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**Datasheet for the decision
of 1 October 2024**

Case Number: T 2037/22 - 3.3.03

Application Number: 16884775.4

Publication Number: 3260493

IPC: C08L67/02, C08G63/183, C08K3/08

Language of the proceedings: EN

Title of invention:
PBAT RESIN COMPOSITION

Patent Proprietor:
Kingfa Sci. & Tech. Co., Ltd.

Opponent:
Novamont S.p.A.

Relevant legal provisions:
RPBA 2020 Art. 12(4)
EPC Art. 100(b), 54(2), 56

Keyword:

Evidence admitted into the procedure by the opposition division and on which the contested decision is based - not to be disregarded

Additional evidence submitted on appeal - admitted in part
Unusual parameter - Sufficiency of disclosure (yes) - Novelty (yes) no reversal of burden of proof - Inventive step (yes)
objection based on hindsight considerations

Decisions cited:

G 0001/03, G 0002/21, T 0292/85, T 0301/87, T 0238/88,
T 0686/91, T 0740/01, T 0131/03, T 1666/16, T 2732/16



Beschwerdekammern

Boards of Appeal

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Case Number: T 2037/22 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 1 October 2024

Appellant: Novamont S.p.A.
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
21 June 2022 concerning maintenance of the
European Patent No. 3260493 in amended form.**

Composition of the Board:

Chairman D. Semino
Members: F. Rousseau
M. Millet

Summary of Facts and Submissions

- I. The appeal lies from the interlocutory decision of the opposition division according to which European patent No. 3 260 493 as amended according to the claims of auxiliary request I submitted with letter of 4 June 2021 and a description adapted thereto met the requirements of the EPC.
- II. The following documentary evidence was *inter alia* submitted before the opposition division:
- D1: CN 104 262 913 A and computer-generated translation thereof D1e
- D2: CN 104 312 106 A and computer-generated translation thereof D2e
- D3: US 4,250,078
- D4: Affidavit by Dr. W. Zhao dated 2 June 2021
- D5: Rework of experiments according to the patent in suit
- D6: J. Phosee *et al.*, "Mechanical Properties and Morphologies of Rice Husk Silica (RHS)/Poly(butylene adipate-co-terephthalate) (PBAT) Composites: effect of filler content", Pure and Applied Chemistry International Conference 2010 Proceedings, Ubon Ratchathani, Thailand, ISBN: 978-974-523-230-3, pages 515-518
- D7: J. Phosee, "Factors affecting properties of rice husk silica/poly(butylene adipate-Co-terephthalate) composites", Thesis submitted in Partial Fulfilment of the Requirements for the Degree of Master of Engineering in Polymer Engineering, Suranaree University of Technology, Academic Year 2011

III. According to the reasons for the contested decision which are pertinent for the appeal proceedings, i.e. those concerning auxiliary request I:

- (a) There was no reasonable doubt that D6 and D7 had been made available to the public before the priority date. Those documents were admitted into the proceedings.
- (b) Novelty was acknowledged over each of D1, D2, D6 and D7. Concerning D6 and D7, in the absence of enough information about the composition of the rice husk silica (RHS), or experimental evidence, it could not be concluded, also based on the information in the patent in suit, that the RHS containing PBAT compositions described in D6 and D7 inevitably exhibited a variation of b-value of less than 2.
- (c) The conclusion that the RHS containing PBAT compositions of D6 and D7 fulfilled the structural requirements of operative claim 1, but not necessarily the functional feature of a variation of b-value of less than 2 did not constitute evidence that the claimed invention lacked sufficiency of disclosure. Having regard to the teaching of the patent in suit, in particular its embodiments 1 to 20, supplemented by declaration D4, it was not apparent that the skilled person would be prevented from carrying out the invention.
- (d) None of the documents offered by the opponent as starting point for assessing inventive step, i.e. D3, D6 or D7, related to the same effect/objective as the opposed patent. Whereas D6 and D7 were dismissed as possible starting points, D3 was

deemed to be at least more promising in this respect. An inventive step was acknowledged over this starting point, since it was only with hindsight that the skilled person would have replaced the PET-based composition of D3 by a PBAT copolymer in order to solve the problem of providing an alternative polyester composition.

- IV. An appeal was filed by the opponent (appellant).
- V. With their statement of grounds of appeal, the appellant filed the following additional documents:

D8: Declaration by Assistant Prof. Dr. Nitinat Suppakarn, dated 18 October 2022
D9: Experimental report "Carbon black composites".
- VI. With the reply to the statement of grounds of appeal the patent proprietor (respondent) filed auxiliary requests II to XVI and IXa to XIIIa.
- VII. In preparation of the oral proceedings, a communication pursuant to Article 15(1) RPBA conveying the Board's provisional opinion was issued.
- VIII. In reply to the Board's communication, the appellant made additional submissions with letter of 26 September 2024.
- IX. Oral proceedings before the Board were held on 1 October 2024.
- X. The final requests of the parties were as follows:

The appellant requested that the decision under appeal be set aside and that the European patent No. 3 260 493 be revoked.

The respondent requested that the appeal be dismissed, or alternatively that the contested decision be set aside and that the patent be maintained on the basis of auxiliary requests II to XVI including requests IXa to XIIIa, all filed with the reply to the statement of grounds of appeal.

