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Datasheet for the decision of 9 September 2014

Case Number: T 1231/11 - 3.3.03

Application Number: 01965966.3

Publication Number: 1313801

IPC: C08K3/10, C08K3/22, C08K9/00, C09D17/00, C08K9/02

Language of the proceedings: EN

Title of invention:
TITANIUM DIOXIDE SLURRIES HAVING IMPROVED STABILITY

Patent Proprietor:
Cristal USA Inc.

Opponent:
Sachtleben Chemie GmbH

Headword:

Relevant legal provisions:
EPC Art. 54, 56, 113(1)
RPBA Art. 13(1)

Keyword:
Novelty - (yes)
Inventive step - (yes)
Witness offered but not summoned - substantial procedural violation (no)
Late-filed documents

Decisions cited:
G 0010/91, T 0267/06, T 0448/07, T 0025/08, T 1100/07

Catchword:

Beschwerdekammern
Boards of Appeal
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Case Number: T 1231/11 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 9 September 2014

Appellant: (Opponent)	Sachtleben Chemie GmbH Dr. Rudolf Sachtleben Strasse 4 47198 Duisburg (DE)
Representative:	Nobbe, Matthias Demski & Nobbe Patentanwälte Reichspräsidentenstraße 21-25 45470 Mülheim a.d. Ruhr (DE)
Respondent: (Patent Proprietor)	Cristal USA Inc. 20 Wight Avenue Suite 150 Hunt Valley, MD 21030 (US)
Representative:	Cockerton, Bruce Roger Carpmaels & Ransford LLP One Southampton Row London WC1B 5HA (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 1 April 2011 rejecting the opposition filed against European patent No. 1313801 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	B. ter Laan
Members:	O. Dury
	R. Cramer

Summary of Facts and Submissions

I. The appeal by the opponent lies against the decision of the opposition division posted on 1 April 2011 rejecting the opposition to European patent No. 1 313 801, based on application No. 01 965 966.3.

II. The granted patent was based on thirty claims of which claims 1, 8, 9 and 15 read as follows:

"1. A slurry having improved stability comprising: i) below 78 weight-percent rutile titanium dioxide based on the total weight of the slurry with a surface treatment comprising an amorphous alumina compound, ii) a polyacrylic acid dispersing agent having a molecular weight in the range of from 2,000 to 5,000, that is neutralized with a neutralizing agent having a monovalent group, and iii) water, wherein the slurry has a pH of from 6 to 8."

"8. A slurry according to claim 1, wherein the amorphous alumina compound comprises below 5.5 weight-percent alumina from wet treatment of the titanium dioxide based on the total weight of titanium dioxide."

"9. A slurry according to claim 1, wherein the amorphous alumina compound comprises from 1 weight-percent to 5 weight-percent alumina from wet treatment of the titanium dioxide based on the total weight of titanium dioxide"

"15. A method of making a slurry having improved stability comprising i) mixing rutile titanium dioxide surface treated with an amorphous alumina compound; ii) water; and iii) a polyacrylic acid dispersing agent

having a molecular weight in the range of from 2,000 to 5,000 under conditions so as to form the slurry, wherein the dispersing agent or derivative thereof is neutralized with a neutralizing agent having a monovalent group, the mixing is performed at a pH of from 6 to 8 and wherein the rutile titanium dioxide is present in an amount below 78 weight-percent based on the total weight of the slurry."

The remaining claims were directed to embodiments of claim 1 (claims 2 to 7, 10 to 14) and of claim 15 (claims 16 to 30).

III. An opposition against the patent was filed in which the revocation of the patent in its entirety was requested on the grounds of Art. 100(a) EPC (lack of novelty and lack of an inventive step).

IV. During the opposition procedure the following documents, *inter alia*, were cited:

D1: US-A-5,068,056

D4a: T. A. Egerton, "The Modification of Fine Powders by Inorganic Coatings", Kona, Powder and Particle, 16 (1998), pages 5 and 46-59

D5: Declaration of Dr. Fu Chu "Frank" Wen, 19 February 2008

D6: Wu et al., Morphology "Phase Diagram" of the Hydrous Alumina Coating on TiO_2 Particles during Aqueous Precipitation, Ind. Eng. Chem. Res. 2006, 45, 5274-5278

D7: US 3,523,810

E0: Affidavit (Eidesstattliche Erklärung) from Mr. Lüger, 18 July 2007

E1-E4: Invoices

E5: Produktionszettel Titan R 610 L dated 18 March 1998
E6-E11: Analytic data of "Hombitan 610L. Slurry 65%"
E12: Product data of "Hombitan® R610L", Sachtleben Chemie GmbH
E13: Prospect “Sparte Kunststoffe”, Sachtleben Chemie GmbH
E14: Product data of "Hombitan R610L", Sachtleben Chemie GmbH

V. In its decision the opposition division held in particular that the subject-matter of claim 1 as granted was novel over D1, which did not unambiguously disclose an amorphous alumina coating on titanium dioxide, and that the public prior use was not proven in view of a lack of correlation between the pieces of evidence E0-E14. In the absence of such evidence, document E0 was not sufficient to conclude the identity of Hombitan R 610 L and Titan R 610 L. Novelty was therefore acknowledged. The requirements of Art. 56 EPC were met starting from D7 as the closest prior art since there was no hint in the cited documents to use in particular an amorphous alumina coating in order to provide a slurry of titanium dioxide having suppressed gelation over time and enhanced photodurability. Therefore, the opposition was rejected.

VI. On 1 June 2011, the opponent (appellant) lodged an appeal against the above decision. The prescribed fee was paid on the same day. In its statement of grounds of appeal filed on 11 August 2011 the appellant requested that the decision of the opposition division be set aside and the patent in suit be revoked in its entirety. As an auxiliary request, remittal to the

first instance was requested. With letter dated 11 August 2011 the following document was filed:

D8: H. A. Van Straten et al., Precipitation from Supersaturated Aluminate Solutions, I. Nucleation and Growth of Solid Phases at Room Temperature, J. Coll. Interface Sci., 98, No 2, April 1984, p. 342-362

The appellant filed further arguments with letter of 2 April 2012.

