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**Datasheet for the decision
of 12 June 2024**

Case Number: T 0355/22 - 3.3.05

Application Number: 16741817.7

Publication Number: 3326224

IPC: H01M4/583, C09C1/56, H01M4/56,
H01M4/62, H01M4/14

Language of the proceedings: EN

Title of invention:

OXIDIZED CARBON BLACKS AND APPLICATIONS FOR LEAD ACID BATTERIES

Patent Proprietor:

Cabot Corporation

Opponent:

Orion Engineered Carbons IP GmbH & Co. KG

Headword:

Oxidized carbon black/Cabot

Relevant legal provisions:

EPC Art. 54, 56, 83, 84, 123(2), 123(3)
RPBA 2020 Art. 12(2), 12(4)

Keyword:

Novelty - auxiliary request 3 (yes) - auxiliary request 4 (yes)

Inventive step - auxiliary request 3 (no) - auxiliary request 4 (yes)

Amendments - allowable - main request (no) - auxiliary request 1 (no) - auxiliary request 3 (yes) - auxiliary request 4 (yes)

Claims - clarity - auxiliary request 1 (no)

Auxiliary requests 3, 4 - requirements of Art. 12(2) and (4) RPBA 2020 met (yes)

Decisions cited:

G 0003/14

Catchword:



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Case Number: T 0355/22 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 12 June 2024

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
29 November 2021 concerning maintenance of the
European Patent No. 3326224 in amended form.**

Composition of the Board:

Chair E. Bendl
Members: S. Besselmann
R. Winkelhofer

Summary of Facts and Submissions

- I. The appeals lie from the opposition division's interlocutory decision according to which European patent EP 3 326 224 B1 as amended on the basis of the then auxiliary request 1 met the requirements of the EPC.

The patent in suit concerns oxidized carbon blacks and applications for lead-acid batteries.

- II. Claim 1 of the patent as granted reads as follows:

*"1. An electrode composition comprising:
an oxidized carbon black having a BET surface area ranging from 80 to 2100 m²/g, wherein the oxidized carbon black has at least one of the following properties:*

(a) a volatile content of at least 3 wt.% relative to the total weight of the oxidized carbon black, as determined by weight loss at 950°C;

(b) a total oxygen content of at least 3.5 wt.% relative to the total weight of the oxidized carbon black;

(c) a total titratable acidic group content of at least 0.5 μmol/m², as determined by Boehm's titration method; and

(d) a total titratable acidic group content of at least 0.5 mmol/g, as determined by Boehm's titration method."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the expression "at least one" preceding the list of properties (a)-(d) has been deleted, and in that the wording "the composition further comprising a lead-containing material selected

from lead, PbO , leady oxide, Pb_3O_4 , and $PbSO_4$, hydroxides, acids, and metal complexes thereof" has been added at the end of the claim.

Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the first part of the claim has been amended as follows (amendments marked by the board):

"An electrode composition comprising:
an oxidized carbon black having a BET surface area ranging from ~~80~~ 650 to 2100 m^2/g and an oil absorption number (OAN) ranging from 35 to 500 mL/100g, wherein the oxidized carbon black has at least one of the following properties:

(a) a volatile content of at least ~~3~~ 5.5 wt.% relative to the total weight of the oxidized carbon black, as determined by weight loss at 950°C; ...", and in that the expression "the composition further comprising a lead-containing material" has been added at the end of the claim.

Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 in that the range of the BET surface area has been amended to "650 to 1500 m^2/g ", the claim reading as follows:

"1. An electrode composition comprising:
an oxidized carbon black having a BET surface area ranging from 650 to 1500 m^2/g and an oil absorption number (OAN) ranging from 35 to 500 mL/100g, wherein the oxidized carbon black has at least one of the following properties:

(a) a volatile content of at least 5.5 wt.% relative to the total weight of the oxidized carbon black, as determined by weight loss at 950°C;
(b) a total oxygen content of at least 3.5 wt.% relative to the total weight of the oxidized carbon

black;

(c) a total titratable acidic group content of at least 0.5 $\mu\text{mol}/\text{m}^2$, as determined by Boehm's titration method; and

(d) a total titratable acidic group content of at least 0.5 mmol/g, as determined by Boehm's titration method, the composition further comprising a lead-containing material."