XI. The sole claim which is relevant to the present decision is claim 1 of auxiliary request I which reads as follows:

"1. A PBAT resin composition, characterized in that, it comprises following components:

- (a) poly(butyleneadipate-co-terephthalate);
- (b) iron element;

wherein, based on a total weight of the PBAT resin composition, a weight content of the iron element is 1 ppm - 500 ppm, measured by a microwave digestion-ICP-OES method: 0.1 g of a smashed sample is weighed and put into a microwave digester; 5 ml of nitric acid is added so as to fully immerse the sample, followed by dropwise adding 1.0 ml of hydrogen peroxide slowly; after reacting for 2 minutes, the digester is covered and sealed with a lid and put into a microwave digestion furnace for digestion; after the furnace is cooled to room temperature, a solution in the digester is filtered with a 0.45 mm - filter membrane followed by being transferred to a volumetric flask, and then is diluted to 50 ml with distilled water and measured by an ICP-OES; and

wherein after the PBAT resin composition is aged in boiling water for 24 hours and 48 hours, a variation of

b-value - measured as described in the present specification - is less than 2."

- XII. The parties' submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They concerned essentially admittance of documents D6 to D9, sufficiency of disclosure of the invention defined in claim 1, novelty of the subject-matter of claim 1 over D6, D7, D1, and D2 and inventive step of said subject-matter starting from the disclosure of D6, D7 or D3.

Reasons for the Decision

Admittance of D6 and D7

1. The respondent contests the admittance of D6 and D7 arguing that that the opposition division has exercised its discretion to consider documents D6 and D7 in the opposition proceedings according to the wrong principles, since no reason was given by the appellant for their late submissions and their *prima facie* relevance was not shown considering that their date of publication was highly questionable.
- 1.1 It is uncontested that D6 and D7, submitted with letter of 17 February 2022, i.e. more than 3 months prior to the oral proceedings, were not only admitted into the proceedings (contested decision, points 3.1.1 to 3.1.5 of the reasons), but were held to anticipate the subject-matter of claim 1 of the then pending main request (contested decision, points 3.2.2.3 to 3.2.2.6 of the reasons). Moreover, their content was taken into account by the opposition division when assessing

novelty, sufficiency of disclosure and inventive step of the subject-matter defined in the then pending auxiliary request I, corresponding to the present main request (contested decision, points 4.2.3 to 4.2.5; 4.3.2.1 and 4.3.2.2; 4.4.1.3, 4.4.1.6 and 4.4.2.4 to 4.4.2.6).

Under Article 12(1)(a) RPBA, any such evidence and objections based on it, having become part of the contested decision, are basically part of the appeal proceedings (see also Case Law of the Boards of Appeal, 10th Edition, 2022, in the following "Case Law", V.A. 3.4.4). The Board concludes therefrom that D6 and D7 and the objections based on those documents are part of the appeal proceedings (Article 12(4) RPBA).

- 1.2 The decisions referred to in section II.1 of the rejoinder do not concern the present procedural situation and are therefore not relevant. This was indicated in point 9.2 of the Board's preliminary opinion and not contested by the respondent. Since there is no legal basis for retroactively not admitting documents D6 and D7 on appeal, this documentary evidence and objections based thereon has to be taken into account. Accordingly, whether or not the Board itself would have exercised their discretion to admit D6 and D7 into the proceedings and the objections based thereon in a different manner has no bearing on the fact that those have to be taken into account.

Admittance of D8 and D9

2. The submission of documents D8 and D9 is to be regarded as an amendment to the appellant's case within the meaning of Article 12(4) RPBA. Their admittance to the proceedings, which is contested by the respondent

(rejoinder, pages 4 and 5), is subject to the discretionary power of the Board in accordance with Article 12, paragraphs (4) to (6) RPBA. Pursuant to Article 12(4) RPBA, the Board shall exercise its discretion in view of, *inter alia*, the complexity of the amendment, the suitability of the amendment to address the issues which led to the decision under appeal, and the need for procedural economy.

2.1 The opposition division decided that D6 and D7 had been made available to the public. D8 is a declaration of Mr Suppakarn, who is one of the authors of D6 and the advisor of the thesis D7 (D7, third page). This declaration which aims at confirming the public availability of these documents has been submitted as a matter of precaution in case the respondent would still contest their public availability. It does not add any complexity to the case. On that basis, the Board exercised its discretion under Article 12(4) RPBA by admitting D8 into the proceedings.

2.2 D9 is an experimental report meant to demonstrate that composites containing 10 wt% of carbon black relative to the amount of PBAT exhibit a variation of the b-value which is significantly less than 2, despite the absence of iron. D9 is alleged to show that composites containing a colourizing agent such as silica in an amount of 10 wt% or even higher would also fulfil that parametric condition. This would demonstrate that the Rice Husk Silica (RHS) comprising compositions of D6 and D7 also fulfil the parametric condition set out in operative claim 1 (statement of grounds of appeal, page 15, items 81 to 83). D9 is used in addition support of the objection that the subject-matter of operative claim 1 lacks an inventive step, arguing that the incorporation of a certain amount of an "iron element"

as stipulated in claim 1 is by no means essential in order to impart discolouration resistance properties to a PBAT composition, i.e. to meet the functional requirement of claim 1 (statement of grounds of appeal, page 32, item 176).

As to the justification for the filing of new evidence, it is the appellant's contention that the documents filed on appeal have been submitted in response to the reasoned decision and/or observations brought forward by the patentee in the oral proceedings (statement of grounds of appeal, page 2, item 6). In the absence of a specific indication pointing to particular passages of the reasoned decision or of the minutes, the Board cannot see how this could be the case for D9. The opposition division merely pointed out that the influence of adding at least 10 wt% of RHS on the variation of the b-value would be unknown, and that the additives in accordance with the teaching of the patent in suit were different from those of D6 and D7 (see point 4.2.5 of the Reasons referred to by the appellant in item 11 of the statement of grounds of appeal).

