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**D E C I S I O N**  
**of 22 January 2004**

**Case Number:** T 0784/02 - 3.3.1

**Application Number:** 97107128.7

**Publication Number:** 0807668

**IPC:** C09B 67/22

**Language of the proceedings:** EN

**Title of invention:**

Crystal growth modifiers for perylene pigments

**Applicant:**

Sun Chemical Corporation

**Opponent:**

-

**Headword:**

Co-precipitated blends/SUN CHEMICAL

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Main request and first - and second auxiliary request -  
inventive step (no) - obvious solution"

"Third auxiliary request - inventive step (yes) - non obvious  
solution"

**Decisions cited:**

T 0197/86

**Catchword:**

-



Case Number: T 0784/02 - 3.3.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 22 January 2004

**Appellant:** Sun Chemical Corporation  
222 Bridge Plaza South  
Fort Lee  
NJ 07024 (US)

**Representative:** Vossius & Partner  
Postfach 86 07 67  
D-81634 München (DE)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 14 February 2001  
refusing European application No. 97107128.7  
pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** A. J. Nuss  
**Members:** P. P. Bracke  
J. H. Van Moer

## Summary of Facts and Submissions

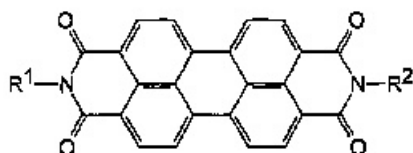
I. The appeal lies from the Examining Division's decision, despatched on 14 February 2001, refusing European patent application No. 97107128.7, published as EP-A-0 807 668, due to lack of inventive step over the disclosure of document

(1) FR-A-2 359 175.

The decision was based on the set of 14 claims in the application as originally filed with Claim 1, which read:

"A pigment composition comprising a co-precipitated blend comprising

(a) 60 to 95 percent by weight of a perylene pigment having the formula



wherein R<sup>1</sup> and R<sup>2</sup> are independently C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>5</sub>-C<sub>7</sub> cycloalkyl, C<sub>7</sub>-C<sub>16</sub> aralkyl, or C<sub>6</sub>-C<sub>10</sub> aryl; and

(b) 5 to 40 percent by weight of a polycyclic aromatic compound."

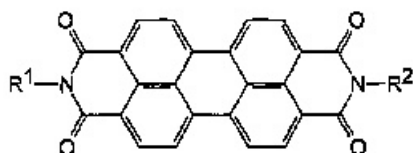
In particular, the Examining Division found that the claimed pigment compositions represented a selection of the pigment compositions known from document (1) and that an unexpected effect had not been shown.

II. With a letter dated 22 December 2003, the Appellant filed sets of claims according to a first, second and third auxiliary request.

Claim 1 according to the first auxiliary request read:

"1. A pigment composition comprising a co-precipitated blend comprising

(a) 60 to 95 percent by weight of a perylene pigment having the formula



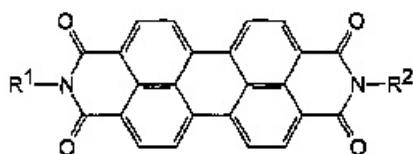
wherein R<sup>1</sup> and R<sup>2</sup> are independently C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>5</sub>-C<sub>7</sub> cycloalkyl, C<sub>7</sub>-C<sub>16</sub> aralkyl, or C<sub>6</sub>-C<sub>10</sub> aryl; and

(b) 5 to 40 percent by weight of a polycyclic aromatic compound which is a fused ring aromatic system containing at least five rings, at least one of which is substituted with one or more keto groups."

Claim 1 according to the second auxiliary request read:

"1. A pigment composition comprising a co-precipitated blend comprising

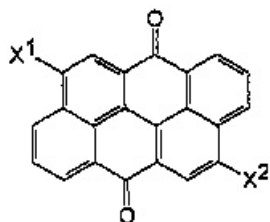
(a) 60 to 95 percent by weight of a perylene pigment having the formula



wherein  $R^1$  and  $R^2$  are independently  $C_1$ - $C_6$  alkyl,  $C_5$ - $C_7$  cycloalkyl,  $C_7$ - $C_{16}$  aralkyl, or  $C_6$ - $C_{10}$  aryl; and

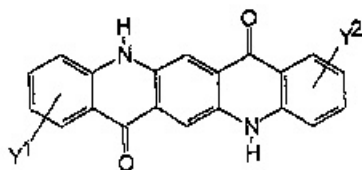
(b) 5 to 40 percent by weight of a polycyclic aromatic compound wherein the polycyclic aromatic compound is

(i) an anthanthrone having the formula



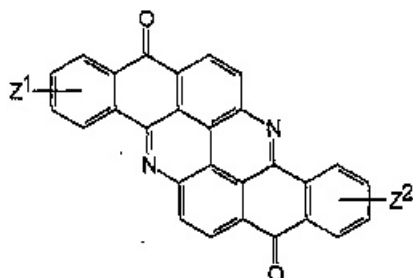
wherein  $X^1$  and  $X^2$  are independently hydrogen, halogen,  $C_1$ - $C_6$  alkyl,  $C_1$ - $C_6$  alkoxy,  $C_7$ - $C_{16}$  aralkyl, or  $C_6$ - $C_{10}$  aryl;