Claims 2-5 of auxiliary request 4 relate to particular embodiments.

III. The following documents cited in the impugned decision are of relevance here:

- D3 Cabot Carbon Blacks - Under the Electron Microscope, 2nd Ed., Godfrey L. Cabot, Inc., Boston, MA, Vol. 6, No. 12, 1953
- D4 US 2004/0157107 A1
- D5 Cabot Russe für Spezialanwendungen, Produktübersicht Europa A-136, Cabot Corporation, brochure from year 2000
- D6 US 2002/0160251 A1
- D7 US 2010/0028773 A1
- D8 Raven Blacks, brochure, Columbian Chemicals 10/2006
- D9 US 2012/0251876 A1
- D15 Influence of expander components on the processes at the negative plates of lead-acid cells on high-rate partial-state-of-charge cycling. Part II. Effect of carbon additives on the processes of charge and discharge of negative plates, D. Pavlov et al., Journal of Power Sources 195 (2010), 4444-4457
- D16 US 2012/0211703 A1

- D25a Technical information brochure "Purity of Carbon Black Pigments", TI 1223, Evonik, April 2009
- D25b Technical information brochure "Purity of Pigment Black", TI 1223, Degussa, 02-2001
- D25c Technical information brochure "Zur Reinheit von Pigmentrußen", TI 1223, Degussa-Hüls 3-2000

IV. The following document was submitted with the opponent's statement of grounds of appeal:

D31 Analysis report

V. In their statement of grounds of appeal, the opponent raised objections under Articles 123(2), 84, 83, 54 and 56 EPC against the request allowed by the opposition division. In reply to the patent proprietor's appeal, the opponent raised objections under Articles 123(2), 83, 54 and 56 EPC against the patent as granted and argued that auxiliary requests 2-8 should not be admitted into the proceedings and were not allowable either.

VI. In their statement of grounds of appeal, the patent proprietor defended the patent as granted. They maintained auxiliary request 1 allowed by the opposition division and initially filed auxiliary requests 2-8, which corresponded to auxiliary requests 2 and 5-10 filed on 16 April 2021 (submission dated 14 April 2021) in the opposition proceedings, but then withdrew auxiliary request 2 (submission of 9 December 2022).

VII. Both appellants had initially requested oral proceedings but withdrew their respective requests in reply to the communication setting out the board's preliminary opinion (appellants' submissions of 3 June 2024), provided the board remained with its

preliminary opinion. The summonses to oral proceedings were thus cancelled (6 June 2024).

VIII. The patent proprietor's arguments, where relevant to the present decision, can be summarised as follows.

D31 should not be admitted into the proceedings. The inventive step objection based on D15 should not be admitted either.

Main request (patent as granted)

The multiple dependencies of the claims as granted were supported by the application as originally filed.

Auxiliary request 1

The opposition division's decision regarding auxiliary request 1 was correct. Claim 1 was based on claims 22 and 26 as originally filed, restricted to embodiments in which all of features (a)-(d) were present. There was no inconsistency in claim 1.

Auxiliary request 3

Auxiliary request 3 corresponded to an auxiliary request filed during the opposition proceedings and was thus part of the proceedings. Claim 1 was a combination of claims 1 and 21 as originally filed. The claimed subject-matter was novel. The available experimental data demonstrated improved properties compared with the prior art, in particular D9. There was no indication in D9 to use oxidized carbon black for improving the performance of electrode compositions for lead-acid batteries.

Auxiliary request 4

Auxiliary request 4 also corresponded to an auxiliary request filed during the opposition proceedings and was

part of the proceedings. The considerations regarding novelty and inventive step were the same as for auxiliary request 3.

- IX. The opponent's arguments, where relevant to the present decision, can be summarised as follows.

Main request

The opposition division's decision regarding the main request was correct.

Auxiliary request 1

Combining features (a)-(d) violated Article 123(2) EPC and led to a lack of clarity.