In this regard, contrary to the what the appellant's argument would appear to suggest (statement of grounds of appeal, page 3, item 11), neither the opposition division, nor the respondent, pointed out that RHS was an inert material, at least as far as colour stability within the meaning of operative claim 1, represented by the variation of the b-value, was concerned. On that basis, it is not apparent to the Board how D9 which does not concern a material similar to that used in D6 and D7 could be suitable to address novelty or inventive step of the subject-matter of operative claim 1 over D6 or D7.

Moreover, no justification was provided to have waited for the appeal proceedings to argue in relation to inventive step that the presence of iron element was by no means essential in order to impart discolouration resistance properties (i.e. a limited variation of the b-value) to a PBAT composition and that such effect could be obtained by the addition of carbon black.

Under these circumstances, the Board exercised its discretion under Article 12(4) RPBA by not admitting document D9 into the proceedings.

Main request (auxiliary request I underlying the contested decision)

Sufficiency of disclosure

3. According to the established jurisprudence of the Boards of Appeal of the EPO a European patent complies with the requirements of sufficiency of disclosure, if a skilled person, on the basis of the information provided in the patent specification and, if necessary, using common general knowledge, is able to carry out the invention as claimed in its whole extent without undue burden, i.e. with reasonable effort. This means in the present case to prepare a PBAT resin composition comprising 1 to 500 ppm of iron-element and meeting the parametric requirement of operative claim 1, namely a variation of b-value - measured as described in the present specification - of less than 2 when the resin composition is aged in boiling water for 24 hours and 48 hours.

According to the case law (Case Law, supra, II.C.5.2), an invention is in principle sufficiently disclosed if at least one way is clearly indicated enabling the

person skilled in the art to perform the invention in the whole range that is claimed. Whether the disclosure of one way of performing the invention is sufficient to enable a person skilled in the art to carry out the invention in the whole claimed range is a question of fact that must be answered on the basis of the available evidence, and on the balance of probabilities in each individual case.

- 3.1 It can be agreed with the respondent that the specification contains ample information on how to prepare the claimed PBAT compositions, including embodiments 1 to 20 (rejoinder, page 14, first full paragraph). It can be referred in this respect to paragraphs [0011] and [0012] concerning the PBAT resin, paragraphs [0014] and [0013] addressing the type of iron-containing compounds to be used and their mode of addition, paragraphs [0015] to [0025] concerning the optional additives and their total amount, paragraph [0029] describing the synthesis of the exemplified PBAT resins and paragraphs [0031] to [0034], including table 1, describing various exemplified embodiments of the present invention.

The appellant's objection concerning an alleged insufficient disclosure for the composition of operative claim 1 is based on three aspects, namely (i) the contradictory indications in table 1 for the amounts of iron containing compounds used to prepare the compositions of embodiments 1 to 20 and their content of iron element, (ii) an alleged incomplete information regarding the PBAT resin, in particular that used in embodiments 1-20 and comparative embodiments 1 and 2, and (iii) the respondent's opinion that a variation of the b-value of less than 2 does not

necessarily result from the structural features defined in operative claim 1 being met.

Amounts of iron containing compounds used for embodiments 1 to 20

- 3.2 As regards the alleged ambiguity concerning the amount of iron containing compound used in the experimental part of the specification, table 1 on pages 5 to 7 of the specification describes two compositions identified as "comparative embodiments" 1 and 2, i.e. embodiments which are not in accordance with the invention defined in granted claim 1, as well as compositions 1 to 20, which in contrast are implicitly understood as embodiments of the invention in accordance with the granted patent.

Embodiments 1 to 20 concern compositions with an indicated iron content ranging from 8 to 500 ppm, which values almost cover the whole range of 1 to 500 ppm defined in granted claim 1, said embodiments meeting at the same time the parametric requirement of operative claim 1 defined by a variation of b-value of less than 2. In contrast, the two comparative embodiments 1 and 2 concern compositions with a iron content of 0.5 and 600 ppm, i.e. values which frame the claimed range of 1 to 500 ppm, and do not result in the variation of b-value in accordance with operative claim 1. Those comparative embodiments confirm that the selection of the iron content defined in operative claim 1 is crucial in order to meet the functional feature of said claim.

There is therefore no doubt that for any of the iron-containing compounds taught in paragraph [0014] of the specification as a source of iron element the skilled person would select the appropriate amount thereof in

order to prepare a composition whose iron element content is in the range defined in operative claim 1 in order to achieve the result expressed by the parametric definition of said claim. The same is therefore valid for the compositions defined with embodiments 1 to 20.

Accordingly, the undisputedly existing inconsistency in table 1 of the specification for all embodiments and comparative embodiments between the amount of iron-containing compound added in g (as a source of iron) and the resulting iron element content in ppm, i.e. an amount of added iron containing compound which is systematically 10 times lower than the amount which would be necessary to obtain the iron-content indicated in ppm, cannot mislead the skilled person desiring to prepare the claimed compositions. The iron content defined in claim 1 does not only have the same order of magnitude than that described for embodiments 1 to 20, but above all dictates to the skilled person the amount of iron containing compound needed, so that no ambiguity can exist in this respect.

3.3 Moreover, as shown by the respondent, experimental report D5 confirms that the amount of iron in ppm indicated in table 1 and corresponding to that within the range defined in operative claim 1 is that which allows for preparing a composition meeting the parametric requirement of that claim (rejoinder, paragraph bridging pages 16 and 17). This is also confirmed in declaration D4 made by one of the inventors of the patent in suit. In this regard, D4 and D5 are not part of the teaching needed by the skilled person to successfully prepare a composition meeting the functional requirement of operative claim 1, but the mere confirmation that the content of the element iron in ppm as indicated in table 1 and required by

operative claim 1 is the one necessary to achieve the functional feature recited in operative claim 1, and not one which is 10 time lower, as could appear to be the case based on the amount of iron containing compounds indicated in table 1.