(ii) a quinacridone having the formula



wherein  $Y^1$  and  $Y^2$  are independently hydrogen, halogen,  $C_1$ - $C_6$  alkyl,  $C_1$ - $C_6$  alkoxy,  $C_7$ - $C_{16}$  aralkyl, or  $C_6$ - $C_{10}$  aryl;  
or

(iii) a flavanthrone having the formula

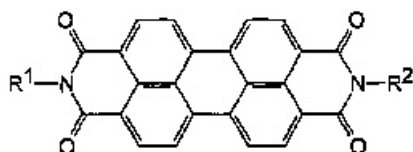


wherein  $Z^1$  and  $Z^2$  are independently hydrogen, halogen,  $C_1$ - $C_6$  alkyl,  $C_1$ - $C_6$  alkoxy,  $C_7$ - $C_{16}$  aralkyl, or  $C_6$ - $C_{10}$  aryl."

The third auxiliary request consisted of nine claims with the independent claims reading:

"1. A pigment composition comprising a co-precipitated blend comprising

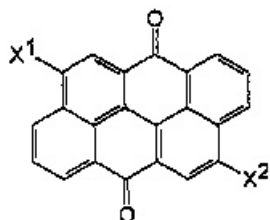
(a) 60 to 95 percent by weight of a perylene pigment having the formula



wherein R<sup>1</sup> and R<sup>2</sup> are independently C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>5</sub>-C<sub>7</sub> cycloalkyl, C<sub>7</sub>-C<sub>16</sub> aralkyl, or C<sub>6</sub>-C<sub>10</sub> aryl; and

(b) 5 to 40 percent by weight of a polycyclic aromatic compound, wherein the polycyclic aromatic compound is

(i) an anthanthrone having the formula

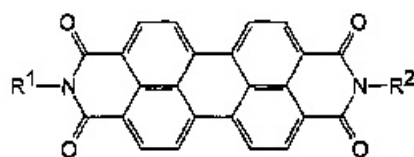


wherein X<sup>1</sup> and X<sup>2</sup> are independently hydrogen, halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>7</sub>-C<sub>16</sub> aralkyl, or C<sub>6</sub>-C<sub>10</sub> aryl."

"5. A process for preparing pigment composition according to Claim 1 comprising

(1) acid pasting or acid swelling a mixture comprising

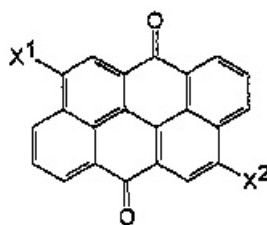
(a) 60 to 95 percent by weight of a perylene pigment of formula



wherein R<sup>1</sup> and R<sup>2</sup> are independently C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>5</sub>-C<sub>7</sub> cycloalkyl, C<sub>7</sub>-C<sub>16</sub> aralkyl, or C<sub>6</sub>-C<sub>10</sub> aryl;

(b) 5 to 40 percent by weight of a polycyclic aromatic compound wherein the polycyclic aromatic compound is

(i) an anthanthrone having the formula



wherein X<sup>1</sup> and X<sup>2</sup> are independently hydrogen, halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>7</sub>-C<sub>16</sub> aralkyl, or C<sub>6</sub>-C<sub>10</sub> aryl; and

(c) 5 to 25 parts by weight, relative to the total of components (a) and (b), of a strong acid;

(2) drowning the mixture from step (1) by adding said mixture to 0.5 to 100 parts by weight, per part of said mixture, of a liquid in which the pigment is substantially insoluble, thereby precipitating the pigment composition;

(3) isolating the pigment composition;

(4) optionally, conditioning the pigment composition."

Claims 2 to 4 were dependent on Claim 1 and Claims 6 to 9 were dependent on Claim 5.

- III. Oral proceedings before the Board took place on 22 January 2004.
- IV. The Appellant contested that the claimed pigment compositions were a selection of the pigment compositions known from document (1). Moreover, the Appellant submitted that an improvement had been shown in the application and that there was nothing in document (1) to suggest producing a co-precipitated blend with a totally different amount of pigment and polycyclic aromatic compound in order to provide improved pigment compositions.
- V. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims
- as originally filed (main request)
  - or, in the alternative, on the basis of any of the first to third auxiliary requests filed with the letter dated 22 December 2003.

### **Reasons for the Decision**

1. The appeal is admissible.



2. *Main request*

2.1 Article 123(2) EPC and novelty

Since the Board came to the conclusion that the main request does not meet the requirement of inventive step, it is not necessary to give any reasoning as to whether the requirements of Article 123(2) EPC and of novelty are met.