Auxiliary requests 3 and 4

Auxiliary requests 3 and 4 should not be admitted into the proceedings. They did not meet the requirements of Article 123(2) EPC. Claim 1 in each of these requests had not been further distinguished from D4, D6, D7, D9 and D16. Each of D9, D15 and D16 could be regarded as the closest prior art. The objective technical problem was merely that of providing an alternative. It would have been obvious for the skilled person to use oxidized high-surface-area carbon blacks as specified in the claim; these were within the teaching of D9 or D16 and also commercially available (D3). This conclusion also applied in respect of the more ambitious technical problem of reducing water loss and improving the performance of lead-acid battery cells because this problem was already addressed in D9, with the carbon-based additives described by D9 being recommended for this purpose.

- X. The patent proprietor (appellant 1) requests that the decision under appeal be set aside and amended such

that the opposition be rejected (main request), or that the patent be maintained as amended on the basis of auxiliary request 1 (i.e. rejection of the opponent's appeal) or alternatively on the basis of one of auxiliary requests 3-8 filed with the grounds of appeal.

The opponent (appellant 2) requests that the decision under appeal be set aside and amended such that the patent be revoked.

Reasons for the Decision

1. Oral proceedings

Both parties withdrew their requests for oral proceedings, provided the board remained with its preliminary opinion (point VII.). The board has no reason to deviate from its provisional opinion, in particular since there were no further submissions as to the substance of the case. There was consequently no need to hold oral proceedings and the decision could be issued in writing.

Main request (patent as granted)

2. Article 100(c) EPC

2.1 The opposition division found that the subject-matter of claims 5, 6 and 10-12 (and claim 13 in so far as it depended on these claims) extended beyond the content of the application as filed.

- 2.2 According to the patent proprietor, claims 5 and 6 corresponded to original claims 27 and 28, and claims 10 and 11 corresponded to original claims 7 and 9. Claim 12 was based on original claims 38 and 39, and claim 13 was based on original claim 36.
- 2.3 However, claim 5 referring back to claim 1 constitutes an inadmissible intermediate generalisation because the presence of an organic molecule expander has only been disclosed in conjunction with embodiments in which a lead-containing material as defined in claim 4 is also present; see claim 27 as originally filed, which referred back to claim 26. Similarly, paragraph [0063] of the application as originally filed refers back to the preceding embodiments ("these embodiments") which also include a lead-containing material.
- 2.4 Claim 6 referring back to claim 1 likewise constitutes an inadmissible intermediate generalisation because the presence of BaSO_4 has only been disclosed in conjunction with embodiments in which a lead-containing material as defined in claim 4 is also present; see claim 28 as originally filed, which referred back to claim 26. Similarly, paragraph [0063] of the application as originally filed refers back to the preceding embodiments ("these embodiments") which also include a lead-containing material.
- 2.5 Claim 10 is based on claim 7 as originally filed, but this claim referred to an oxidized carbon black having a certain oil absorption number (OAN) as an additional essential feature, due to its dependency on claim 1 of the application as originally filed. The OAN is not required in claim 10 as granted when taken in conjunction with claim 1, on which it depends. Moreover, the BET surface area range and the range of

the volatile content in alternative (a) are also different in claim 10 as granted compared with the claims as originally filed.

Paragraphs [0053] and [0054] of the application as originally filed disclose the definition of the conductivity index and various ranges but do not specifically disclose the range of from 10 to 75 in combination with the properties and ranges stipulated in claim 1 as granted, with selections being needed. Thus, the combination of features of claim 10 was not directly and unambiguously disclosed in the application as originally filed.

- 2.6 Similar considerations apply to the additional feature in claim 11 as granted. In the application as originally filed, this feature was disclosed in claim 9, which depended on a different claim 1 from claim 1 as granted (see point 2.5 above).
- 2.7 Claim 12 as granted differs from the disclosure of claims 38 and 39 of the application as originally filed (which corresponds to the disclosure of paragraphs [0057] and [0058] of the application as originally filed and relates to a method of making an oxidized carbon black) in that the oxidized carbon black is different (the volatile content in alternative (a) is different, and a resulting BET surface area range is specified in the claims as granted).
- 2.8 The same considerations apply to claim 13 as granted as well due to its back references.
- 2.9 Thus, the opposition division's finding with regard to the claims cited above is correct. The requirements of

Article 100(c) EPC prejudice the maintenance of the patent as granted.