The appellant submitted during the oral proceedings that evidence D4 and D5 should not be taken into account, since it would be derivable from decision G 2/21 that a lack of sufficiency of disclosure could not be remedied by post-published evidence. The appellant appears to have referred to points 73 to 77 of the Reasons for decision G 2/21 in which the Enlarged Board considered the jurisprudence regarding sufficiency of disclosure. However, as it can be taken from point 77 of the Reasons for decision G 2/21 ("the proof of a claimed therapeutic effect has to be provided in the application as filed") and the preceding points 74 to 76, that the analysis of the Enlarged Board of the jurisprudence regarding sufficiency of disclosure was made in relation to second medical use claims in which the technical effect is usually a therapeutic effect. In such a case, because the subject-matter of second medical use claims is commonly limited to a known therapeutic agent for use in a new therapeutic application, it is necessary that the patent at the date of its filing renders it credible that the known therapeutic agent, i.e. the product, is suitable for the claimed therapeutic application (point 74). Accordingly, the appellant's argument relying on G 2/21 is based on a generalization of an analysis made by the Enlarged Board exclusively concerning the case law relative to claimed therapeutic effects. The Enlarged Board, however, did not make such generalization, let alone analysed the case law concerning any other type of effect in relation to

sufficiency of disclosure. There is in particular no indication that the Enlarged Board in G 2/21 was of the view that in order to meet the sufficiency requirement, proof of a claimed technical effect which is not a therapeutic effect, has to be provided in the application as filed, let alone in general for a parametric or functional definition meant to provide a limitation of the subject-matter defined otherwise in terms of structural features.

Independently of the point in time at which proof of a claimed technical effect has to be provided in relation to sufficiency of disclosure, the Enlarged Board in G 2/21 did not question the requirements defined under the established Case Law for acknowledging sufficiency of disclosure, which have been recalled in point 3 above.

3.4 Moreover, the fact that the iron content given in table 1 in ppm appears to be relative to the amount of PBAT copolymer, but not to the PBAT resin composition, which might also contain additives, as was noted by the appellant (statement of grounds of appeal, pages 9 and 10, items 54 to 58), also does not have any influence on the above assessment of sufficiency of disclosure. This is because the iron-content in embodiments 1 to 20 are still within the claimed range of 1 to 500 ppm when expressed relative to the total weight of the resin composition.

3.5 Consequently, contrary to the appellant's position, the skilled person does not need to make assumptions as to the amount of iron compounds to be used in order to prepare the claimed composition.

Accordingly, the above analysis concerning the amount of iron compound that the skilled person would find appropriate to use when preparing a composition in accordance with operative claim 1 is not dependent on whether or not the inconsistency of the data shown in table 1 of the specification in relation to the amount of iron can be resolved in a manner complying with the requirements of Rule 139 EPC (statement of grounds of appeal, pages 10, item 61). A decision as to whether the criteria for allowing such a correction under Rule 139, second sentence, EPC could be met can be left unanswered, as such a request was not made.

Information regarding the PBAT resin

- 3.6 Concerning the alleged incomplete information provided in respect of the PBAT resin, in particular the PBAT resin used in embodiments 1-20 and comparative embodiments 1 and 2 (appellant's letter of 26 September 2024, items 14 to 17), it is undisputed that the preparation of such PBAT resins is well known in the art, the appellant acknowledging in item 14 of said letter that typically a metal based catalyst (such as compounds of Sn, Ti, Al, Sb or Zn and the like) is used. Accordingly, the absence of an indication of which specific catalyst or stabilizer was used for the synthesis of the PBAT resin described in paragraph [0029] of the patent does not mean that the skilled person would not be in the position to prepare such resins. In any event, the appellant did not explain as to why the catalyst or the stabilizer used for embodiments 1 to 20 and comparative embodiments 1 and 2 would be relevant in order to meet the parametric conditions defined in operative claim 1, let alone provided any evidence in this respect. This is not apparent to the Board, as embodiments 1 to 20 and

comparative embodiments 1 and 2 empirically show that the decisive factor in order to meet the parametric requirement of operative claim 1 is the content of iron element and not the catalyst or said stabilizer which is not described to have been varied for the embodiments and comparative embodiments.

Relation between the structural definition of operative claim 1 and its functional feature

3.7 Finally, the third aspect of the appellant's submissions in respect of sufficiency of disclosure is based on the argument that the patent in suit would teach that a variation of the b-value of less than 2 is the inevitable result of fulfilling the structural features defined in operative claim 1, but that specific compositions falling within the ambit of the structural definition of operative claim 1, in particular those described in D6, D7, D1 or D2 (statement of grounds of appeal, item 157), would be seen by the respondent not to meet that parametric condition.

This would be the case for the compositions comprising 10, 20, 30, 40, 50 and 60 wt% of rice husk silica (RHS) described in D6 and D7 (hereafter the RHS containing compositions of D6/D7). This would raise serious doubts as to whether the disclosure of the invention defined in operative claim 1 is sufficient, in particular in view of the fact that operative claim 1 allows for the presence in the PBAT resin composition of any other component in addition to PBAT and the iron element in the required quantity (statement of grounds of appeal, pages 29 and 30, items 161, 163 and 164).

Taking into account that the content of iron defined in operative claim 1 would be based on the whole composition, the appellant also argues that the comparative composition 2 with an iron content of 600 ppm based on the PBAT resin which does not exhibit a variation of b-value of less than 2 would comprise by the mere addition of any further compound in amount of about 20 wt% at most 500 ppm iron based on the whole composition, in accordance with the definition of operative claim 1, but would still not meet the parametric requirement of operative claim 1 (statement of grounds of appeal, page 30, item 165).