VII. By letter dated 21 December 2011, the patent proprietor (respondent) requested that the appeal be dismissed or, alternatively, that the patent be maintained in amended form according to any of auxiliary requests I to IV filed therewith.

VIII. In a communication dated 29 July 2014 accompanying the summons to oral proceedings, the Board set out its preliminary view of the case, *inter alia* regarding novelty and inventive step. The question of the molecular weight of Antiprex A was posed.

IX. By letter of 28 August 2014, the respondent submitted further arguments and filed the following documents:

D9: Declaration by Mr. Drury, 27 August 2014
Annex A1: Tamol™ 731A – Datasheet from the Dow Chemical Company
Annex A2: S. C. Yin et al., "Use of Chemical Dispersants in the Enumeration of Bacteria in Activated Sludge", Applied Microbiology, Vol. 16, N° 11, Nov. 1968, p.1790-1791
Annex A3: Narlex LD29 – Datasheet from the Database InfoChems

Annex A4: Tamol™ 1124 Dispersant – Datasheet from the Dow Chemical Company

Annex A5: US-B-8,435,639, cover sheet and columns 9, 10

Annex A6: Tamol™ SG-1 – Datasheet from the Dow Chemical Company

Annex A7: US-A-5,266,406, cover sheet and columns 11, 12

Annex A8: Tamol™ 901 Dispersant – Datasheet from the Dow Chemical Company

Annex A9: Tamol® "Dispersant summary table for coatings applications" from the Rohm and Haas Company

X. Oral proceedings were held on 9 September 2014 in the presence of both parties. During the oral proceedings the appellant filed the following document:

D10: Doherty, W. O. S. et al, "Assessment of novel poly(acrylic acid) species for calcium oxalate scale inhibition", Proc. Aust. Soc. Sugar Cane Technol., Vol. 24, 2002

XI. The appellant's arguments may be summarised as follows:

Main request

Sufficiency of disclosure

a) The patent in suit did not disclose any method for producing an aluminium coating on a rutile titanium oxide powder, so that the requirements of Art. 83 EPC were not fulfilled.

Novelty

b) Claims 1 and 15 as granted could be read in two ways:

(1) rutile titanium dioxide having a coating comprising an amorphous alumina compound or

(2) rutile titanium dioxide which had been treated with an amorphous alumina compound (product-by-process), after which an amorphous alumina compound was not mandatorily present in the coating.

The second reading was supported by the patent specification and made technical sense. Since there was no limitation to the pH and temperature conditions in claim 1, a treatment with an amorphous alumina compound could also result in the formation of a crystalline alumina compound on the surface of the titanium dioxide, as shown by D6.

c) In example 3 of D1 a rutile titanium dioxide pigment coated with an alumina compound was prepared and dispersed in an aqueous slurry comprising the sodium polyacrylate dispersing agent Antiprex A which had a molecular weight comprised between 2,000 and 5,000 (D10). Considering the chemistry involved, in particular the pH, and in view of D6, there was no doubt that in example 3 a two layer system, one of which being amorphous alumina, formed on titanium dioxide, was disclosed, contrary to what was indicated in D5. Therefore, claims 1 and 15 of the patent in suit were not novel over D1.

d) D10 should be admitted to the proceedings. It was filed in reaction to the Board's communication and showed that the molecular weight of Antiprex A fell within the range of granted claim 1. Although D10 was published thirteen years after the priority date of D1, it was well known that Antiprex A had been available on the market in the same composition for forty years.

e) As shown by E1-E4 and E0, a compound named "Hombitan R 610 L 65%ige Slurry" had been sold between July and September 1998 and was therefore available to the public before the priority date of the patent in suit. According to E0, E5 and E6-E11, the slurry had a pH of from 7.0 to 7.3, comprised Coatex P30, a dispersing agent with a molecular weight of from 4,000 to 4,500, and Titan R 610 L, equivalent to Hombitan R 610L, which consisted of rutile titanium dioxide comprising alumina at the surface thereof (E12-E14). The alumina compound's morphology was not mentioned in E12-E14. However, it was clear from D4a that it was amorphous, as usually formed onto titanium dioxides. The passage of D4a cited by the respondent did not pertain to coatings on titanium dioxide (D8, cited in said passage) and was therefore not relevant. Therefore, claims 1 and 15 as granted were not novel in view of a public prior use.

The public prior use could be confirmed by Mr. Lüger, who had been offered as a witness. According to standard EPO jurisprudence the witness had to be summoned should any doubt remain (T 267/06; T 448/07; T 25/08). The information Mr.

Lüger could provide had not been given in writing during opposition or appeal proceedings because of confidentiality obligations.

Substantial procedural violation

f) During the opposition proceedings, Mr. Lüger had also been offered as a witness in support of the public prior use argument. However, without having heard Mr. Lüger on specific decisive points, the opposition division came to the conclusion that a public prior use was not sufficiently proven. This constituted a substantial procedural violation, justifying remittal of the case to the first instance.

Inventive Step

g) In D7, example 1, an amorphous alumina coating on titanium dioxide was disclosed, whereas in examples 2-4 the alumina was crystalline. Example 1 was therefore the closest prior art and the problem to be solved was to provide photostable slurries having enhanced stability towards gelation.

h) The solution to that problem resided in the selection of an amorphous coating, a neutralized polyacrylic acid dispersant having a molecular weight of from 2,000 to 5,000, and a pH of the slurry within the range specified in claim 1 of the patent in suit. In that respect, if the Board intended to admit D9 and annexes A1, A2 and A9, filed by the respondent in order to clarify the identity of the dispersant used in D7, then D10 should also be admitted.

i) The examples of the patent in suit were not comparable. In examples 1 to 4 four different dispersants in different amounts were used. Comparative examples A to E differed from examples 1 to 4 by at least two variables. In particular, a comparison between example 4 and comparative example D was not possible in view of the effective amount of dispersant present in the slurry per particle of titanium dioxide. Therefore, those examples could not be relied upon for showing any unexpected technical effect. The problem should be formulated as to provide an alternative slurry with good resistance to gelation.