Auxiliary request 1

3. Sufficiency of disclosure

3.1 As correctly set out by the opposition division, since there is no technical effect specified in the claim, the question of sufficiency of disclosure in this case boils down to whether the claimed electrode compositions can be provided across the entire range claimed. The opponent did not provide any evidence that this would not be the case.

4. Article 123(2) EPC

4.1 Claim 1 differs from claim 1 as granted, *inter alia*, in that all of properties (a)-(d) need to be present in combination, with the term "at least one of" having been deleted.

4.2 According to the impugned decision, and as argued by the patent proprietor, the subject-matter of claim 1 at issue was based on claims 22 and 26 of the application as originally filed, restricted to the embodiment in which all of features (a)-(d) were present in combination.

4.3 However, claim 22 as originally filed specified that the oxidized carbon black had "at least one" of the listed properties (a)-(d). While this generically encompassed any arbitrary combination, it does not amount to a specific disclosure of the combination of

all four properties (a)-(d). Moreover, these properties are in part interrelated among themselves and with the BET surface area. For instance, property (c) (the total titratable acidic group content of at least $0.5 \mu\text{mol}/\text{m}^2$) may be converted into property (d) (the total titratable acidic group content expressed in mmol/g) on the basis of the BET surface area. The observation that samples B-F fulfil all four properties (a)-(d) in combination does not constitute a pointer that these properties are to be present in combination across the entire broad range of BET surface areas claimed (i.e. from 80 to $2\ 100 \text{ m}^2/\text{g}$), considering that samples B-F span a much narrower range of BET surface areas and properties (c) and (d) are linked via the BET surface area. Combining the claimed BET surface area with the requirement that both (c) and (d) be fulfilled results in additional implicit limitations, as outlined by the patent proprietor with regard to clarity (page 6 of the patent proprietor's reply, second full paragraph). These additional limitations are not directly and unambiguously derivable from the application as originally filed.

4.4 The requirements of Article 123(2) EPC are therefore not met.

5. Article 84 EPC

5.1 The consequence of the amendment by which the term "at least one of" was deleted compared with the claims as granted is that claim 1 now requires all of properties (a)-(d) to be present in combination. Claim 1 as granted, by contrast, did not require any specific combination of these properties. As per G 3/14, it may

thus be examined whether this amendment introduces non-compliance with Article 84 EPC.

- 5.2 Claim 1 now specifies a value of the volatile content (a) which is lower than the total oxygen content (b), even though the volatile content normally includes the total oxygen content. The amendment combining property (a) with property (b) thus results in an inconsistency.

However, the opponent's other objection - that the claims also lacked clarity and conciseness in relation to properties (c) and (d) - is not convincing. While these properties are indeed linked via the BET surface area, fulfilling both requirements (c) and (d) in combination provides an additional limitation, depending on the BET surface area under consideration.

- 5.3 In summary, the amendment results in non-compliance with Article 84 EPC.

Auxiliary request 3

6. Article 12 RPBA

- 6.1 Auxiliary request 3, which was filed with the patent proprietor's statement of grounds of appeal, corresponds to auxiliary request 5 filed during the opposition proceedings. It was not dealt with in the impugned decision because a higher-ranking request was allowed.

- 6.2 According to the opponent, this request should not be taken into consideration because it did not converge with the higher-ranking requests.

6.3 However, the alleged non-convergence in this case is due to the fact that objections under Article 123(2) EPC are being addressed (the omission of the term "at least one" in the claims allowed by the opposition division).

6.4 For these reasons, auxiliary request 3 is to be taken into consideration (Article 12(2) and (4) RPBA 2020).

7. Article 123 EPC

7.1 Claim 1 is a combination of claims 1 and 21 as originally filed. There is no need to additionally refer to either claim 22 of the application as originally filed (on which claim 1 as granted was based) or the description.

Claim 1 nevertheless constitutes a limitation of claim 1 as granted; this was not contested.

