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Datasheet for the decision of 25 October 2022

Case Number: T 0359/19 - 3.3.02

Application Number: 05853122.9

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IPC: C09B69/00

Language of the proceedings: EN

Title of invention:
IMPROVED ANTHRAQUINONE colourant COMPOSITIONS AND METHODS FOR PRODUCING THE SAME

Patent Proprietor:
Milliken & Company

Opponent:
Clariant Produkte (Deutschland) GmbH

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - all requests (no)

Decisions cited:

Catchword:

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Case Number: T 0359/19 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 25 October 2022

Appellant: (Opponent)	Clariant Produkte (Deutschland) GmbH Group Intellectual Property Am Unisys-Park 1 65843 Sulzbach (DE)
Representative:	Jacobi, Markus Alexander Patentanwälte Isenbruck Bösl Hörschler PartG mbB Eastsite One Seckenheimer Landstraße 4 68163 Mannheim (DE)
Respondent: (Patent Proprietor)	Milliken & Company 920 Milliken Road, Legal Dept. (M-495) Spartanburg, SC 29303 (US)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 24 October 2018 rejecting the opposition filed against European patent No. 1828314 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	M. O. Müller
Members:	M. Maremonti
	M. Blasi

Summary of Facts and Submissions

I. The appeal lodged by the opponent ("appellant") lies from the opposition division's decision to reject the opposition against European patent No. 1 828 314 ("the patent").

II. The patent as granted contains 15 claims, with independent claim 1 reading as follows:

"*1. A process for the manufacture of a N,N'-dialkyleneoxy-substituted 1,4-diaminoanthraquinone colourant having ≤ 1.0 wt.-% of a violet impurity and ≤ 1.0 wt.-% of a water- and methanol-insoluble black impurity, which method comprises the steps of*

(a) combining 2,3-dihydro-9,10-dihydroxy-1,4-anthracenedione, 1,4-dihydroxyanthraquinone and a polyalkyleneoxy-substituted amine into a mixture;

(b) conducting a condensation reaction of the mixture by agitating and heating the mixture to form a condensation product; and

(c) oxidizing the condensation product;

wherein the method is conducted without the use of solvents."

III. The opposition had been filed on the grounds under Article 100(a) to (c) EPC. Document E12, *inter alia*, was referred to during the opposition proceedings:

E12: US 6,039,794

IV. The opposition division came to, *inter alia*, the following conclusion.

- The subject-matter of claim 1 as granted involved an inventive step in view of E12 taken as the closest prior art.

V. In its statement of grounds of appeal, the appellant contested the opposition division's reasoning and submitted, *inter alia*, that the claimed subject-matter lacked inventive step in view of E12 taken as the closest prior art.

VI. In its reply to the appeal, the patent proprietor ("respondent") maintained that the subject-matter of the claims as granted involved an inventive step when starting from E12 as the closest prior art. It also filed sets of claims according to auxiliary requests 1 to 17.

VII. In a subsequent letter, the appellant contested, *inter alia*, the inventive step of the subject-matter claimed in auxiliary requests 1 to 17.

VIII. The parties were summoned to oral proceedings as per their requests. In preparation for oral proceedings, the board issued a communication under Article 15(1) RPBA 2020, in which it expressed, *inter alia*, the preliminary opinion that the subject-matter of claim 1 as granted and of claim 1 according to auxiliary requests 1 to 17 did not involve an inventive step in view of document E12 taken as the closest prior art.

IX. By letter dated 18 October 2022, the respondent filed new sets of claims according to auxiliary requests 1 to 17 to replace the previously filed auxiliary requests 1 to 17.

X. Oral proceedings before the board were held on 25 October 2022 by videoconference.

XI. Final requests relevant to the decision

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

The respondent requested that the appeal be dismissed and that the patent be maintained as granted (main request). Alternatively, it requested that the patent be maintained in amended form on the basis of the claims of one of auxiliary requests 1 to 17 filed by letter dated 18 October 2022.

XII. The appellant's submissions relevant for the present decision are summarised as follows.

- Document E12, especially example 1, represented the closest prior art. The claimed subject-matter differed from the process in example 1 of E12 only in that a polyalkyleneoxy-substituted amine was used instead of octadecyl amine to manufacture the colourant.