Furthermore, an iron-content of 0.5 ppm, as used in comparative example 1, which does not result in a variation of b-value of less than 2, should be conventionally rounded up to a value of 1 ppm (statement of grounds of appeal, pages 30 and 31, items 167 to 169).

On that basis, all embodiments falling within the structural definition of operative claim 1 would not necessarily fulfil the functional requirement of a variation of b-value of less than 2.

This is not convincing:

- 3.8 First of all, contrary to the appellant's contention (statement of grounds of appeal, pages 7, 8, 28 and 29, items 36 to 45, 157 and 161) the specification does not teach that a content of iron element in a range 1 to 500 ppm would necessarily result in a variation of the b-value of less than 2. It has to be borne in mind that this functional feature is defined in dependent granted claim 7, which refers to any of claims 1 to 6. Hence, the general teaching provided in the specification

refers to the invention as defined in its broadest term in granted claim 1 which does not comprise that functional restriction.

The only passages of the specification in which a connection between a content of iron element in a range 1 to 500 ppm and the achievement of a variation of b-value of less than 2 are paragraphs [0026] and [0034].

However, paragraph [0026] merely states that adding an iron-containing compound into the PBAT resin and controlling the content of the iron element in a range of 1 ppm - 500 ppm in the composition can postpone the speed of reaction of the aromatic structure in the PBAT resin under a hot and humid condition, so that a variation of b-value of less than 2 is obtained. It does not indicate that this is independent from all other constituents of the resin composition defined in granted claim 1.

The same is true for the teaching of paragraph [0034], which only concerns the specific embodiments 1 to 20.

The other passages of the specification mentioning a content of the iron element in the range of 1 ppm to 500 ppm (i.e. paragraphs [0006] and [0008]) merely teach that the presence of such an amount improves colour stability, however, without stating that a content of above 500 ppm necessarily corresponds to a variation of b-value of at least 2.

- 3.9 As regard the specific compositions alleged to fall within the structural definition of operative claim 1, i.e. the RHS containing compositions of D6 and D7, it is pointed out that RHS is not taught in the patent in suit as a source of iron for providing an iron content

of 1 to 500 ppm in the resin composition, let alone for the purpose of achieving a variation of b-value of less than 2.

There is also no reason to conclude that the use of RHS, as employed in D6 and D7, should be considered by the skilled person to represent an alternative means to achieve such a variation of b-value of less than 2. It is referred in this respect to the analysis of novelty over D6 and D7 provided in point 6.4 below.

There is therefore no case for arguing that the preparation of PBAT compositions comprising 10, 20, 30, 40, 50 and 60 wt% of RHS which is described in D6 and D7 would correspond to the teaching provided in the patent in suit.

Hence, any conclusion that said compositions of D6 and D7 would not meet the functional requirement of operative claim 1, despite of them meeting the structural requirements of that claim, could not lead to the unavoidable deduction that the teaching of the patent in suit is insufficient.

- 3.10 This is all the more true for D1 and D2 which do not even disclose the combination of structural features defined in operative claim 1 (see points 5.1 to 5.4 below).
- 3.11 Moreover, the question to be answered is not whether any conceivable possible combination of features falling within the structural definition of operative claim 1, in particular those which are not based on the teaching of the specification, would meet the functional definition of that claim, but whether the specification taken as a whole would provide the

skilled person with sufficient guidance to generally identify within the structural definition of operative claim 1 and over its full scope those compositions which meet the parametric definition of operative claim 1.

As recalled in point 2.5.2 of decision G 1/03 by a reference to decisions T 238/88, T 292/85 and T 301/87, the non-availability of some particular variants of a functionally defined component feature of the invention is immaterial to sufficiency as long as there are suitable variants known to the skilled person through the disclosure or common general knowledge which provide the same effect for the invention.

On that basis, the mere existence of some compositions meeting the structural definition of operative claim 1, but not fulfilling its functional definition is not enough to conclude that a lack of sufficiency of disclosure would arise, all the more when these compositions are not at all suggested by the teaching of the patent in suit.

This does not only apply to the RHS containing PBAT compositions of D6 and D7 addressed above, but also to the theoretical situations envisaged by the appellant in which a composition having an amount of iron element relative to the PBAT copolymer which is far above the limit of 500 ppm, based on the PBAT copolymer, and is therefore not expected in view of the experimental part of the patent in suit to fulfil the thermal stability requirement of operative claim 1, would still not do so by addition of large amount of filler, despite the fact that its iron content based on the composition would have been brought back within the limits defined in operative claim 1. In particular, the patent suit

does not teach to use any amount of additive in the composition of operative claim 1, in particular fillers in an amount of at least 10 wt%. Paragraph [0015] merely teaches that 0 to 10 parts of additives can be used for 100 parts of PBAT, in line with the amounts used in embodiments 1 to 20 (pages 5 to 7, table 1). Moreover, no data have been provided by the appellant to support their assumption of what would happen in such a theoretical situation.

This is also valid for compositions having an iron content of 0.5 ppm, if they were to the benefit of the appellant considered to meet the structural definition of operative claim 1. In this regard, the patent in suit does not teach that an iron-content of 0.5 ppm would lead to a variation of b-value of less than 2, but rather the contrary with comparative example 1. Moreover, taking into account the conventional rounding conventions addressed by the appellant, an iron-content of 1 ppm can correspond to an amount higher than 1.0 ppm for which no case has been made that it could no lead to the sought result.

3.12 Finally, according to the established jurisprudence of the Boards of Appeal of the EPO, an objection of lack of sufficient disclosure presupposes that there are serious doubts, substantiated by verifiable facts (Case Law, *supra*, II.C.9.1). Having regard to the above analysis, it must be concluded that such facts have not been submitted by the appellant.