7.2 The additional features of claims 2-5 correspond to those of claims 3, 7, 8 and 9 as granted. They are based on originally filed claims 13, 11, 16 and 18, which all refer back to claim 1 as originally filed.

7.3 The requirements of Article 123(2) and (3) EPC are met.

8. Novelty

8.1 Documents D4, D6, D7, D9 and D16 are mentioned in the context of the opponent's combined discussion of Articles 54 and 56 EPC (point II.2.3.2 of the opponent's reply).

8.2 Some substantiation regarding lack of novelty has been provided but only in respect of D7, D9 and D16. The objections are not convincing, notwithstanding the question of whether the objection based on D16 would constitute a fresh objection and should be disregarded.

8.2.1 According to D7, a lead-containing material is not necessarily present because D7 mentions lead batteries only as one of several possible battery types (paragraph [0021]), meaning that a selection is needed. A further selection is needed within the BET surface area range generally disclosed in D7 (e.g. 100 to 1 500 m²/g in paragraph [0044]). Moreover, there is no explicit disclosure of any one of properties (a)-(d) stipulated in claim 1, nor is there any evidence that any of the commercial carbon blacks indicated in D7 - among which a selection would in any case also be needed - exhibit these properties in conjunction with a BET surface area within the claimed range.

8.2.2 D9 relates to lead-acid batteries (paragraph [0001]) and thus discloses the presence of a lead-containing material (paragraph [0011]). Notably, D9 discloses a carbon-based additive having an oil absorption number (OAN) of 100 to 300 ml/100 g and a surface area of 50 to 2 000 m²/g (paragraph [0011]), for instance carbon black having a BET surface area of from 1 300 to 1 600 m²/g (Figure 5; Table 1). However, while D9 generally mentions the possibility of surface functionalisation (paragraph [0054]), this does not necessarily imply that it is an oxidized carbon black having one of properties (a)-(d) stipulated in the claim. In particular, there is no disclosure of a carbon black having not only a BET surface area within the relevant range but also one of said properties (a)-(d). In so far as the opponent relies specifically on

the commercial carbon black Raven 3500, which is mentioned in a list of suitable commercially available carbon-based additives (paragraph [0057]), this specific carbon black at least does not have a BET surface area within the claimed range ($375 \text{ m}^2/\text{g}$ according to D8, table on the penultimate page).

8.2.3 The opponent does not contest that D16 does not mention a volatile content, total oxygen content or total titratable acidic group content (page 25, last paragraph of the opponent's statement of grounds of appeal). There is no evidence that one of properties (a)-(d) would be inevitably obtained.

8.3 In respect of D4 and D6, no details have been provided other than that it was allegedly not true that the subject-matter of claim 1 had been further distinguished from these documents by the BET surface area range. This does not amount to a substantiated objection. In any case, D4 and D6 had been cited because they mention the specific commercial materials Black Pearls 1300, Monarch 1300 and Regal 400 (point II.23 of the impugned decision; page 7 of the opponent's reply). These materials have a surface area of $560 \text{ m}^2/\text{g}$ (Black Pearls 1300, Monarch 1300) and $96 \text{ m}^2/\text{g}$ (Regal 400) (see the second page of D5), i.e. lower than stipulated in the claim at issue.

8.4 In the light of the above, novelty is acknowledged.

9. Inventive step

9.1 The patent in suit relates to oxidized carbon blacks which can be useful in electrode and lead-acid battery applications (paragraph [0002]).

- 9.2 D9 also relates to carbon-based additives for lead-acid batteries (paragraphs [0001] and [0011]) and is a suitable starting point for assessing inventive step.
- 9.3 The patent in suit addresses the technical problem of obtaining improved dynamic charge acceptance and minimised water loss (paragraph [0120]).
- 9.4 The claimed electrode composition comprising an oxidized carbon black is proposed as the solution to this technical problem, the oxidized carbon black having at least one of properties (a)-(d) stipulated in claim 1.
- 9.5 The opponent is of the view that the objective technical problem is merely providing an alternative because oxidized carbon black "A" (BET surface area of 1 520 m²/g, volatile content of 5.28%, Table 1 of the contested patent) showed comparable performance with the control carbon black "CB" (Table 4 and Figure 4) and was reported as being expected to result in high water loss (paragraph [0110] of the contested patent).
- 9.6 Oxidized carbon black "A" is not encompassed by claim 1 because the volatile content is slightly below the claimed range of at least 5.5 wt.%. The observation that oxidized carbon black "A" does not solve the technical problem posed in this case nevertheless leads to the conclusion that the technical problem is not solved across the entire scope of the claim. Oxidized carbon black "A" differs from samples "B" to "E" in that it has a *lower* volatile content and a *higher* BET surface area. The claim, however, encompasses oxidized carbon blacks having a similar volatile content to sample "A" and an even higher BET surface area of up to