- In particular, the level of the impurities mentioned in claim 1 was not a distinguishing feature since the product of example 1 of E12 did not contain impurities. Specifically, it was disclosed that a product of formula III had been obtained by the disclosed process. Had additional compounds been obtained, this would have been stated as in e.g. example 2 of E12.

- No technical effect was associated with the distinguishing feature. Therefore, the objective technical problem had to be seen in the provision of a process for manufacturing an alternative N-N'-substituted 1,4-diaminoanthraquinone colourant.

- The claimed solution was obvious in view of E12 itself, which disclosed the same polyalkyleneoxy-substituted amines as those taught in the patent as possible alternatives for preparing the colourant.

- Even if it were accepted that these amines led to increased water solubility, the solution was obvious. Specifically, it was part of common general knowledge that the water solubility of a product was a property linked to the product's chemical structure. Any organic chemist would have known that alkoxy groups improved water solubility. On the basis of common general knowledge, the skilled person would therefore have expected polyalkyleneoxy-substituted amines to improve the water solubility of the colourant as compared with the octadecyl amine used in example 1 of E12.

- Therefore, it had to be concluded that the claimed subject-matter lacked an inventive step.

XIII. The respondent's submissions relevant for the present decision are summarised as follows. For further details, reference is made to the reasons for the decision below.

- Starting from E12 as the closest prior art, the claimed process differed from example 1 of E12 specifically on account of both the use of a polyalkyleneoxy-substituted amine and the level of the impurities present in the colourant.

- The burden was on the appellant to prove that the product of example 1 of E12 did not contain impurities.

- The objective technical problem deriving from the distinguishing features had to be seen in the provision of a process to produce anthraquinone

colourants which exhibit properties of brighter colour and water fugitivity and are not prone to staining fabrics or causing a sludge build-up in processing equipment.

- The claimed solution of using a polyalkyleneoxy-substituted amine was not obvious. Even though E12 did mention these amines, it taught away from using them.

- It had to be concluded that the subject-matter of all the claim requests involved an inventive step.

Reasons for the Decision

Auxiliary request 17 - claim 1 - inventive step under Article 56 EPC

1. Claim 1 of auxiliary request 17 reads as follows, with the amendments to claim 1 as granted (point II above) having been highlighted by the board:

"*1. A process for the manufacture of a N,N'-dialkyleneoxy-substituted 1,4-diaminoanthraquinone colourant having* ***≦ <*** *1.0 wt.-% of a violet impurity* ***and ≤ 1.0 wt.-% of a compound selected from***

1-(3-(2-(2-hydroxyethoxy)ethoxy)propylamino)-4-hydroxyanthraquinone,

1-(3-(2-(2-methoxyethoxy)ethoxy)propylamino)-4-hydroxyanthraquinone, and

1-(3-(bis(2-hydroxyethyl)amino)propylamino)-4-hydroxyanthraquinone

representing the violet impurity

and

*≦ **<** 1.0 wt.-% of a water- and methanol-insoluble black impurity,*

which method comprises the steps of

(a) combining 2,3-dihydro-9,10-dihydroxy-1,4-anthracenedione, 1,4-dihydroxyanthraquinone and a polyalkyleneoxy-substituted amine into a mixture;

*(b) conducting a condensation reaction of the mixture by agitating and heating the mixture to form a condensation product **in an inert atmosphere**; and*

(c) oxidizing the condensation product;

*wherein **step (b) is carried out at a temperature of 75-95°C, and** the method is conducted without the use of solvents.*"

2. Closest prior art

2.1 In line with the decision under appeal (point 5.1.2.2 on page 14), both parties indicated document E12, and especially the process disclosed in example 1 in column 6, as the closest prior art.

2.2 In example 1 (column 6, lines 20 to 55), document E12 discloses a process for manufacturing an N,N'-substituted 1,4-diaminoanthraquinone colourant, comprising combining leucoquinizarin, quinizarin and octadecyl amine into a mixture, conducting a condensation reaction by agitating and heating the mixture to 90°C under a nitrogen atmosphere, and completely oxidising the condensation product. The reaction is carried out without the use of solvents. According to example 1, the process leads to the formation of a compound of formula III as shown in column 5 of E12.

3. Distinguishing features

3.1 The respondent argued that the claimed subject-matter differed from example 1 of E12 on account of the use of a polyalkyleneoxy-substituted amine and in that the condensation reaction was carried out at a temperature of 75 to 95°C. Example 1 of E12 disclosed that after heating to 90°C, the temperature was increased to 100°C, i.e. outside the claimed range. Moreover, the process of claim 1 differed from example 1 of E12 on account of the specified level of impurities of less than 1 wt.-%. The appellant had not provided any analysis of the product obtained in example 1 of E12. Therefore, it was nothing more than speculation to state that the product of this example did not contain impurities, especially the violet and black impurity defined in claim 1.