3.13 It follows from the above that none of the lines of argumentation submitted by the appellant concerning an alleged lack of sufficiency of disclosure of the invention defined in the operative claims is

convincing. On that basis, the patent in suit complies with the requirements of sufficiency of disclosure.

Novelty

4. It is a general and consistently applied principle of the Boards of Appeal that, in order for novelty to be denied, there must be a direct and unambiguous disclosure in the state of the art which would inevitably lead the skilled person to subject-matter falling within the scope of what is claimed.

Novelty over D1 and D2

5. The appellant objects that the resin composition of operative claim 1 lacks novelty over each of D1 and D2.
 - 5.1 It is undisputed that D1 describes bags produced by co-extrusion of a layer of 100 parts PBAT and an anti-counterfeiting strip of 0.1 to 20 parts of a masterbatch which includes a coding substance, which can be selected from several options including iron (D1, paragraphs [0012], [0013], [0024], [0025], [0030], [0033] and [0058]). The appellant's objection concerning D1 (statement of grounds of appeal, pages 23 to 27, items 128 to 148) is based on the premise that the skilled person seeking to analyse the object defined in claims 1 and 3 of D1 in accordance with the method described in the opposed patent would prepare "a smashed sample" from this object, i.e. any structure of the object would no longer exist in said sample (statement of grounds of appeal, page 23, item 129).

The Board disagrees.

5.2 D1 does not disclose that the bags described therein should be "smashed" so that a mixing of the components of the bag layer and those of the the anti-counterfeiting strip takes place. Such a process step, which would be necessary to obtain a composition with the components of claim 1, is only disclosed in the patent in suit and therefore is to be disregarded when analysing the disclosure content of D1.

In that respect, the appellant submits that claim 1 and dependent claim 3 of D1 do not relate to the specific embodiments described for example in Figures 1 to 3, and, consistently, do not contain any limitations regarding the structure of the plastic bag. This is not relevant, as claims 1 and 3 do not disclose that the 100 parts PBAT are mixed with 0.1 to 20 parts of the anti-counterfeiting masterbatch.

5.3 Taking into account the disclosure of D1 as a whole, the only reasonable reading of its claim 1 is that the components 100 parts PBAT and 0.1 to 20 parts of the anti-counterfeiting masterbatch define the relative amounts and quality of the components used for preparing said bag, which as indicated in the rest of D1 is only prepared by coextruding these two components.

5.4 Even if the skilled person wished to analyse the bag of D1, for which there is no apparent necessity, as the various parts making the bag, including their composition, are described in that document, there is no reason that he/she would inevitably carry out an analysis as described in the patent in suit. Accordingly, the appellant's submissions concerning novelty over D1 are based on an inadmissible hindsight

knowledge of the invention defined in operative claim 1 in which such a "smashing step" is required.

For the above reasons, novelty of the claimed PBAT resin composition over D1 is acknowledged.

- 5.5 The appellant submits that the observations brought forward with respect to lack of novelty over the disclosure in D1 also apply to D2. On that basis, the analysis and resulting conclusion given above in relation to D1 equally apply to D2.

Novelty over D6 and D7

6. The appellant objects that the resin composition of operative claim 1 lacks novelty over each of the PBAT compositions of D6 and D7 comprising 10, 20, 30, 40, 50 and 60 wt% of RHS. The respondent does not only dispute (i) that these compositions comprise a weight content of the iron element in the range of 1 ppm to 500 ppm, but also (ii) that the functional feature of a variation of b-value - measured as described in the present specification - of less than 2 is met by those compositions (rejoinder, page 11 and 12, section 1.3). The respondent also disputes that D6 and D7 have been available to the public within the meaning of Article 54(2) EPC (rejoinder, page 2, last paragraph).
- 6.1 Concerning the status of D6 and D7, D6 is an extract of proceedings of a conference held in January 2010. These proceedings have been assigned a International Standard Book Number (ISBN), which is commercial book identifier. D6 is also indicated in Appendix C of D7 as a publication (see also point 3 of the minutes of the oral proceedings before the opposition division). It is therefore not credible that D6 has not been made

publicly available before the priority date of the patent in suit, i.e. about six years after said conference. Moreover, declaration D8 confirms its public availability before the priority date of the patent in suit (page 2, penultimate paragraph). Said declaration also makes credible that the thesis D7 from which the results are discussed in D6 was made available to the public within the meaning of Article 54(2) EPC (D8, last but one full paragraph of page 1 to second full paragraph of page 2). On that basis, documents D6 and D7 are part of the prior art pursuant to Article 54(2) EPC.

6.2 It is the appellant's position that the submissions made in the light of D6 equally apply when considering D7 and accordingly, that the evaluation of "*the content of D7 and the teaching in the opposed patent must result in the same finding as set out with respect to D6*" (statement of grounds of appeal, pages 21 and 22, items 117 to 122). This is not disputed by the respondent. On that basis, the analysis given below applies to the appellant's and respondent's submissions in respect of both D6 and D7.

6.3 Concerning argument (i), it is the respondent's contention that the test method defined in operative claim 1 and the one used in D6/D7 to measure the elemental iron content in the compositions disclosed therein would give different results so that it cannot be concluded that the iron content is according to claim 1.

The computation by the appellant concerning the amount of elemental iron in the compositions of D6/D7 whose results are shown in item 67 on page 12 of the statement of grounds of appeal has not been contested.