2 100 m²/g. Such samples are closer to sample "A" than to samples "B" to "E". Considering that sample "A" does not solve the problem posed, it cannot be concluded that the problem would be solved by any such other samples encompassed by the scope of the claim.

- 9.7 In the light of the above, the objective technical problem is merely that of providing an alternative.
- 9.8 Considering that D9 already suggests surface functionalisation of the carbon-based additive (paragraph [0054]; see also claims 47 and 48), indicates -COOH in the list of possible functional groups and generally mentions an amount of functional groups of 0.1 to 95 wt.%, 1 to 50 wt.% or 5 to 25 wt.%, the skilled person following this teaching and wishing to provide an alternative would readily provide an oxidized carbon black having a volatile content within the range of claim 1. The same conclusion would be arrived at in view of the fact that a carbon black of this kind is commercially available (Carbolac 2; see D3).
- 9.9 For these reasons, the subject-matter of claim 1 of auxiliary request 3 lacks an inventive step.

Auxiliary request 4

10. Article 12 RPBA
- 10.1 Reference is made to the remarks regarding auxiliary request 3 (point 6.), which also apply to auxiliary request 4. Auxiliary request 4 corresponds to auxiliary request 6 filed during the opposition proceedings and is a limitation of the current auxiliary request 3,

with the upper limit of the BET surface area range having been changed to 1 500 m²/g.

10.2 Auxiliary request 4 is also to be taken into consideration.

11. Article 123(2) EPC

11.1 The amendment is based on claim 2 as originally filed, which depended on claim 1 as originally filed. The requirements of Article 123(2) EPC are met; see the remarks made in respect of auxiliary request 3.

12. Novelty

12.1 Reference is made to the remarks regarding auxiliary request 3. Novelty is acknowledged.

13. Inventive step

13.1 While the limitation does not provide an additional delimitation from D9, it does affect the question of whether the technical problem posed (see point 9.3) has been solved across the whole scope claimed.

13.2 Oxidized carbon black "A" (BET surface area of 1 520 m²/g, volatile content of 5.28%, Table 1 of the contested patent) is not included in the scope of the claim as its BET surface area is too high and its volatile content slightly too low. This example on its own thus does not call into question whether the problem is successfully solved. Moreover, the question of whether any technical effect may be achieved if the

oxidized carbon black has an even higher BET surface area than sample "A" and a similar volatile content no longer arises since these samples are outside the scope of the claims.

Example 6 illustrates the claimed invention. Example 6 relates to lead batteries in which the negative electrode paste contains, *inter alia*, PbO and the carbon black (sample "B" being according to the claimed invention). Oxidized carbon black "B" is derived from a carbon black having an OAN of 160 ml/100 g. There is no reason to expect that the processing would substantially affect the OAN, i.e. to such an extent that the OAN is then outside the broad range stipulated in the claim (from 35 to 500 ml/100 g). Moreover, this is confirmed by the additional data provided by the patent proprietor in the table on page 9 of the submission of 9 December 2022 (oxidized carbon black "B" has an OAN of 160 ml/100 g).

The experimental results provided in the patent in suit support that the technical problem - obtaining improved dynamic charge acceptance and minimised water loss (see point 9.3) - has been solved.

The examples as a whole show that this may be associated with the properties of the oxidized carbon black, i.e. that the oxidized carbon black according to the claim has beneficial properties for use in a lead-containing electrode composition (useful for a lead-acid cell where water loss is relevant). There is no evidence that this would be limited to a certain range of electrode compositions.