3.2 The board finds the respondent's arguments concerning the claimed level of impurities unconvincing for the following reasons.

3.2.1 As stated above, E12 discloses (column 6, lines 54 and 55) that the final product obtained in example 1 is the compound of formula III as shown in column 5. From this disclosure, it is clear that the compound of formula III was obtained in example 1 in pure form.

3.2.2 This conclusion is confirmed by the fact that the process in example 2 of E12 (columns 6 and 7) led instead to the formation of a product that was a mixture of a compound of formula III and a compound of formula IV (shown in column 5). It was not disputed that the compound of formula IV corresponded to a violet impurity within the meaning of the patent (see the respondent's reply to the appeal, paragraph bridging pages 7 and 8). Since no compound of formula IV is mentioned in relation to the product obtained in

example 1, it must be concluded that this product does not contain any such impurity.

3.2.3 More importantly, as also pointed out by the appellant, the operating conditions used in example 1 of E12 fall under the conditions that are to be applied in the claimed process according to the patent (paragraphs [0021] and [0022]). The patent teaches (paragraphs [0024], [0025] and [0042]) that the claimed level of impurities of less than 1 wt.-% derives from the absence of solvents, such as water, during the colourant manufacture. However, as stated above, this is a condition that is also present in the process of example 1 of E12.

3.2.4 The respondent argued that the burden was on the appellant (as the opponent) to prove that the claimed level of impurities was disclosed in example 1 of E12 and so was not a distinguishing feature.

The board accepts that the burden of proof normally rests on the party that raises an objection, i.e. the appellant in the current case. However, as set out in points 3.2.2 and 3.2.3 above, the disclosures of E12 and the patent provide strong support for the appellant's assertion that the claimed level of impurities is also part of the product of example 1 of E12. The burden was thus on the respondent to prove the contrary.

3.3 For these reasons, the board holds that the claimed level of impurities does not represent a feature distinguishing the subject-matter of claim 1 from example 1 of E12. Therefore, the subject-matter of claim 1 differs from example 1 of E12 in that a polyalkyleneoxy-substituted amine is used and in that the condensation reaction is carried out at a temperature of 75 to 95°C; example 1 discloses that

after heating to 90°C for 2.5 hours, the temperature of the reaction mixture is increased to 100°C, i.e. outside the claimed range.

4. Objective technical problem

4.1 The respondent did not rely on any technical effect deriving from the different temperature required by claim 1 as compared with the temperature used in example 1 of E12. However, the respondent referred to examples 4 to 6 and comparative example 6 of the patent, which showed the effects achieved by the claimed process. The reported results demonstrated that the claimed level of impurities made it possible to improve the hue angle of the colourant and to avoid both a sludge build-up in processing equipment and the formation of stains on fabric. Moreover, using polyalkyleneoxy-substituted amine meant the colourant exhibited water solubility/fugitivity. In view of these results, the respondent argued that the objective technical problem starting from E12 had to be seen in the provision of a process to produce anthraquinone colourants which exhibit properties of brighter colour and water fugitivity and are not prone to staining fabrics or causing a sludge build-up in processing equipment.

4.2 The board disagrees.

4.2.1 As per the problem-solution approach, the objective technical problem has to be formulated in view of the technical effects, if any, of the features distinguishing the claimed subject-matter from the closest prior art. As set out above, the level of impurities required by claim 1 does not constitute a feature distinguishing the process of claim 1 from example 1 of E12.

4.2.2 The respondent has not provided any comparison between the hue angle of the colourant of claim 1 and that of the product of example 1 of E12, nor as regards staining of fabrics or sludge build-up in processing equipment. Rather, according to paragraph [0056] of the patent, it is the absence of solvents in the manufacture of the colourant that allows the improvements asserted by the respondent to be achieved. However, the absence of solvents is also part of the process of example 1 of E12.

4.2.3 As regards the use of a polyalkyleneoxy-substituted amine, the board accepts that, in view of the chemical structure of this amine as compared with octadecyl amine used in example 1 of E12, the colourant produced according to claim 1 has to be expected to have higher water solubility. At the oral proceedings, the respondent confirmed, with reference to paragraph [0016] of the patent, that water fugitivity and water solubility did represent the same property.

4.3 As a consequence of the above, the board concludes that the objective technical problem has to be seen in the provision of a process for manufacturing N-N'-substituted 1,4-diaminoanthraquinone colourants having higher water solubility.

5. Obviousness of the claimed solution

5.1 As a solution to this technical problem, claim 1 proposes a polyalkyleneoxy-substituted amine to be used for the condensation reaction with quinizarin and leucoquinizarin.

5.2 The respondent argued that even though E12 did mention polyalkyleneoxy-substituted amines, it did not give any indication that using them would have led to the colourant having higher water solubility. Moreover, according to column 5, lines 1 to 6 of E12, the

colourants produced using these amines were a viscous liquid at room temperature. This statement would have taught away from using these amines since E12 aimed at producing colourants that were solid at room temperature. The respondent referred to the passage bridging columns 1 and 2, and to column 3, lines 15 to 18 of E12.

5.3 The board finds these arguments unconvincing.

5.3.1 As pointed out by the appellant, the solution to the stated technical problem provided by claim 1 is known from E12 itself. E12 discloses (column 4, lines 30 to 38; claim 4) that polyoxyalkylene monoamines are suitable amines to be reacted with quinizarin and leucoquinizarin. As an example of such amines, E12 discloses (column 5, lines 1 to 3) M-series Jeffamines, i.e. the same amines as used in the process according to the patent (paragraph [0020]). Therefore, while the octadecyl amine used in example 1 is the most preferred amine according to E12, M-series Jeffamines are disclosed as possible alternatives.

5.3.2 The board concurs with the appellant that the water solubility of a compound is a property linked to the compound's chemical structure. On the basis of common general knowledge, the skilled person would immediately have recognised that a colourant produced using M-series Jeffamines, i.e. polyalkyleneoxy-substituted amines, would have been more water-soluble than the colourant of example 1 of E12 obtained using octadecyl amine, i.e. an amine without any alkyleneoxy groups. The respondent did not dispute this observation at the oral proceedings. In fact, polyalkyleneoxy groups are more polar and thus lead to higher solubility in water than the non-polar octadecyl group.

5.3.3 Therefore, when looking for a solution to the stated objective technical problem, the skilled person would have been prompted by E12 and common general knowledge to replace octadecyl amine with a polyalkyleneoxy-substituted amine in the process of example 1 of E12.

5.3.4 The argument that E12 may be concerned with producing colourants that are solid at room temperature has no bearing on this conclusion. In fact, this argument is an attempt to replace the objective technical problem mentioned above with the one allegedly dealt with in the closest prior art. However, the objective technical problem is the problem solved by the distinguishing feature of the claimed invention over the closest prior art, not a problem allegedly dealt with in that closest prior art.

5.3.5 For want of any technical effect associated with the different temperature required by the claimed process as compared with the process of example 1 of E12, this has to be regarded as an arbitrary selection within the routine abilities of the skilled person.

5.4 For these reasons, the board comes to the conclusion that, starting from E12, the subject-matter of claim 1 of auxiliary request 17 does not involve an inventive step within the meaning of Article 56 EPC in view of common general knowledge. Therefore, auxiliary request 17 is not allowable.

Higher-ranking requests - claim 1 - inventive step under Article 56 EPC

6. At the oral proceedings, the respondent did not contest that claim 1 of auxiliary request 17 defined the narrowest subject-matter among each claim 1 of all the claim requests on file.

It follows that the same observations set out above leading to a lack of inventive step of the subject-matter of claim 1 of auxiliary request 17 apply *mutatis mutandis* to the subject-matter of claim 1 of each higher-ranking request (claim 1 as granted and claim 1 of auxiliary requests 1 to 16). This was not disputed by the respondent either.

Therefore, the board concludes that, starting from E12, the subject-matter of claim 1 as granted and of claim 1 of auxiliary requests 1 to 16 does not involve an inventive step within the meaning of Article 56 EPC in view of common general knowledge.

Conclusion

7. The ground for opposition of lack of inventive step under Article 100(a) and Article 56 EPC prejudices the maintenance of the patent as granted, and none of the auxiliary claim requests submitted by the respondent is allowable under Article 56 EPC, so the patent has to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

N. Maslin M. O. Müller

Decision electronically authenticated