Having regard to

(a) the content of iron element in the RHS measured in D6 by energy dispersive XRF (EDXFR) and expressed as Fe_2O_3 (D6, page 516, left-hand column, first full paragraph and table 1),

(b) the fact that this content leads for the compositions of D6/D7 to contents of iron element between 21 ppm and 87 ppm, i.e. which are all well within the range defined in operative claim 1, and

(c) the absence of any evidence that the method defined in operative claim 1 is inappropriate to determine with accuracy the amount of elemental iron and leads to a result which is significantly different from that obtained with the well-known and accurate analytical EDXFR method,

the Board has no reason to consider that the amount of iron element defined in operative claim 1 constitutes a distinguishing feature over the compositions of D6/D7.

Therefore, respondent's argument (i) fails to convince.

6.4 Concerning argument (ii), the appellant argues that the teaching of the patent in suit relating to the achievement of a variation of b-value of less than 2 would show that the presence of 1 to 500 ppm of iron element based on a total weight of the PBAT resin necessarily implies that said functional feature is met (statement of grounds of appeal, pages 7 and 8, items 36 to 45; page 17, items 94 and 96, page 20, item 109 and page 29, items 161 and 163).

However, as already indicated in point 3.9 above, RHS is not taught in the patent in suit as a source of iron for providing an iron content of 1 to 500 ppm in the resin composition, let alone for the purpose of achieving a variation of b-value of less than 2. The iron containing compounds explicitly mentioned in the patent in suit are those listed in paragraph [0014] and claim 5, namely "*ferric oxide, ferroferric oxide, ferrous oxide, ferrous sulfate, ferric sulfate, ammonium ferric sulfate, ammonium ferrous sulfate, ferrous nitrate, ferric nitrate, ferrous chloride and ferric chloride*" which are the iron-containing compounds used in the examples.

Moreover, no experimental evidence has been provided showing that the addition in D6 and D7 of 10, 20, 30, 40, 50 and 60 wt% of RHS would result in the parametric conditions defined in operative claim 1 to be met, i.e. there is no experimental proof that the iron element added via the RHS (i.e. included in the RHS and making 0.033 wt% of it when calculated in the form of ferric oxide) is available for stabilizing the PBAT resin in the same way it would do, if directly added to the PBAT resin via addition of the above mentioned iron containing compounds.

In this respect, there is even no evidence that the disclosed composition of the RHS, calculated as major oxides, (D6, page 516, left-hand column, lines 6-8, emphasis by the Board) is necessarily an indication that the RHS can be considered to effectively comprise ferric oxide as such, or at least in the proportion indicated in table 1 of D6. In other words, it is also conceivable that iron is also present in a different form.

The absence of evidence for the availability of iron in the form of ferric oxide cannot be remedied by the indication that the RHS is prepared by grinding, resulting in a particle size of about 4.3 μm or has a BET surface area of about 280 m^2/g , reference to these physical parameters being made by the appellant during the oral proceedings in view of section 3.2.1 on page 22 and table 4.2 on page 33 of D7, respectively, since these parameters do not give any indication as to the form in which iron is indeed present in RHS.

- 6.5 The appellant also submits that D6 would show that silica does not discolour on exposure to heat and/or in the presence of water (statement of grounds of appeal, page 14, items 78 and 79, with a reference to the introduction of D6 on its page 515). On that basis, it would be clear that a composition comprising a high amount of silica would exhibit less discolouration, if any at all, irrespective of the presence of 1-500 ppm of an iron element (statement of grounds of appeal, page 15, item 80). In a similar manner, the appellant contends that composites containing a colourizing agent such as silica in an amount of 10 wt.-% or even higher would also exhibit a very low discolouration upon ageing in boiling water (statement of grounds of appeal, page 15, item 82).

This is also not convincing. The point is not whether silica is a material that does not discolour, but rather whether or not the PBAT resin when in contact with the RHS, which is meant to be used as a substitute for silica, would discolour leading to a variation of the b-value of the overall composition within the limit defined in operative claim 1. In this respect, it is not stated in D6 that silica and RHS would be equivalent, the RHS obtained in D6 being indicated to

be an amorphous silica with 97% purity. Moreover, D6 does not concern any thermal stability testing of the PBAT composition, let alone of the type performed in accordance with operative claim 1 in which the colour stability is tested in a boiling water environment. D6 is only concerned with the study of the effect of the RHS content on the mechanical properties of the RHS/PBAT composites (page 515, introduction, last paragraph; Figures 2 to Figures 5; page 518, Conclusion). How, the remaining impurities would impact the thermal stability of PBAT under the test conditions set out in operative claim 1 is unknown.

Accordingly, the appellant's implicit argument that the use of large amount of RHS would amount to a reduction of the amount of copolymer used and therefore to a reduction of the the variation of the b-value for the overall composition presupposes that RHS would have no influence on the degradation of the copolymer when exposed to the test conditions (boiling water for 24 and 48 hours), for which there is, however, no evidence. That argument fails therefore to convince.

Moreover, contrary to the appellant's allegation (statement of grounds of appeal, page 16, item 89), the patent in suit does not emphasise that the presence of chemical elements other than iron is irrelevant. The patent in suit and the evidence submitted by the appellant is simply silent on the influence of RHS on the thermal stability of PBAT when tested under the conditions defined in operative claim 1.

6.6 On that basis, the appellant did not demonstrate that the presence of RHS as disclosed in D6 or D7 in a PBAT resin would inevitably result in a resin composition

fulfilling the parametric condition set out in operative claim 1.

Burden of proof

6.7 The appellant argues in addition that a variation of the b-value within the meaning of the patent in suit being an unusual parameter, it would be legitimate to reverse the burden of proof and to require from the respondent, having chosen to rely on an unusual parameter as the sole distinguishing feature over the compositions disclosed in D6 and D7, to demonstrate that this parameter was not fulfilled by these compositions. The appellant relied in support of their case on decisions T 0131/03, T 0740/01, T 2732/16 and T 1666/16.