As to the admission of annexes A3 to A8, filed by the respondent in order to clarify the identity of the dispersants used in some examples of the patent in suit, similar considerations as for the previous annexes applied.

j) Starting from example 1 of D7, the skilled person would be aware of the fact that amorphous structures, though conferring excellent photodurability, were difficult to disperse and he would therefore look for a more favourable dispersant, such as Antiprex A, which was disclosed in D1 and fell within the ambit of granted claim 1. Antiprex A was known to provide excellent results with alumina-coated titanium dioxides in dispersion. Titanium dioxide was commonly used for its capacity to absorb light, and that independently from its field of application. Hence, the skilled person wishing to provide a slurry of titanium dioxide would not be

deterred from consulting D1, even though the latter related to cosmetic products and not to paint or paper as did the patent in suit and D7. The skilled person was also aware that the pH of the dispersion had to be adapted in view of the dispersant used, a pH of 6 to 8 being commonly adopted when working with sodium polyacrylates.

k) Therefore, the subject-matter of claims 1 and 15 as granted was obvious over D7 combined with D1.

XII. The respondent's arguments relevant for the present decision may be summarised as follows:

Main request

Sufficiency of disclosure

a) No consent was given for introducing the new ground for opposition under Art. 100(b) EPC to the proceedings.

Novelty

b) The skilled person would understand that the term "surface treatment" referred to the finished product so that the granted claims were directed to rutile titanium dioxide coated with an amorphous alumina. That reading was supported by the examples of the patent in suit in which titanium dioxide pigment coated with amorphous alumina TIONA RCL-722 was used (examples 1-4). The second reading proposed by the appellant, according to which the claims encompassed titanium dioxide only treated with an amorphous alumina compound, made no technical sense because the

patent in suit, in particular granted claims 8 and 9, referred to wet treatment in relation to titanium dioxide and the alumina compound; the claims would not refer to the alumina compound's morphology (amorphous) if the latter was lost upon dissolution occurring during such treatment.

c) There was no evidence on file that Antiprex A, which was used in example 3 of D1, had a molecular weight according to granted claim 1. In said example 3, the final pH of the slurry was not indicated and the appellant's argument that it was the same as the pH at the end of the surface treatment of titanium dioxide was not credible in view of the different steps carried out during work-up and dispersion. The appellant's statements according to which two separate layers of alumina were built upon titanium dioxide were speculative. Considering the chemistry involved in example 3 of D1, it was clear from D6 and D5 that the temperature and pH conditions used during precipitation would lead to the formation of a crystalline alumina compound on the surface of titanium dioxide. For those reasons, claims 1 and 15 as granted were novel over D1.

Though D9 and annexes A1 to A9 were filed as soon as possible after receiving the Board's communication, the appellant had waited until the oral proceedings with filing D10. At this very late stage it was not possible to verify the information disclosed in D10. For these reasons, D10 should not be admitted to the proceedings.

d) Regarding the public prior use, the appellant had failed to prove that the product "Hombitan 610 L

65%ige Slurry", referred to in invoices E1-E4, corresponded to granted claim 1, in the light of the fact that E12-E14 did not mention the morphology of the alumina compound. Hence there was no basis for concluding that the alumina compound would be inevitably amorphous. D4a provided contradictory information in this respect. For these reasons, the alleged prior use was not sufficiently proven and claims 1 and 15 as granted were novel in view of the public prior use.

The role of a witness was to confirm what had been substantiated in writing. It was not to discover the facts upon which an alleged prior use was based. If the information for which Mr. Lüger was offered as a witness was confidential, then the appellant could not rely on it for public prior use. For these reasons, hearing Mr. Lüger as a witness was not justified.

Substantial procedural violation - remittal

e) The opposition division did not consider it necessary to summon Mr. Lüger as a witness because the opponent had failed to substantiate in writing the facts regarding which Mr. Lüger was offered to testify. Therefore, the opponent's right to be heard had not been violated before the first instance. Remittal was not justified.

Inventive step

f) Starting from examples 2-4 of D7 as the closest prior art, the problem to be solved was to provide an alternative alumina coated titanium dioxide

slurry to that of D7 which was photodurable and showed excellent anti-gel properties over time.

g) The solution to that problem resided in the selection of at least an amorphous alumina compound on the surface of titanium dioxide, a neutralized polyacrylic acid dispersant having a molecular weight of from 2,000 to 5,000, and a pH of the slurry within the range specified in claim 1 as granted.

In that respect, D9 and annexes A1, A2 and A9 were aimed at clarifying the composition of Tamol 731 used in D7 as a dispersing agent. They were filed as soon as possible after receiving the Board's communication and should be admitted to the proceedings.

h) Even if the examples on file were not true comparative examples they nevertheless showed that slurries according to the subject-matter defined in claim 1 as granted showed excellent anti-gel properties over time (examples 1 to 4).

In that respect, annexes A3 to A9 showed that the dispersants used in examples 2 to 4 and comparative examples D and E fell within the ambit of claim 1 as granted. For the same reasons as for annexes A1, A2, and A9, admission of A3 to A8 to the proceedings was justified.

i) D7 taught away from using an amorphous alumina coating in view of example 1, showing that this would lead to a dispersion having poor anti-gel properties. D1 belonged to a different technical field than D7 and the patent in suit, namely to

cosmetics, and did not identify gelling as a problem. Therefore, the skilled person would not consider combining D7 with D1. Anyway, D1 did not contain any motivation to use a dispersing agent falling within the ambit of claim 1 as granted and to select the pH of the dispersion within the range defined in claim 1. Hence, if the skilled person could have modified examples 2-4 so as to arrive at the subject-matter of granted claim 1, there was no evidence on file proving that he would have done so in the expectation of solving the problem posed.

j) For these reasons, the subject-matter of claims 1 and 15 of the patent in suit was not obvious over D7 combined with D1.

