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D E C I S I O N
of 9 April 1997

Case Number: T 0494/94 - 3.3.3

Application Number: 86300644.1

Publication Number: 0190884.1

IPC: C08F 279/00

Language of the proceedings: EN

Title of invention:

ABS compositions having trimodal rubber particle distributions and process

Patentee:

THE DOW CHEMICAL COMPANY

Opponent:

Bayer AG, Leverkusen Konzernverwaltung RP Patente Konzern
BASF Aktiengesellschaft, Ludwigshafen

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56, 69

Keyword:

"Novelty (yes) - process feature as distinguishing feature in product claim - burden of proof"

"Inventive step (yes) - no incentive"

Decisions cited:

-

Catchword:

-



Case Number: T 0494/94 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 9 April 1997

Appellant:
(Opponent 1)

Bayer AG, Keverkusen
Konzernverwaltung RP
Patente Konzern
Bayerwerk
D-51368 Leverkusen (DE)

Representative:

-

Other party:
(Opponent 2)

BASF Aktiengesellschaft, Ludwigshafen
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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

Interlocutory decision of the Opposition Division
of the European Patent Office posted 10 May 1994
concerning maintenance of the European patent
No. 0 190 884 in amended form.

Composition of the Board:

Chairman: C. Gérardin
Members: P. Kitzmantel
J. A. Stephens-Ofner

Summary of Facts and Submissions

I. European patent application No. 86 300 644.1 in the name of THE DOW CHEMICAL COMPANY which had been filed on 30 January 1986, claiming priority from a US application filed on 1 February 1985, resulted in the grant of European patent No. 190 844 on 18 April 1990, on the basis of 14 claims, Claim 1 reading as follows:

"1. A rubber-modified, impact resistant polymeric composition comprising:

(a) a matrix including an interpolymer, said interpolymer being polymerized from a monovinylidene aromatic monomer and an ethylenically unsaturated nitrile monomer; and

(b) dispersed in said matrix, in the form of discrete particles, from 6 to 40 weight percent, based on total polymeric composition weight, of elastomeric material, wherein the dispersed elastomeric material is characterized by the following three different grafted rubber components:

(1) a component of small, emulsion polymerized particles, being from 10 to 90 weight percent of the total elastomeric material and having a volume average diameter from 0.05 micron to 0.25 micron;

(2) a component of small, mass polymerized particles, being from 5 to 85 weight percent of the total elastomeric material, and having a volume average diameter from 0.5 micron to 3.0 microns; and

(3) a component of large, mass polymerized particles, being from 5.0 to 50 weight percent of the total elastomeric material; said large mass polymerized

particles having a volume average diameter greater than the volume average diameter of the small mass polymerized particles; and said large mass polymerized particles having a volume average diameter of from 1.0 microns to 10 microns."

Independent Claim 7 was directed to a process for preparing a rubber-modified composition by dispersing in an interpolymer matrix an elastomeric material, the matrix and the elastomeric material being defined in accordance with Claim 1.

Claims 2 to 6 and Claims 8 to 14 were dependent, respectively, upon independent Claims 1 and 7.

II. Notice of Opposition requesting revocation of the patent in its entirety on the grounds of Articles 100(a) and 100(b) EPC was filed by Bayer AG (Opponent I) on 9 January 1991, and by BASF AG (Opponent II) on 17 January 1991.

Both Opponents contended that the claimed subject-matter lacked novelty and/or inventive step (Articles 54 and 56 EPC) *inter alia* over the following documents:

D1: US-A-4 430 478 and
D2: US-A-4 419 492.

Opponent I furthermore argued that the opposed patent failed to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 83 EPC).

III. By its interlocutory decision issued in writing on 10 May 1994 the Opposition Division held that there were no valid grounds of opposition to the maintenance of the patent in suit on the basis of an amended set of

12 claims as filed on 9 November 1993 with amendments proposed by the Opposition Division at the end of the oral proceedings on 16 September 1993 and approved by the Patentee's letter of 24 February 1994

The precharacterizing part of Claim 1 of this set is identical to granted Claim 1, the characterizing part reads as follows:

"... characterized by the following three different grafted rubber components:

(1) a component of small, emulsion polymerized particles, being from 10 to 90 weight percent of the total elastomeric material and having a volume average diameter from 0.05 micron to 0.25 micron;

(2) a component of small, mass polymerized particles, being from 5 to 85 weight percent of the total elastomeric material, and having a volume average diameter from 0.65 micron to 1.5 microns; and

(3) a component of large, mass polymerized particles, being from 5.0 to 50 weight percent of the total elastomeric material; said large mass polymerized particles having a volume average diameter of from 3 microns to 8 microns."

Consequential amendments, caused by the restriction of the particle size ranges of rubber components (2) and (3) in amended Claim 1, have been made to original Claims 2, 7 (amended Claim 6), and 8 (amended Claim 7). Original Claims 6 and 12 have been deleted.

The decision held that, in view of the disclosure in the contested patent as well as in the citations on file, the arguments brought forward by Opponent I with respect to the ground of insufficiency under Article 100(b) EPC were unconvincing.

The decision acknowledged the novelty and the inventivity of the subject-matter of the patent in suit over the cited prior art. It held that there was no incentive in the most relevant piece of prior art, namely document D1, to change the particle size range of the medium-size rubber component of from 0.25 to 0.6 μm to the range of from 0.65 to 1.5 μm . The Opponent's additional argument concerning the alleged obviousness of the substitution of mass polymerized medium-size rubber particles for the emulsion polymerized medium-size rubber particles used in D1 was not considered to be sufficiently substantiated and, therefore, was also dismissed.

IV. On 17 June 1994 the Opponent I (Appellant) lodged an appeal against the interlocutory decision of the Opposition Division, paid the appeal fee and submitted a Statement of Grounds of Appeal.

He supplemented his arguments in the submission of 20 November 1996 and during oral proceedings held on 9 April 1997.

IV.1 The Appellant maintained his objection under Article 100(b) EPC as made in the first instance opposition proceedings, but, after having been informed by the Rapporteur's communication of 6 February 1997 that his arguments under this heading appeared unconvincing, he withdrew this ground of opposition during the oral proceedings.

IV.2 In his written submissions the Appellant also argued that Claim 1 did not comply with the requirements of Article 84 EPC, because it was not clear in this claim, even when read in the light of the description (Article 69 EPC), what was meant by "particles of an elastomeric material, which is characterized by three different grafted rubber components". After having been reminded in the afore-mentioned communication that these objections did not come under the grounds of opposition of Article 100 EPC and, being unrelated to the amendments made to the granted version of the opposed patent, could not be considered under the provisions of Article 102(3) EPC either, he did not seek to rely on them during the oral proceedings.

IV.3 The Appellant's position with regard to the issue of novelty was not entirely clear from his written submissions. During the oral proceedings he contended lack of novelty of the subject-matter of Claim 1 over document D1, because the emulsion polymerized medium-size rubber particles disclosed in D1

- (i) at least with respect to a part of the size range set out in D1, had the same particle size as the corresponding particles according to Claim 1, and
- (ii) could not be structurally distinguished from the mass polymerized medium-size rubber particles used according to that claim. This was demonstrated by the close similarity of the particle structure of mass polymerized particles as shown in the photomicrograph submitted by the Respondent (photograph 2 of submission of 5 March 1997) and of emulsion polymerized rubber particles as disclosed in the two photomicrographs in the lower row, centre and right, of Figure 39 of document

D7: Rubber-Toughened Styrene Polymer, A. Echte, Ed.
American Chemical Society, 1989, pages 15 to 64,

which photomicrographs, according to the Appellant,
were identical to those designated c) and d) in
Figure 9 on page 12 of document

D8: Morphologie von ABS-Pfropfkautschuken, J. Stabenow
and F. Haaf, Die Angewandte Makromolekulare Chemie
29/30 (1973), 1-23 (Nr. 359),

filed during oral proceedings in order to alleviate the
unsatisfying quality of the photostat of Figure 39 in
D7. That document D8, the Appellant contended, was,
with respect to this figure, referred to in D7.

IV.4 Regarding the issue of inventive step, the Appellant
argued that, in the absence of any unexpected effect
caused by the substitution of mass polymerized medium-
size rubber particles for the emulsion polymerized
medium-size rubber particles used according to D1, this
substitution was obvious, because it did not amount to
anything more than to the use of a well known
alternative method of polymerization. The same
conclusion of obviousness applied to the minor change,
if any, of the particle size range of the medium-size
particles of 0.25 to 0.6 μm (number-average diameter)
according to D1 to the range of 0.65 to 1.5 μm (volume-
average diameter) according to Claim 1 of the patent in
suit.

The test results submitted by the Patentee with his
letter of 8 January 1992 did not amount to a fair
comparison with the closest prior art according to D1,
since the rubber content of the medium-size particles
prepared, respectively, by emulsion and mass

polymerization, was too different. These results could not, therefore, prove that the change to mass polymerized medium-size rubber particles caused an unexpectedly improved impact strength.

The Appellant also relied on document D2 from which the use, for enhancing the impact strength of ABS compositions, of medium-size mass polymerized grafted rubber particles in combination with small emulsion polymerized grafted rubber particles was known.

V. In his submissions of 22 December 1994 and 5 March 1997 the Respondent (Patentee) argued essentially as follows:

V.1 The objection of insufficiency of disclosure was unfounded because it was well known in the art, e.g. from D1, how mass polymerized particles in the particle size range of from 0.65 to 1.5 μm could be prepared.

V.2 As to the Appellant's objections under Article 84 EPC, these were neither appropriate ones to raise in opposition proceedings, nor were they conclusive.

V.3 With respect to the issue of novelty the Respondent agreed to the preliminary opinion of the Rapporteur set out in the communication of 6 February 1997 that this turned on the question of whether particles prepared by emulsion polymerisation could be distinguished from particles of the same size range prepared by mass polymerisation. In order to demonstrate that this was in fact the case, he submitted photomicrographs allegedly showing the different shape and volume of occlusions in, respectively, mass and emulsion polymerized medium-size rubber particles.

V.4 The Respondent denied that the change of the method of preparation of the medium-size rubber particles from emulsion polymerization (method used according to D1) to mass polymerization (method used according to the patent in suit) was obvious. Considering that the preparation of medium-size rubber particles by agglomeration of emulsion polymerized particles was relatively easy as compared with the preparation by mass polymerization of rubber particles in the size range of from 0.65 to 1.5 μm , which method required high levels of shear and agitation, the skilled person had no reason to make such a change without some concrete expectation of improved results. The fact, as demonstrated by the experimental data submitted with the Patentee's letter of 8 January 1992, that the use of mass polymerized medium-size rubber particles, surprisingly, led to compositions having high impact strength values over a broad range of dart impact testing speeds showed that the change from emulsion to mass polymerization, in the present context, required an inventive effort.

VI. Oral proceedings were held on 9 April 1997.

The Appellant and the Opponent II, the latter in his capacity of a party as of right according to Article 107 EPC (2nd sentence), were represented, while the Respondent, in accordance with his submissions of 3 January 1997 and of 5 March 1997, although duly summoned, did not attend.

The arguments presented by the party as of right during oral proceedings did not add anything of substance to the objections raised by the Appellant.

VII. The Appellant requested that the decision under appeal be set aside and the patent be revoked in its entirety.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Articles 123(2) and (3) EPC*

The amended particle size ranges in Claims 1 and 6 of, for the medium-size rubber component (2), from 0.65 to 1.5 microns, and, for the large rubber component (3), from 3 to 8 microns are based on Claim 2 of the original application (identical to Claim 2 of the granted patent). These ranges are narrower than those in granted Claims 1 and 6.

The further amendments to the claims are consequential and, thus, of a purely editorial nature.

Therefore the requirements of Articles 123(2) and (3) EPC are complied with.

3. *Novelty*

3.1 Document D1

As agreed by all the parties, this document represents the most relevant piece of prior art.

It relates to thermoplastic molding materials containing *inter alia*

- (A) a copolymer of vinyl-aromatic monomers, e.g. styrene, and ethylenically unsaturated monomers, e.g. acrylonitrile (Claim 1; column 1, lines 38 to 66),

- (B) a graft copolymer comprising
 - a hard phase (ba), containing as copolymerized units vinyl-aromatic monomers (bc), e.g. styrene, and ethylenically unsaturated monomers (bd), e.g. acrylonitrile, and

 - an elastomer phase (bb) having a number average particle diameter of from 0.5 to 5 μm (Claim 1; column 1, line 67 to column 2, line 44), and

- (C) a graft copolymer comprising
 - a hard phase (ca), containing as copolymerized units vinyl-aromatic monomers (cc), e.g. styrene, and ethylenically unsaturated monomers (cd), e.g. acrylonitrile, the hard phase being grafted onto

 - an elastomer phase (cb) containing particles in two different size ranges having mean number-average diameters, respectively, of (cb1) from 0.05 to 0.18 μm , and (cb2) from 0.25 to 0.6 μm (Claim 1).

The graft copolymer (B) is preferably prepared by mass graft polymerization, i.e. by reacting a mixture of the monomers (bc and bd) in the presence of an elastomeric (co)polymer (bb) dissolved therein, possibly in the presence of inert solvents (column 2, lines 60 to 65).

The graft copolymer (C) is prepared by emulsion graft copolymerization of a mixture of vinyl-aromatic monomers (cc) and ethylenically unsaturated monomers (cd) in aqueous emulsion onto the elastomer phase (cb), e.g. polybutadiene (column 3, line 40 to column 4, line 50). To obtain the bimodal particle size distribution of graft copolymer (C) the agglomeration method is particularly preferred, according to which, prior to grafting, a certain proportion of first stage emulsion polymer particles having a particle size of from 0.08 to 0.15 μm is enlarged by agglomeration to particles in the size range of from 0.25 to 0.6 μm (column 5, lines 35 to 50).

3.2 The compositions according to Claim 1 of the patent in suit are characterized on page 2, lines 3 and 4 of the patent specification as ABS or ABS-type compositions (ABS = acrylonitrile butadiene styrene) having a defined trimodal rubber particle size distribution. The compositions disclosed in D1 belong to the same category. It remains to be decided whether the particle diameter ranges and/or the methods of preparation of the grafted rubber particles according to the patent in suit and according to D1, insofar as they are different, can be recognized as features that distinguish the compositions of present Claim 1 from those according to D1.

3.2.1 The respective particle sizes [μm] according to the patent and according to D1 are as follows:

	small	medium	large
patent in suit	0.05 - 0.25	0.65 - 1.5	3 - 8
document D1	0.05 - 0.18	0.25 - 0.6	0.5 - 5

These ranges cannot be directly compared because according to the patent in suit the particles sizes are defined by their volume-average diameter, while according to D1 they are defined by their number-average diameter (cf. respective Claims 1). Pursuant to page 5, lines 40 to 45 of the patent in suit the (polydispersity) ratio of volume-average diameter of a particle group to the number-average diameter of the same group is generally in the range of from 1 to 3.5. From this it must be concluded that the ranges of the groups of the small particles and the large particles, which numerically overlap to a large extent, overlap indeed also factually, i.e. when taking account of the different methods of measurement of the respective particle diameters. Moreover, the particle size ranges of the medium-size particles, which numerically do not overlap (patent in suit: 0.65 - 1.5 μm ; D1: 0.25 - 0.6 μm), will also overlap, since the conditions for overlapping are already given at the very low polydispersity ratio of 1.1, which corresponds to the ratio of the lower limit of the volume-average particle diameter of 0.65 μm according to the patent in suit and of the upper limit of the number-average particle diameter of 0.6 μm according to D1.

That the different numerical ranges indicated for the medium-size particles in Claim 1 of the patent in suit and in D1 do not, at least with respect to a part of these ranges, relate to different particle sizes, but are only the result of the different methods of measurement, is obvious from the Respondent's test report of 8 January 1992. In paragraph (ii) on page 1 of this report for the **same** particles a volume-average diameter of 0.8 μm (being within the range of from

0.65 to 1.5 μm according to present Claim 1) and a number-average diameter of 0.5 μm (being within the range of from 0.25 to 0.6 μm according to D1) is indicated.

It follows that the respective rubber particle size ranges do not qualify as characteristics which distinguish the compositions according to Claim 1 of the patent in suit from those disclosed in D1.

3.2.2 According to the patent in suit and according to D1 the same methods of polymerization are used for the preparation of, respectively, the small and the large rubber particles; in both cases the small particles are prepared by emulsion polymerization and the large particles are prepared by mass polymerization. By contrast, the medium-size rubber particles are prepared differently, according to patent in suit by mass polymerization, according to D1 by emulsion polymerization.

D1 is silent on the microscopic structure of the emulsion polymerized medium-size rubber particles.

For the reasons set out below the Appellant has failed to prove conclusively that the emulsion polymerized medium-size rubber particles disclosed in D1 are structurally identical to the mass polymerized medium-size rubber particles used according to Claim 1 of the patent in suit.

3.2.2.1

(i) Preparation of ABS and ABS-type compositions by **emulsion** polymerization starts from a rubber latex to which styrene and possibly acrylonitrile monomers are added. On polymerization the monomers form a polymer shell around the rubber particles. Depending i.a. on

the relative proportions, on the size of the rubber particles and on their degree of crosslinking, the monomers may also dissolve in the rubber particles, leading to a cellular structure (D7: page 46, last paragraph to page 48, first paragraph, including Figure 39; D7 is a review document, that was published in 1989, but the information referred to therein, which is relevant to the present case, was published before the priority date of 1 February 1985 of the patent in suit).

- (ii) The preparation of ABS by **mass** (or bulk) polymerization starts from a homogeneous rubber solution to which the monomers styrene and possibly acrylonitrile are added and polymerized. The system then separates into two phases after a few percent of conversion, because the two polymer solutions are incompatible. When the phase-volume ratio approaches unity, phase inversion begins and the rubber phase is distributed within the surrounding polystyrene phase. The rubber phase itself is not homogeneous, because the phase inversion occurs between a polystyrene solution and a subemulsion of polystyrene droplets in rubber solution which form occlusions in the rubber particles (D7: page 19, second paragraph to page 20 first paragraph; page 23, last 9 lines). The microscopic structure of such particles is illustrated in Figures 9, 11 and 12 of D7 (pages 26 to 28). In this case too the corresponding reference articles were published before 1985.

3.2.2.2 The apparent vast difference between the physical processes taking place during the preparation of ABS by emulsion and mass polymerization, respectively, i.a. involving, on the one hand shell formation and swelling of preformed rubber latex particles by diffused monomer (emulsion polymerization) and, on the

other hand the formation of grafted rubber particles by phase inversion from a monomer subemulsion in a rubber solution, justifies the Respondent's submission, that so differently prepared grafted rubber particles must be structurally different i.a. with respect to the shape and volume of occluded matrix polymer (same submission page 2, third paragraph), because it is these physical processes that determine the ultimate microstructure of the grafted rubber particles. This is evidenced by the photomicrographs (photographs 1 and 2, blends 1 and 2) submitted with the Respondent's letter of 5 March 1997.

3.2.2.3 The arguments and evidence adduced by the Appellant in rebuttal are not conclusive for the following reasons.

- (i) The gist of the Appellant's argument was that the cellular particle structure of the **mass** polymerized medium-size rubber particles exhibited in the Respondent's evidence (photograph 2 and photomicrograph of blend 2) could not be distinguished from the structure of the **emulsion** polymerized medium-size rubber particles shown in Figure 39 of D7 (page 48, photomicrographs in the centre and on the right of the lower row) and that, therefore, the structure of the emulsion polymerized medium-size rubber particles disclosed in D1 must be identical to the structure of the medium-size rubber particles according to Claim 1 of the patent in suit.

- (ii) However, even if the Appellant's position were right, namely that the microscopic structures represented in the respective pieces of evidence could not be distinguished from one another, this would not justify the conclusion that the same applies to the medium-size rubber particles disclosed in the patent in suit and in D1.

- (iii) Such a conclusion could only be drawn on the basis of evidence comparing like with like. In the present case this means that the particles, whose structures are compared, should have essentially identical make-up, i.e. should be identical with regard to the chemical constitution and degree of crosslinking of the rubber particles, the degree of grafting and the chemical constitution of the matrix. From the available information, however, nothing can be learnt about the respective make-up of the medium-size grafted rubber particles whose structures are represented, on the one hand in the Respondent's evidence (photograph 2 and photomicrograph of blend 1) and, on the other hand in Figure 39 of D7.

- (iv) By arguing that **under certain conditions** the structure of emulsion polymerized medium size grafted rubber particles matches that of graft polymerized particles the Appellant has not discharged the burden of proof to the necessary standard referred to above.

3.2.2.4 The Appellant therefore failed to prove that the emulsion polymerized medium-size grafted rubber particles disclosed in D1 **inevitably must have** the same structure as the mass polymerized medium-size grafted rubber particles specified in Claim 1 of the patent in suit.

3.2.3 In consequence, the disclosure of document D1 does not deprive of novelty Claim 1 of the patent in suit. The same conclusion applies to independent Claim 6, because the process specified therein involves the use of compositions according to Claim 1.

4. *Inventive step*

4.1 The Appellant's and the party as of right's arguments with respect to this issue are again based on document D1. However, the contention that it was obvious to the person skilled in the art to use, in the ABS compositions according to D1, as medium-size grafted rubber component mass polymerized instead of emulsion polymerized particles, for the reasons to follow, is again inconclusive.

4.2 Problem to be solved

4.2.1 In the patent in suit it is set out that it "would be desirable to produce an ABS or ABS-type composition having good impact resistance over a broad range of dart impact speeds" (page 3, lines 3 to 4). As compared with the trimodal ABS compositions according to document D1, which contain emulsion polymerized medium-size grafted rubber particles, the Respondent claimed in the test report filed on 8 January 1992 (page 3, point 6) that the tested composition according to the patent in suit "not only shows substantially improved toughness as measured by the

notched izod test, but it also shows notably good and uniformly high impact strength values across the full range (i.e., 30 to 30,000 in/min) of impact speed testing, and has vastly better toughness in the instrumented dart impact test at 30,000 in/min than does its prior art counterpart, Blend 2, which fails in a brittle mode at that dart speed."

4.2.2 From these statements it can be concluded that the problem underlying the subject-matter of the patent in suit with respect to the compositions according to D1 was the provision of similar trimodal ABS-type compositions having improved toughness properties.

4.3 Solution

4.3.1 According to the patent in suit this problem is to be solved by the substitution, in the trimodal compositions according to document D1, of mass polymerized medium-size grafted rubber particles for the emulsion polymerized medium-size grafted rubber particles used in D1.

4.3.2 The results in Table I of the Respondent's aforementioned test report of 8 January 1992 demonstrate that the use of mass polymerized medium-size rubber particles in lieu of emulsion polymerized medium-size rubber particles led to an enhanced notched Izod value (3.6 ft lbs/in as compared with 2.5 ft lbs/in) and to an improvement of the Dart Impact Toughness at dart speeds of 3000 and 30000 in/min (404 and 394 in-lbs, respectively, as compared with 385 and 164 in-lbs (involving failure in brittle mode), respectively) while at lower dart speeds of 30 and 300 in/min the toughness values were a little worse (356 and 375 in-lbs, respectively, as compared with 386 and 404 in-lbs, respectively).

- 4.3.3 According to these results the problem set out in point 4.2.2 supra has been solved by the subject-matter of Claim 1.
- 4.3.4 The above conclusion is not invalidated by the Appellant's criticism of the afore-mentioned test report.
- 4.3.4.1 In particular, the Appellant objected that the impact resistance data contained in Table I of this test report were inappropriate to show an improvement obtained by the use of mass polymerized medium-size particles instead of emulsion polymerized medium-size particles, because the rubber content of the respective medium-size particles was too different to provide a fair comparison and was also not sufficiently close to the nearest embodiment disclosed in D1.
- 4.3.4.2 The Respondent's test report of 8 January 1992 demonstrates that ABS compositions ("Blend 1") comprising a total rubber content of 15%, achieved by the presence of 15.8% of large mass polymerized rubber particles (i), 45.1% medium-size mass polymerized rubber particles (ii) having a rubber content of 7.5% and 21.3% small emulsion polymerized rubber particles (iii) having a rubber content of 47.5% are superior in several aspects of toughness to other ABS compositions ("Blend 2") differing from "Blend 1" in the use, in lieu of particles (ii) and (iii), of 28.1% of a bimodal emulsion resin (iv) comprising small and medium-size particles having an overall rubber content of 48%, obtained by partial agglomeration, prior to grafting, of 25% of the afore-mentioned particles (iii).

The Appellant correctly pointed out that the different rubber content of the medium-size rubber particles in Blends 1 and 2 (7.5% and 48%, respectively) should have an impact on the toughness properties that adds to the influence of their different preparation by mass or emulsion polymerization. However, this fact does not invalidate the toughness results of the Respondent's test report. Blends 1 and 2 comprise so many identical features (total rubber content; styrene/acrylonitrile copolymer matrix and graft; amount, constitution and particle size of large mass polymerized and small emulsion polymerized particles; particles size of medium-size particles) that it is reasonable to assume that the different methods of polymerizing the respective medium-size particles contribute to the improvement of the toughness of Blend 1 over that of Blend 2 .

Nor is the probative weight of the Respondent's test report diminished by the fact that the disclosure of the closest prior art document D1 comprises emulsion polymerized medium-size rubber particles that have a higher rubber content than 7.5%, i.e. the percentage of rubber present in the mass polymerized medium-size rubber particles of Blend 1 of the Respondent's test report. There is no need that comparative evidence strictly adheres to all parameters of the closest prior art embodiment as long as the influence of the relevant critical characteristic is appropriately reflected. This is the case here.

4.3.4.3 Since the Appellant's criticism was not based on any counter-evidence, he did not even begin to discharge the burden of proof resting upon him. The Appellant's respective statements are thus to be considered as mere allegations that cannot change the conclusion drawn in point 4.3.3 supra.

4.4 Obviousness

4.4.1 Document D1 contains no hint whatsoever as to the possible improvement of some toughness characteristics of trimodal ABS compositions by changing the method of preparation of the medium-size grafted rubber particles from emulsion polymerization to mass polymerization. With respect to this document the solution of the existing problem (cf. point 4.2.2 supra) by the subject-matter of Claim 1 was thus non-obvious.

4.4.2 The same conclusion is arrived at when, as suggested by the Appellant during the oral proceedings, the disclosure of document D2 is also taken into account. Although D2 proposes, in the **bimodal** ABS-type compositions disclosed therein, the use of "large" particles in the range of 0.8 to 2.0 μm that have been prepared by mass-suspension polymerization (cf. Claim 1; page 4, line 72 to page 5, line 65), D2 is devoid of any information that by the use of such mass polymerized rubber particles instead of emulsion polymerized particles the toughness characteristics of the compositions can be improved.

The skilled man could not, therefore, get any clue from D2 that by the choice of mass polymerized rubber particles in the size range of from 0.8 to 2.0 μm he would be able to positively influence the toughness of **bimodal** ABS-type compositions. Even less could such a conclusion be drawn with respect to the **trimodal** ABS-type compositions according to document D1.

4.4.3 It follows that the subject matter of Claim 1 was non-obvious over the citations on file and, therefore, meets the requirement of Article 56 EPC.

- 4.4.4 For the same reasons the subject-matter of independent Claim 6 also involves an inventive step since it is directed to a process for preparing a rubber-modified impact resistant polymeric composition characterized by the same combination of features.
- 4.4.5 Owing to their dependency upon independent Claims 1 and 6, the inventivity of the subject-matter of Claims 2 to 5, respectively 7 to 12 is also given.
5. The grounds of opposition maintained by the Appellant do not, therefore, prejudice the maintenance of the patent in suit in the form as amended during the first instance opposition proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

C. Gérardin