13.3 For these reasons, and in the absence of any counter-evidence, the technical problem of obtaining improved

dynamic charge acceptance and minimised water loss may be considered solved.

- 13.4 Although D9 generally describes surface functionalisation (as indicated in point 9.8 above), there is no guidance to functionalise the surface such that one of properties (a)-(d) is fulfilled, in conjunction with a BET surface area within the claimed range. D9 also mentions a second carbon-based additive having a surface area of only 3 to 50 m²/g, to which the teaching regarding surface functionalisation may likewise apply. Furthermore, D9 does not associate surface functionalisation with the intended effect of balancing dynamic charge acceptance and water loss.

The opponent, relying on analytical report D31, was of the view that the commercial material Raven 3500, mentioned along with various others in paragraph [0057] of D9, inherently exhibited properties (a)-(d). The patent proprietor contested this and argued that D31 was irrelevant and late-filed and should be disregarded.

Even if it were accepted - in the opponent's favour - that Raven 3500 has at least one of properties (a)-(d) as an inherent property, this cannot amount to a prompt to provide that property in high-BET-surface-area carbons in order to solve the technical problem posed, because neither these properties nor the technical problem are explicitly addressed.

The opponent did not identify any teaching in the prior art that would prompt the skilled person to provide one of properties (a)-(d) in order to solve the technical problem posed.

- 13.5 The commercial carbon black Raven 3500 does not constitute a more promising starting point within D9. As set out in relation to novelty, its BET surface area is below the claimed range. Irrespective of whether Raven 3500 exhibits one of properties (a)-(d) as an inherent property, none of them is specifically addressed in D9, as indicated. The general disclosure of D9 consequently provides no basis for extracting any such inherent property of an individual commercial carbon and generalising it, such as by combining it with a higher BET surface area.
- 13.6 The objection of lack of inventive step in view of D9 is therefore not convincing.
- 13.7 A different conclusion would not be reached starting from D16, which is less relevant than D9 because it does not mention any of properties (a)-(d) and is silent as to the possibility of surface functionalisation. As convincingly argued by the patent proprietor, the purpose of adding water and oxygen during the method of manufacture (Figure 1 and paragraphs [0052] and [0053] of D16) is to increase the porosity of the carbon; it is not necessarily associated with surface functionalisation. D16 explicitly refers to an etched or porous carbon black (paragraphs [0052] and [0053]).
- 13.8 A different conclusion would not be reached starting from D15 either. Irrespective of whether this objection, which was raised for the first time in the statement of grounds of appeal, should be taken into account, it is not convincing. D15 is silent as to any beneficial effect of properties (a)-(d) with regard to balancing dynamic charge acceptance and water loss.

The opponent relies in particular on the disclosure of a commercial carbon black "Printex U" which has a BET surface area of 100 m²/g (Table 1 in D15). With reference to D25a-c, the opponent argues that Printex U inherently has a volatile matter content of 4.5 wt.% and an amount of carboxylic acid groups (sum of the various acid groups indicated in D25a-c) of 0.131 mmol/g.

However, not only the BET surface area but also the volatile content and the acid group content (per mass) are less than as stipulated in the claim. According to the opponent's calculation, only property (c), i.e. the acid group content expressed per surface area, is fulfilled. Again, there is no basis for extracting specifically this inherent property of an individual commercial carbon and generalising it. Moreover, the consequence of merely increasing the surface area towards a value within the claimed range would be that the acid group content per surface area also falls out of the claimed range. It therefore cannot be discerned how the skilled person starting from D15 could arrive at a composition within the scope of claim 1.

D15 is silent as to any beneficial effect of properties (a)-(d) with regard to balancing dynamic charge acceptance and water loss.

- 13.9 For these reasons, none of the objections of lack of inventive step are convincing.
- 13.10 Claims 2-5 depend on claim 1. Consequently, the same conclusion applies.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the claims according to auxiliary request 4 submitted with the statement of grounds of appeal and a description to be adapted where necessary.

The Registrar:

The Chair:



L. Malécot-Grob

E. Bendl

Decision electronically authenticated