XIII. The appellant (opponent) requested that the decision under appeal be set aside and that the European patent No. 1 313 801 be revoked (main request) or that the decision under appeal be set aside and the case be remitted to the department of first instance for further prosecution (auxiliary request).

The respondent (patent proprietor) requested that the appeal be dismissed (main request), or alternatively that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the auxiliary requests I to IV filed with letter of 21 December 2011.

XIV. The Board announced its decision at the end of the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Sufficiency of disclosure

The grounds for opposition under Art. 100(a) EPC were the only grounds raised and decided upon in the first-instance proceedings. Therefore, the appellant's objections regarding sufficiency of disclosure raised for the first time during the appeal proceedings constitute a fresh ground for opposition under Art. 100(b) EPC in the sense of G 10/91 (OJ EPO 1993, 420, Headnote 2, point 16 of the Reasons).

Such a fresh ground for opposition may be considered only with the patent proprietor's approval (G 10/91, Headnote 3), which was in the present case denied.

Under these circumstances, the Board is not empowered to deal with the objection of sufficiency of disclosure submitted by the appellant (G 10/91, point 18 of the Reasons, last two sentences).

3. Novelty

3.1 Claim 1 of the patent in suit defines among other things that the slurry comprises:

"rutile titanium dioxide with a surface treatment comprising an amorphous alumina compound",

for which the appellant proposed two readings:

(1) the rutile titanium dioxide comprises an amorphous alumina compound on the surface thereof;

(2) the rutile titanium dioxide has only been treated with an amorphous alumina compound,

the difference being that in the latter case no amorphous alumina needs to be present on the surface of the titanium dioxide; the alumina compound actually present may be only crystalline.

3.1.1 Although the wording of claim 1 may be ambiguous, the Board considers that the literal wording of claim 1, in particular following the use of "with", would be understood by a skilled person working in the technical field of the patent in suit as being directed to titanium dioxide having an amorphous alumina compound coated thereon i.e. according to the first reading. In paragraph [0017] of the patent specification it is indicated that the titanium dioxide is "surface treated with an amorphous alumina compound". Besides, a list of "suitable amorphous alumina compounds useful for surface treatment of the titanium dioxide" is given in paragraph [0018] of the patent in suit. However, the terms "surface treated" and "surface treatment" are as ambiguous as the wording of claim 1 and could encompass both readings indicated above. Nevertheless, paragraph [0019], first sentence reads: "The weight percent of the amorphous alumina compound can vary depending on the amount of amorphous alumina substantially coating the titanium dioxide" and paragraph [0022], first sentence reads: "It will be understood by those skilled in the art that other inorganic metal oxides ....can also be used to substantially coat the titanium

dioxide." From those passages it is clearly derivable that the wording "with a surface treatment comprising an amorphous alumina compound" means, in the context of the patent in suit, that the titanium oxide according to claim 1 should comprise amorphous alumina coated thereon. This is further in line with the fact that in the examples TIONA RCL-722 is used which is described as a titanium dioxide pigment "treated with ... amorphous alumina" (paragraph [0023] of the patent in suit) and "contains ... amorphous alumina" (column 7, lines 27-28 of the patent in suit).

In addition, claims 8 and 9 of the patent in suit, both dependent on claim 1, both specify "wherein the amorphous alumina compound comprises ... from wet treatment of the titanium dioxide ...". The wording of those claims, in particular due to the use of "from", only makes sense for the first of the above indicated two readings.

For those reasons, the wording of claim 1 cannot be interpreted in such a way that no amorphous alumina compound needs to be present on the titanium dioxide and is read so as to impose the presence of at least some amorphous alumina compound on the surface of the titanium dioxide.

3.1.2 The same considerations apply for the method of claim 15 (see wet treatment mentioned in dependent claims 22 and 23). In addition, according to claim 15, the rutile titanium oxide and the amorphous alumina compound are mixed at a pH of from 6 to 8. Claim 15 is however open to further steps after the mixing. Therefore, the pH of the slurry prepared according to the method of claim 15 is not necessarily 6 to 8.

3.2 The appellant raised a novelty objection in view of the aqueous dispersion prepared in example 3 of D1.

3.2.1 D1 describes aqueous dispersions of titanium dioxide (claim 1). In column 7, example 3, a multi-step process for depositing hydrous alumina and silica onto rutile titanium dioxide particles is disclosed, said process comprising:

a) precipitation of alumina from aqueous aluminium sulphate at a starting pH of 9.1 and a temperature of 60°C (lines 15-23),
b) ageing for 30 minutes at 60°C at pH of 2.4 (lines 24-26),
c) addition of sodium aluminate until a pH of 11.8, subsequent stirring at 60°C for 45 minutes (lines 27-33),
d) addition of sulphuric acid to reduce the pH to 7.5, ageing, then filtration and washing of the cake (lines 34-41),
e) drying at 110°C to obtain acicular rutile titanium dioxide particles (lines 42-48),
f) addition to water and the sodium polyacrylate used in example 1. After milling the mill base contained 40% solids (lines 49-55). The polyacrylate used in example 1 was available under the name Antiprex A (column 6, lines 24-27).

3.2.2 Claim 1 of the patent in suit requires that the slurry has a pH of from 6 to 8.

The pH of the aqueous dispersion obtained in step f) identified above is not explicitly disclosed in example 3 of D1. The pH mentioned last is that of step d): 7.5. After step d) a number of actions is however

taken until the aqueous dispersion is obtained (column 7, lines 34-51):

- ageing for 15 minutes under stirring,
- filtering and washing the filter cake several times,
- drying overnight at 110° C,
- addition to a mixture of water and sodium polyacrylate.

The appellant failed to provide any evidence that those actions would not affect the pH of the dispersion. On the contrary, it is credible that ions generated by the acid/base chemistry during deposition of the coating - which comprises hydrous alumina and silica, which both have an influence on the pH of a solution - will be washed away during the work-up. The extent to which the pH may vary as a consequence cannot be determined from example 3 of D1 as it stands.