All these decisions are based on the same rationale, namely that when a strong presumption has been established that a claimed subject-matter defined with an unusual parameter is inherently disclosed in the prior art, the patent proprietor cannot merely claim the benefit of the doubt and has to demonstrate that the parametric definition chosen distinguishes the claimed subject-matter from the prior art (T 0131/03, Reasons, points 2.3 to 2.7; T 0740/01, Reasons, point 2.3; T 2732/16, Reasons, point 2.3.5; T 1666/16, Reasons, point 4.8).

In the present case, as shown in above points 6.4 to 6.6, the appellant has not succeeded in showing that it was reasonable to assume that a variation of b-value of less than 2 was inherently achieved by the compositions of D6 and D7. Accordingly, there is in the present case no justification to reverse the burden of proof and to require from the respondent that they demonstrate that

a variation of the b-value of less than 2 distinguishes the claimed subject-matter from the compositions of D6 and D7.

- 6.8 Consequently, the Board has no reason to deviate from the opposition division's conclusion in the contested decision that the subject-matter of operative claim 1 is novel over each of D6 and D7.

Inventive step

7. The appellant contends that the presence of 1 to 500 ppm of an iron element, based on the total weight of the PBAT resin composition, cannot confer an inventive step to the compositions encompassed by claim 1 (statement of grounds of appeal, page 32, items 175 to 178). Independently from the fact that these submissions are made in the light of the experimental report D9 which was not admitted into the proceedings (point 2.2 above), those submissions only concern the effect achieved by the iron-content, without referring to any prior art. On that basis, these submissions alone cannot demonstrate that the claimed subject-matter does not involve an inventive step, having regard to the state of the art, as required by Article 56 EPC.
8. The appellant also submits as separate objections that the subject-matter of operative claim 1 would lack an inventive step starting from the disclosure of each of D3, D6 and D7 taken as the closest prior art (statement of grounds of appeal, items 179 to 228). The respondent submits that these separate objections are based on inadmissible ex post facto considerations, in particular concerning the choice of these prior art documents as the closest prior art.

- 8.1 According to the case law (Case Law, *supra*, I.D.3.2) ideally the closest prior art should be a document that mentions the purpose or objective indicated in the patent in suit as a goal worth achieving. The aim thereof is that the assessment process should start from a situation as close as possible in reality to that encountered by the inventor, avoiding *ex post facto* considerations. Therefore a document not mentioning a technical problem that is at least related to that derivable from the patent specification does not normally qualify as the closest state of the art on the basis of which an inventive step is to be assessed, regardless of the number of technical features it may have in common with the subject-matter of the patent (see Case Law, *supra*, I.D.3.3, in particular T 686/91).

In view of paragraphs [0003] to [0005] and [0008] of the patent in suit, it was an object of the present invention to provide a PBAT resin composition having improved colour stability in boiling water ageing.

- 8.2 The Board agrees with the opposition division's position that none of D6, D7 or D3 would relate to said effect or objective. As already indicated in point 6.5 above, D6 is not concerned with any thermal stability testing of the PBAT composition, let alone of the type performed in accordance with operative claim 1, i.e. colour stability in boiling water ageing. D6, is only concerned with the study of the effect of the RHS content on the mechanical properties of the RHS/PBAT composites (page 515, introduction, last paragraph; Figures 2 to Figures 5; page 518, Conclusion). This equally applies to D7, whose technical teaching was not differentiated from that of D6 by the appellant concerning the objection of lack of inventive step.

As regards D3, that document does not concern PBAT, but polyester moulding compositions based on PET or PET-based copolyesters for blow moulding operations to produce beverage bottles (see abstract). D3 is also not concerned with improved colour stability in boiling water ageing.

In view of the above, the selection of any of D3, D6 or D7 as the starting point when aiming at PBAT composition having colour stability in boiling water ageing does not represent a realistic choice for the skilled person, said choice being in fact merely dictated by structural similarities concerning the presence of iron in the compositions described in these documents.

Already on this basis, the appellant's reasoning on inventive step starting from any of those documents lacks the required objectivity and therefore cannot succeed.

8.3 Furthermore, even starting from the disclosure of D3 (as in the analysis of the opposition division, see decision, point 4.4.2 of the Reasons) and considering to the benefit of the appellant that the skilled person would be faced with the problem of the mere provision of an alternative polyester composition, it is only with the benefit of hindsight that the skilled person would find it obvious to arrive at the subject-matter of operative claim 1. As pointed out by the respondent, replacing the PET or PET-based copolyester of D3 with PBAT would require a total departure from the teaching of that document, according to which in its claim 1 the amount of units which are not ethylene terephthalate cannot exceed 30 mole percent. Moreover, the skilled

person would have no motivation to keep using 1 to 300 ppm of iron oxide, when replacing the PET or PET-based copolyester given that the use of iron oxide is linked to the presence of these resins and their particular use, i.e. imparting increased heat up rate in the production of bottles made of these PET-based (co)polymers by blow moulding operations (column 1, lines 18 to 62; column 2, lines 20-28; column 5, example 7; column 6, lines 3-7) and PBAT is not indicated to be suggested for the same kind of use.

On that basis, it has not been shown that the skilled person would have found obvious starting from the teaching of D3 to arrive at the subject-matter of operative claim 1.

9. Consequently, none of the inventive step objections of the appellant to claim 1 succeeds. On that basis, the subject-matter of operative claim 1 involves an inventive step within the meaning of Article 56 EPC.
10. As none of the objections put forward by the appellant against the main request is successful, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated