and (9) are mentioned among the references on the last page of both documents (4) and (5). Even if the content of the former citations were incorporated by reference into the latter citations, this would result in a combined disclosure not available before the date of filing of the patent in suit, since documents (4) and (5) are not prepublished (Article 54(2) EPC).

As far as document (10) is concerned, it is mentioned in document (1) (page 12, paragraph 1) as disclosing polyesters and polyamides suitable for the fabrication of yarns. However, as conceded by the Appellant, there is no indication of a possible reaction giving rise to a block and/or graft copolymer within the terms of the patent in suit. The incorporation by reference of document (10) into document (1) would not consequently modify the teaching of the latter and could not influence the ultimate outcome of the case. In view of its late submission, this citation will be disregarded pursuant to Article 114(2) EPC.

For these reasons, none of the newly cited documents will be considered hereinafter.

3. Claim 1 of the patent in suit is directed to a process for preparing block and/or graft copolymers by forming an intimate mixture of two or more polymers with one or more organic phosphite compounds. Of the polymers used, at least one of them should have one or more amino functions and at least one of them should have one or more carboxylic acid functions and the phosphites the formula given therein. In a further step that mixture is heated.

To achieve the desired result more information is given in terms of functional features such as to the amount of phosphite to be used and the heating conditions which are both linked with the result to be achieved either by the term "effective" amount or in that heating temperature and time have to be "sufficient to form said block and/or graft copolymer".

The Board understands the subject-matter of Claim 1 as determined by the terms of that claim in conjunction with the description to be a process to prepare a block and/or graft copolymer in such an amount that it is detectable by an increase in viscosity wherein the functional terms amount to technical process features.

4. The only document in appeal proceedings is document (1). This document discloses mixtures of polymers blended with organic phosphites and then melted by heating to e.g. 285°C for 8 minutes (page 11 of typed version, lines 1 to 8). In the so obtained molten mixture the polyester is said to be uniformly dispersed throughout each mixture.

That document is silent as to any increase in viscosity provided by that treatment; in particular, there is no hint to a reaction giving rise to a block and/or graft copolymer.

4.1 The issue of novelty reduces thus to the question whether there is any implicit disclosure enabling a man skilled in the art to produce mixtures comprising the said block and/or graft copolymers in an amount identifiable by viscosity increase.

In the Board's view neither Example 1 of document (1) nor the first full paragraph on page 9 (typed numbering) could lead a person skilled in the art to the conclusion that block and/or graft copolymers are produced by the process disclosed therein.

The mixture according to said Example comprises 30 parts of polyester, 10 parts of polycaproamide, which contains 11 milliequivalents of NH_2 groups per kilogram of polymer, various amounts of triphenyl phosphite and 50 ppm of cupric acetate as heat stabiliser. Under the process conditions given therein a molten mixture with melt viscosities of about 2000 poises at 285°C is obtained, wherein the polyester is uniformly dispersed and has a particle diameter of about 2 microns. This treatment is said to increase the whiteness of the multifilament yarns made from such blends, but there is no explicit mention of a block and/or graft polymer within the terms of the patent in suit.

4.2 Although in view of the experimental results in Table I of document (1) a certain influence of triphenyl phosphite on some mechanical properties of the multifilament yarns - in particular on ultimate tensile strength and breaking strength - cannot be denied, in the absence of experimental evidence provided by the Appellant (cf. decision T 219/83, OJ EPO 1986, 211), this effect cannot be equated with the formation of block and/or graft polymers. On the contrary, several compositional and operative features mentioned in

Example 1 speak against a reaction giving rise to such polymers.

First, the amine groups of polycaproamide are blocked by reaction with sebacic acid to reduce the amine group analysis to 11 milliequivalents of NH_2 group per kilogram of polymer. There are thus practically no amine groups left to react with the carboxylic groups of the polyester for adduct formation. Moreover, it is noted that the end groups of the polyester are not specified, which can only mean that reactivity with polycaproamide is not essential.

Secondly, the indication in Example 1 that the polyester ingredient is dispersed as discrete microfibrils in the polyamide matrix amounts to a clear teaching that this process results in a mixture having distinct phases and that substantial adducting does not occur. The partial fusion of the polymer ingredients mentioned on page 9, paragraph 2, to which the Appellant referred in the Notice of Opposition, does not support the argument that a reaction between the polymers has taken place; this passage merely refers to fusion of filaments to produce dimensionally stable fabrics which retain their original fabric-like appearance, but are somewhat softer.

Thirdly, after cooling and solidifying a sample of the melt, the polycaproamide can be leached by treatment with formic acid, whereafter the residual polyester material can be examined. This is a further indication that adducting is non-existent or at most very low.

For these reasons the Board cannot interpret Example 1 as an implicit disclosure of a process whereby a block and/or graft polymer would be produced.

4.3 It follows that the process disclosed in document (1), which is strictly limited to the production of filaments having an increased whiteness, cannot be equated to the present process, which aims at the production of block and/or graft copolymers. The subject-matter of Claim 1 is therefore novel over the prior art known from that citation.

5. In the absence of a document dealing specifically with a process for producing block and/or graft polymers, which would be a more appropriate starting point for the assessment of an inventive step, the Board will follow the same approach as the Appellant in the Statement of Grounds of Appeal. On that basis, the technical problem underlying the patent in suit may be seen in the definition of a process for producing block and/or graft copolymers of polyesters and polyamides.

The solution offered is to heat the two polymers in the presence of an organic phosphite as specified in Claim 1.

The Board is, with regard to the specification, especially the results given in Table I, satisfied that the above problem is effectively solved with the given means.

This has only been disputed by the Appellant as to the extent that the copolymer content in the product so produced amounts to about 100%. As shown above, however, this argument is based on a misinterpretation of the claimed subject-matter (cf. item 3 above) and that argument is, therefore, dismissed.

6. It remains thus to be decided whether the claimed subject-matter involves an inventive step, in particular whether it is obvious to a person skilled in the art in view of the teaching of document (1).

6.1 As already discussed above under novelty, it is known from document (1) to use organic phosphites in the melt blending of polyamides and polyesters. The purpose of adding the phosphorous compound is to increase the whiteness of the obtained polymer blend. There is no suggestion in this document that the copolymerisation reaction will be promoted by that addition.

Contrary to the arguments provided by the Appellant, the amine end groups of the polyamide are blocked in a process to produce a filament having improved whiteness by melt spinning a blend of polyester and polyamide (cf. all the Examples given in (1)). This reduction of the amine group content of the polyamide must thus be regarded as an essential feature of the known process, which contrasts with the requirement concerning the functionality of the polyamide in the patent in suit.

As to the amount of phosphites to be added document (1) discloses the use of about the same amounts as the patent in suit. In document (1) the addition occurs in order to solely increase the whiteness of the filaments; this results in the formation of a dispersion of the polyester throughout the polyamide which forms the continuous phase. By contrast, in the patent in suit the addition of phosphite is combined with an appropriate heating (time and temperature) to provide a reaction between polyamide and polyester leading to a block and/or graft copolymer.

Contrary to the arguments of the Appellant it is not possible without any knowledge of the patent in suit to interpret page 9 (typed numbering), lines 11 to 18 and Table I of (1) as hinting at the present invention, since the said passage on page 9 deals with the production of fabrics and the results given in the indicated Table I demonstrate the effect of the organic phosphorus compound on whiteness. No explanation of the improved ultimate tensile strength and breaking strength values is provided and it is not clear how a person skilled in the art could correlate these effects to the formation of block and/or copolymers in those blends.

6.2 The Appellant disputed the presence of any inventive step based on the general problem to provide improved filaments from polyamide/polyester blends common to both the patent in suit (cf. the introduction in conjunction with page 6, lines 55 to 60) and document (1). The teaching given in both documents was addressed to the same skilled person and said person and the process taught in (1) would inevitably lead to products having not only improved whiteness but at the same time having improved mechanical properties as demonstrated by the examples. The now claimed production of block copolymers was thus merely based on an extra or bonus effect resulting from a "one-way street situation" which could, with regard to the decision T 192/82 (OJ EPO 1984, 420), not amount to evidence for any inventive step.

These arguments do not apply in the present case. In contradistinction to the Appellant's argument, the production of block and/or graft polymers cannot be regarded as an additional effect to whiteness, since the operative features in document (1) and in the patent in suit are not identical. The claimed subject is a process requiring the addition of phosphite combined with appropriate operative features in order to ensure the

operative features in document (1) and in the patent in suit are not identical. The claimed subject is a process requiring the addition of phosphite combined with appropriate operative features in order to ensure the formation of block and/or graft polymers. These operative features not being envisaged in document (1), both the process and the resulting products are different, which excludes a "one-way street" situation.

The arguments based on the decision T 192/82 are thus dismissed.

6.3 For these reasons the process according to Claim 1 must be regarded as involving an inventive step.

7. The subject-matter of dependent Claims 2 to 18 comprising all the features of Claim 1 is, for the reasons given for that subject-matter, also patentable.

Order

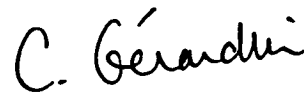
For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:


E. Gorgmaier

The Chairman:


C. Gérardin