Therefore, example 3 of D1 does not directly and unambiguously disclose the pH of from 6 to 8 of the titanium dioxide slurry as required by granted claim 1.

3.2.3 Claim 1 of the patent in suit specifies a molecular weight of the dispersing agent of from 2000 to 5000.

(a) The molecular weight of Antiprex A used in example 3 of D1 is not explicitly disclosed. D1 only mentions that useful dispersing agents may have a molecular weight in the range of from 1000 to 10.000 (column 4, lines 26-27), which is broader than the range defined in granted claim 1. Therefore, the information disclosed in D1 does not allow to conclude that Antiprex A has a molecular weight within the range of from 2000 to 5000.

(b) The appellant relied on a statement made by the examiner (communication of 13 September 2005, page 2) referring to "Antiprex (Mw 2000)". However, that statement can, for lack of any supporting evidence, not be used as a basis for the conclusion that Antiprex A has a molecular weight falling within the range defined in present claim 1.

(c) The appellant relied further on D10.

The admission to the proceedings of D10, which was filed during oral proceedings, is subject to the Board's discretion (Art. 13(1) RPBA).

The question of the molecular weight of Antiprex A was first raised in the Board's communication. However, instead of reacting immediately, the appellant waited until the oral proceedings to file D10. Under these circumstances, admitting D10 to the proceedings would put the respondent in a disadvantageous position since he was not able to react on the information present in that document. In addition, considering that D10 was published 13 years after the effective date of D1, it is questionable whether both products are identical. No evidence has been presented that the molecular weight of Antiprex A had not changed over time and that the Antiprex A used in D1 was identical to anything else on file describing a product of the same name. Therefore, the relevance of D10 is at least doubtful. For those reasons, D10 is not admitted to the proceedings (Art. 13(1) RPBA).

(d) In conclusion, it has not been shown that the dispersant Antiprex A used in example 3 of D1 has a molecular weight as defined in present claim 1.

3.2.4 Claim 1 of the patent in suit requires the presence of at least an amorphous alumina compound on the surface of the titanium dioxide (see section 3.1.1 above).

(a) The morphology of the hydrous alumina comprised in the coating obtained in example 3 of D1 is not explicitly disclosed.

(b) The appellant's argument according to which the coating method disclosed in example 3 would mandatorily lead to the formation of two layers of alumina having different morphologies, one thereof being amorphous, is neither explicitly disclosed in D1 nor supported by any evidence and does not seem to be in line with the teaching of D1. D1 merely refers to titanium dioxide particles coated with a hydrous oxide of e.g. aluminium (column 2, lines 10-17) that may be obtained by addition of aluminum sulphate followed by alkali metal aluminate to a titanium dioxide dispersion containing alkali metal silicate (column 3, lines 15-26).

(c) Referring to D5 and D6, the parties reached different conclusions in respect of the morphology of the alumina compound that could be expected in the coating disclosed in example 3 of D1. In the absence of any evidence in support of those arguments they can however not be followed by the Board.

(d) In view of the above, it cannot be concluded from the evidence on file that D1 directly and unambiguously discloses that the coating obtained in example 3 comprises at least some amorphous alumina.

3.2.5 In summary, example 3 of D1 does not directly and unambiguously disclose the pH of the slurry, the molecular weight of the dispersant and the presence of at least an amorphous alumina compound on titanium dioxide, as required by present claim 1.

3.2.6 Similar considerations apply in view of claim 15 of the patent in suit. In that respect, even though claim 15 does not impose any restriction as to the pH of the slurry (see section 3.1.2 above), it requires that the mixing of rutile titanium dioxide comprising at least an alumina compound at the surface thereof and the dispersing agent should be performed at a pH of 6 to 8, which is not explicitly disclosed in example 3 of D1.

3.2.7 Therefore, the subject-matter of both claims 1 and 15 of the main request is novel over D1. The same is valid for the claims depending on claims 1 and 15.

3.3 The appellant raised a novelty objection in respect of a public prior use and referred to E0-E14 in support.

3.3.1 In cases of alleged public prior use, the following circumstances have to be clarified (Case Law of the Boards of Appeal of the EPO, 7th edition, 2013, section IV.D.3.3.3 a)):

(i) when the act of prior use occurred
(ii) what was made available to the public through that use

(iii) the circumstances of the act of use, i.e. where, how and by whom the subject-matter was made public through that use.

In the present case, the decisive issue resides in the determination of "what" was made available through the alleged public prior use. Therefore, the analysis provided in the following sections is primarily directed to point (ii), namely "what" has been disclosed in the documents relied upon by the appellant.

3.3.2 In that respect, the appellant relied on E0, E1-E4, E5, E6-E11 and E12-E14 in combination with D4a.

(a) The first issue to be clarified is whether or not those documents, when read in combination as done by the appellant, discloses subject-matter that anticipates the granted claims. In that respect, the following conclusions are drawn:

(i) E1-E4 are invoices concerning a product identified as "Hombitan R 610 L 65%ige Slurry", for which however no information regarding its composition is given.

(ii) E5 is an information sheet ("Produktionszettel") giving a recipe for obtaining an aqueous slurry identified as and containing "Titan R 610 L (Sachtl.)". According to E0 (page 2, first full paragraph), "Titan R 610 L (Sachtl.)" is Hombitan R 610 L. The slurry has a pH of 7.0-10.0, a solids content of 64-66% and it contains Coatex P30 - which is, according to E0 (page 2, first full paragraph), a

neutralized dispersing agent with a molecular weight of 4,000-5,000. E5 does not disclose the presence of rutile titanium dioxide comprising at least an amorphous alumina compound on the surface thereof as required by granted claim 1. Also, E5 is an internal document and it has not been shown by the appellant that third parties could have gained knowledge of all the information contained therein.

(iii) E6-E11 are copies of faxes providing compositional analyses of a product named "Hombitan 610L. Slurry 65%", indicating the solids content (varying from 64,7 to 65,4 %), pH (varying from 7,0 to 7,3), viscosity and density of six different lots thereof. Those documents contain no information about the presence in the slurry of *inter alia* a dispersant and of rutile titanium dioxide comprising at least an amorphous alumina compound at the surface thereof as required by granted claim 1.

(iv) E12-E14 are leaflets providing information about a compound called "Hombitan® R 610 L", showing, among other things, that that product is based on a rutile titanium dioxide pigment with a coating comprising silica and alumina (E12: first paragraph and three first entries in the Table, E13: page 2, third paragraph and second entry in the Table at page 3, E14: first paragraph and three first entries in the Table). Those documents do not provide any information whether or not the alumina compound is at

least partly amorphous. To that end, the appellant relied on D4a and D8.

Even if it were accepted that the information contained in D4a was directly applicable to E12-E14, D4a provides contradictory information regarding the morphology of alumina compounds coated onto titanium dioxide: on the one hand it is stated that the precipitated oxides are non-crystalline unless subsequently calcined or dried at high temperatures (paragraph bridging pages 47 and 48), on the other hand in the first full paragraph in column 2 of page 51 crystalline ("pseudo-boehmite") structures are discussed.

D8 is cited as reference (29) in D4a but D8 does not mention titanium dioxide particles and hence it is not relevant to the present case. Therefore, D4a and D8 do not allow to draw any conclusion as to the morphology of the alumina compound comprised in the coating disclosed in E12-E14.

(v) Therefore, on the basis of the evidence on file, it cannot be concluded that the documents relied upon by the appellant disclose rutile titanium oxide with a coating comprising amorphous alumina.

(b) The appellant relied further on the statutory declaration of Mr. Lüger (E0) in order to prove that E1-E14 described slurries according to granted claim 1.

Mr. Lüger was offered as a witnesswho was able to confirm the contents of this statutory declaration (E0), in which it was *inter alia* mentioned that

- the slurry described in E5 was representative of the product "Hombitan R 610 L 65%ige Slurry" referred to in the invoices E1-E4, which was sold to the company Kämmerer GmbH,
- E12-E14 showed that "Titan R 610 L" used in the slurry of E5 was based on rutile titanium dioxide coated with Al_2O_3, SiO_2,
- "Hombitan R 610 L" and "Titan R 610 L" were the same product.

However, Mr. Lüger has never stated anything and has never been offered as a witness regarding the morphology of the alumina compound of the coating described in any of E1-E14, although this was already an important issue in proceedings before the opposition division.

As explained in the preceding section, the morphology of the alumina compound is decisive. When it cannot be shown that at least some amorphous alumina compound is present on the surface of the coated titanium dioxide described in E1-E14, it cannot be concluded that the product "Hombitan R 610 L" comprises all the features of granted claim 1 or that the products referred to in E1-E14, even when read in combination, are slurries having all the features now being claimed.

Since Mr. Lüger has never made any written statement regarding the morphology of alumina

present in the coating disclosed in any of E1-E14, any information provided on this matter would amount to introducing new facts to the proceedings, contrary to the principle laid down by established jurisprudence of the EPO and reflected in Art. 12(2) RPBA. This view is not in contradiction with the decisions cited by the appellant which all refer to cases in which hearing of a witness in support of an alleged public prior use was offered for facts that were already on file:

- in T 267/06 (points 2.3 and 2.4 of the Reasons), an affidavit, a drawing and a witness hearing had been offered as evidence of public prior use. In the Board's view, the witness should have been heard in view of essential details referred to in the affidavit, which had however apparently been disregarded by the opposition division;

- in T 25/08 (point 4.3.1 b) of the Reasons), the Board was of the opinion that a hearing would have been necessary in order to confirm what had already been brought forward in writing;

- in T 448/07 (point 1.6.2 of the Reasons), the patent was revoked based on a public prior use supported *inter alia* by a declaration, which contained however some contradicting points. The Board took the view that in this case, the witness should have been heard in order to clarify those points.

It is the function of a witness to confirm what has been alleged and not to fill in the gaps in

facts brought forward to support the case (T 1100/07, point 2.2).

As to the appellant's statement that a written statement by Mr. Lüger had not been possible due to confidentiality obligations, it is questionable how Mr. Lüger would have concurred with such obligations during oral proceedings, since those are, as well as the minutes of taking evidence and the decision, public.

For those reasons, the request to hear Mr. Lüger as a witness is refused.

(c) In conclusion, the evidence relied upon by the appellant is not sufficient to prove the public prior use of a slurry according to granted claim 1.

Similar considerations apply *a fortiori* to claim 15 of the patent in suit because none of E0-E14 disclose how the products were prepared.

3.3.3 Another issue addressed during the proceedings was related to the question whether or not a link between E1-E4, E5, E6-E11, E12-E14 can be established.

In that respect, none of the reference numbers mentioned in E6-E11 in relation to the analysed product ("Auftragsnummer", "Produktionsnummer") corresponds to any of the numbers disclosed in E1-E4 ("Auftrag", "Artikelnr."). The same applies to the amounts of product disclosed in E6-E11 ("Liefermenge in Kg") and E1-E4 ("Menge"). Moreover, the products referred to in E6-E11 have been analysed at least three months before the invoices E1-E4 were issued. In addition, as can be

inferred from Mr. Lüger's statement (E0: first full paragraph at page 2), E5, which was issued at least four months before the invoices, shows merely an example of a recipe that can be used to produce the product identified in E1-E4. For these reasons, it cannot be concluded without any doubt that the products mentioned in E1-E4, relied upon for the public prior use argument, have the properties shown in any of E5 or E6-E11.

3.3.4 In view of the above, the public prior use of a slurry having all the features of granted claim 1 has not been proven. The same is valid for granted claim 15. Consequently, it is not necessary to consider the issues (i) and (iii) identified in section 3.3.1 above.

3.4 In conclusion, claims 1 and 15 of the main request fulfil the requirements of Art. 54 EPC. Since claims 2-14 and 16-30 are dependent on claims 1 and 15 respectively, those, too, fulfil the requirements of Art. 54 EPC.

4. Substantial procedural violation - Remittal

Although in relation to the question as to whether or not the opposition division committed a substantial procedural violation in not hearing Mr. Lüger as a witness the appealed decision is not very detailed, it can be inferred from the minutes of the oral proceedings before the first instance and the appealed decision that the opposition division refused to hear the witness because his testimony was not considered to be relevant for the outcome of the case. In that respect, the opposition division considered that the public prior use was not novelty destroying mainly because "there was no information if the alumina

coating on titanium dioxide is amorphous" (two last points of section 3.2 in the decision) and Mr. Lüger had never been offered to testify on that matter. Hence, the hearing of Mr. Lüger would not have modified the opposition division's conclusions. Therefore, the opposition division did not contravene the opponent's right to be heard by not hearing Mr. Lüger as a witness (Art. 113(1) EPC). Remittal is therefore not justified and it is therefore refused.

5. Inventive Step

5.1 Closest prior art

5.1.1 The patent in suit relates to photodurable titanium dioxide slurries having improved stability and to a method for making a slurry having improved stability (paragraphs [0009]-[0011]). In paragraphs [0010] and [0014] reference is also made to a reduced tendency towards gelation over time.

Such slurries are known from D7 which discloses a titanium dioxide-based pigment suitable for use in non-gelling latex paint compositions comprising a rutile titanium dioxide substrate coated with a boehmite-type alumina having an average crystallite size of at least about 50 angstroms, said alumina being present in amounts of from about 0.5 to about 10% by weight based on the titanium dioxide (claim 1), and aqueous dispersions (slurries) thereof (claim 4; column 1, lines 54-57).

Both parties considered D7 to be the closest prior art document and the Board sees no reason to depart from that view.

In the examples D7 describes the preparation of various slurries. Contrary to the slurries of examples 2 to 4, the slurry prepared in example 1 serves comparative purposes; it gels very quickly, namely within two days (column 5, lines 30-31). Hence, example 1 of D7 does not constitute the most promising starting point for the skilled person wishing to provide slurries with improved stability toward gelling. The slurries of examples 2-4 are therefore to be seen as the closest prior art.

5.2 Problem to be solved

Paragraphs [0008], [0010]-[0014] and [0017] of the patent in suit identify the problem to be solved as being that of providing slurries that are photodurable and exhibit improved stability, and a method for producing slurries with improved stability. The term "improved stability" as referred to in the patent in suit includes improved fluidity, viscosity, pumpability, dispersibility and reduced tendency to flocculate or gel over time (paragraph [0028]).

During the appeal proceedings, the respondent formulated the problem to be solved starting from D7 as providing an alternative slurry that is photodurable and shows excellent anti-gelling properties over time. In view of paragraph [0028] of the patent specification, that formulation can be accepted.

5.3 Solution

5.3.1 As a solution to the problem defined above, the patent in suit proposes a slurry according to claim 1 and a process according to claim 15.

5.3.2 In examples 2 to 4 of D7, titanium dioxide coated with crystalline alumina in the boehmite form is prepared. While examples 2 and 3 respectively mention "highly crystalline" and "less crystalline" boehmite forms, it was not disputed by the parties that this does not refer to the alumina morphology but rather to the diameter of the crystallite present on the surface of the titanium dioxide. The alumina on the titanium dioxide is thus exclusively crystalline. That has not been contested by the appellant.

5.3.3 The pigments formed in examples 2 to 4 of D7 were tested for viscosity stability at 60°C in an aqueous slurry having a pH of 9.2 and comprising *inter alia* a dispersant designated as "Tamol 731" (D7: column 3, line 59 to column 4, line 17).

In order to show that Tamol 731 was not a polyacrylic acid dispersing agent having a molecular weight in the range of from 2,000 to 5,000, as required by granted claim 1, the respondent filed D9 and annexes A1, A2 and A9 with letter dated 28 August 2014, one month before the oral proceedings. The admission to the proceedings of those documents is therefore subject to the Board's discretion (Art. 13(1) RPBA). While each of D9, A1, A2 and A9 aim at clarifying the composition of Tamol 731 used in D7, D9 further refers to certain products used in the patent in suit. Those documents were filed in reply to the Board's communication in which the issue had been addressed for the first time during the proceedings, and do not lead to any procedural complication. Furthermore, their admission to the proceedings was not explicitly contested by the appellant. Therefore, D9, A1, A2 and A9 are admitted to the proceedings (Art. 13(1) RPBA).

A1 and A9 refer to a product identified under the tradename "Tamol™ 731A", which was however not shown to be identical to the "Tamol 731" used in D7. A2 does not mention the molecular weight of the product identified therein under "Tamol 731-25%". Hence, A1, A2 and A9 do not provide any information regarding the molecular weight of the "Tamol 731" used in D7. The same considerations apply to D9.

Therefore, it cannot be concluded that D7 discloses a dispersant having a molecular weight according to present claim 1.

5.3.4 In conclusion, the slurry defined in claim 1 of the patent in suit differs from the slurries obtained from examples 2-4 of D7 in the pH, the molecular weight of the dispersant and the morphology of the alumina compound onto the surface of titanium dioxide. The same considerations apply in respect of the process of granted claim 15, except for the pH (see section 3.1.2).

5.4 Success of the solution - Problem effectively solved

5.4.1 In examples 1 to 4 of the patent in suit the preparation of a slurry based on titanium dioxide comprising amorphous alumina (commercially available under the name TIONA RCL-722), water and a dispersing agent is described. In example 1 the dispersing agent is Alcosperse-149, which is indicated as a 40% active sodium polyacrylate, Mw 2500; hence a polyacrylic acid neutralized with a neutralizing agent having a monovalent group, as required by granted claim 1. The dispersing agent used in examples 2 to 4 is however less clearly described (Narlex LD29: polyacrylic acid homopolymer-45% active, Mw 2000; Tamol 1124:

functionalized polyacrylic acid copolymer-50% active, Mw 2200; Tamol 1254: functionalized polyacrylic acid copolymer-50% active, Mw 3500, repectively). That is also the case in comparative examples D (Tamol SG-1: functionalized polyacrylic acid copolymer-50% active, Mw 13000) and E (Tamol 901: Mw 12000).

Annexes A3 to A8, which together with D9 and A9 aimed at clarifying this point, were filed at the same time as D9, A1, A2 and A9. They refer to datasheets (A3, A4, A6, A8) or passages taken from patent specifications (A5, A7) pertaining to the dispersing agents disclosed in the examples of the patent in suit. For the same reasons as given before in respect of D9, A1, A2 and A9, Annexes A3 to A8 are admitted to the proceedings (Art. 13(1) RPBA).

It was not contested that it may be concluded from A3 to A8 that

- Narlex LD29 is a sodium salt of a polyacrylic acid homopolymer with a molecular weight of approximatively 2,000 (A3: section uses);
- Tamol 1124 is a dispersant provided in the ammonia form (A4: page 1, second full paragraph);
- Tamol 1254 is a salt of a copolymer (A5: col. 9, lines 57-58);
- Tamol SG-1 is a dispersant provided in the ammonia form (A6: page 1, third paragraph of section "Description");

Therefore, it is concluded that the dispersing agents of examples 2-4 are dispersing agents as defined in granted claim 1. Consequently, the slurries prepared in those examples are also according to granted claim 1.

It was further not disputed that it is shown in the patent in suit that the slurries of examples 2-4 have anti-gelling properties over time.

5.4.2 Although it can therefore be accepted that the claimed slurry shows good anti-gelling properties over time, in the absence of any comparison between slurries according to granted claim 1 and slurries according to D7, the problem effectively solved by the claimed slurry can only be seen as to provide a further such slurry (claim 1) or a method of making such a slurry (claim 15).

5.5 Obviousness

5.5.1 It remains to be decided whether it was obvious to modify the teaching of D7 in such a way as to arrive at the subject-matter of claims 1 and 15 of the patent in suit, in particular to do so in order to solve the problem identified above.

5.5.2 According to the teaching of D7 a substantially stable latex paint can be produced by modifying the surface of the titanium dioxide pigment with a coating of a particular alumina crystal form (column 1, lines 63-67). The use of such a crystalline alumina is said to allow avoiding a substantial increase in the viscosity of paint compositions in which the dioxide is incorporated because it avoids any subsequent major change in alumina crystal morphology during storage of the paint composition (paragraph bridging columns 1 and 2). That teaching is further confirmed by the comparison of example 1 (amorphous alumina: col. 4, line 36) with examples 2-3 (crystalline alumina: col. 4, lines 57-58; col. 5, lines 7-9) of D7: whereas the titania of example 1 led to substantial gelling within

two days, the titania of examples 2-3 showed very little gel formation after standing for a few days, whereby the gel even disappeared upon mild agitation (D7: col. 5, lines 30-41).

Therefore, D7 teaches away from using amorphous alumina for coating titanium dioxide particles, in particular with a view to anti-gelling properties.

5.5.3 The slurry defined in granted claim 1 is *inter alia* further characterised in terms of the nature of the dispersing agent and of its pH.

Regarding the dispersing agent, D7 only discloses the use of Tamol 731 (col. 4, lines 3-4). There is no evidence on file that said dispersant has a molecular weight in the range of 2,000 to 5,000 as required by granted claim 1 (see point 5.3.3 above).

Regarding the pH, although D7 discloses that a pH of 7-10 is suitably used in the process of preparation of the coated titanium oxide (claims 4, 6; col. 2, lines 53-64), the only information disclosed in D7 in respect of the pH of the slurry is that, in the examples, the final pH slurry is adjusted to 9.2 (col. 4, lines 15-16). D7 does not specifically disclose slurries having a pH of from 6 to 8 as required by granted claim 1.

Under these circumstances, it cannot be concluded that the skilled person would have found any motivation to modify the slurries of D7 so as to arrive at a slurry having a pH and comprising a dispersant according to granted claim 1 with the aim of obtaining a further

slurry that shows good anti-gelling properties over time.

5.5.4 The appellant considered combining the teaching of D1 with that of D7.

(a) The dispersions of titanium dioxide of D1 are used for the manufacture of absorbers for UV radiation to be used in cosmetics and hair care products, in particular suncreams (column 3, lines 46-55; col. 4, lines 40-50; examples 20-22), which is a completely different technical field from that of D7 (paints).

Besides, although reference to a light gelling is mentioned in D1 (column 1, lines 58-61), it is not addressed in terms of a problem to be overcome. Nor is it formulated in the form of gelling stability over time, which is the problem to be solved addressed in the patent in suit.

Therefore, the skilled person would have had no motivation to combine the teaching of D7 with that of D1, in particular not in order to solve the problem defined above (point 5.4.2).

(b) Under these circumstances, even if the skilled person were to contemplate the combination of D1 with D7, he would have had no hint to modify the teaching of D7 so as to arrive at the combination of features now being claimed, i.e. in particular have selected titanium dioxide comprising an amorphous alumina compound on its surface and a neutralized polyacrylic acid dispersant agent having a molecular weight of from 2,000 to 5,000,

in order to provide an alternative slurry that has satisfying anti-gelling properties over time.

5.6 The same considerations apply to granted claim 15.

5.7 In view of the above, granted claims 1 and 15 fulfil the requirements of Art. 56 EPC. Since claims 2-14 and 16-30 are dependent on claims 1 and 15, respectively, those too fulfil the requirements of Art. 56 EPC. Therefore, the main request can be allowed.

6. The respondent (patent proprietor)'s main request being allowable, there is no need to deal with auxiliary requests I to IV.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar: The Chairman:

B. ter Heijden B. ter Laan

Decision electronically authenticated