2.2 Inventive step

2.2.1 In accordance with the "problem-solution approach" applied by the Boards of Appeal to assess inventive step on an objective basis, it is in particular necessary to establish the closest state of the art forming the starting point, to determine in the light thereof the technical problem which the invention addresses and solves and to examine the obviousness of the claimed solution to this problem in view of the state of the art.

2.2.2 The "closest state of the art" is normally a prior art document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common.

Since Claim 1 relates to pigment compositions comprising a perylene-**diimide** pigment and a polycyclic aromatic compound, such as an anthanthrone, a quinacridone or a flavanthrone, and since document (1) is the only available document describing compositions comprising both components, document (1) is considered

as the closest prior art and, thus, as a suitable starting point for evaluating the inventive merit.

In particular, document (1) relates to pigment compositions containing a diimide of perylenetetracarboxylic acid pigments and another colourant, such as quinacridones, in the form of a physical mixture (see the first paragraph on page 1 and the paragraph bridging pages 2 and 3).

- 2.2.3 When starting from the closest state of the art, the problem underlying the invention is the provision of pigment compositions with enhanced transparency and depth (see page 2, lines 13 and 14, of the published patent application).
- 2.2.4 The application in suit claims to solve that problem by the pigment compositions defined in Claim 1.
- 2.2.5 Therefore, the question arises whether it has been plausibly shown that with all the claimed pigment compositions enhanced transparency and depth are obtained.

The Appellant argued that enhanced transparency and depth for pigment compositions wherein, in accordance with the claimed invention, perylene pigment and anthanthrone are co-precipitated over compositions known from the closest state of the art and containing a physical mixture of such components have been shown by the data presented for example 5 and comparative example 7 in Table 2 of the patent application, since for both examples the colour properties in relation to the colour properties of the pigment composition

described in example 3 and containing only perylene pigment were presented and, thus, a direct comparison between the data of examples 5 and 7 was possible. Since also in Table 3 the colour properties of pigment compositions comprising co-precipitated mixtures of perylene pigment with a quinacridone (example 8) or a flavanthrone (examples 9(A) and 9(B)) in relation to the colour properties of the pigment composition described in example 3 were presented, it could be concluded that enhanced transparency and depth were also shown for pigment compositions comprising co-precipitated mixtures of perylene pigment and quinacridone or flavanthrone.

However, according to the jurisprudence of the Boards of Appeal of the EPO, in order to show a superior effect, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention (see T 197/86 OJ EPO, 1989, 371, Reasons for the Decision 6.1.3).

Since pigment compositions comprising physical mixtures of perylene pigments as defined in present Claim 1 and, for example, quinacridone are known from document (1), i.e. the closest state of the art, a valid comparison for showing enhanced transparency and depth for pigment compositions comprising co-precipitated mixtures of perylene pigment and, for example, a quinacridone can only be made by comparing the colour properties of pigment compositions comprising co-precipitated mixtures of perylene pigment and a quinacridone over pigment compositions comprising a physical mixture of such components.

Therefore, the Board considers that with the data presented in Table 3 enhanced transparency and depth for pigment compositions described in examples 8, 9(A) and 9(B) have not been made credible.

2.2.6 In such a case, only a less ambitious problem can be considered to be effectively solved by the claimed process, namely the provision of further pigment compositions comprising a perylene pigment and a polycyclic aromatic compound.

2.2.7 Therefore, it remains to be decided whether in the light of the teachings of the cited documents a skilled person seeking to solve the above-stated problem would have arrived at the claimed compounds in an obvious way.

In particular, the question arises whether it could be expected that pigment compositions comprising a co-precipitated blend of a perylene pigment and a polycyclic compound, such as a quinacridone, in the relative amounts defined in Claim 1, would provide suitable transparency and depth properties.

2.2.8 It is uncontested that the co-precipitation of two or more pigment components was known in the art, as illustrated for example by FR-A-2 111 115, which was cited in the European Search Report and which describes the co-precipitation of a linear quinacridone with derivatives of quinacridone (see, for example, the second and third paragraphs on page 1). As it is also taught in that document that such co-precipitated pigments have attractive colour properties, a skilled person would have expected that by co-precipitating a

perylene pigment and a polycyclic organic compound, such as quinacridone, suitable pigment compositions would be obtained.

Furthermore, in the absence of any indication that the relative amounts of perylene pigment and polycyclic aromatic compound are critical, an inventive step cannot be seen in merely indicating ranges for the relative amounts of the components. At no stage of the procedure did the Appellant try to justify the presence of an inventive step on that basis.

2.2.9 Therefore, Claim 1 and consequently the set of claims according to the main request cannot be considered to meet the requirement of inventive step.

3. First and second auxiliary requests

Since Claim 1 in both sets of claims embraces a pigment composition comprising a co-precipitated blend of perylene and, for example, quinacridone, neither set of claims meets the requirement of inventive step for the same reasons as given for the main request.

4. *Third auxiliary request*

4.1 Article 123(2) EPC

Claims 1 and 5 result from the combination of original Claims 1 and 9 respectively wherein the anthanthrones as described in original Claim 2 are selected as the polycyclic aromatic compounds; Claims 2, 3 and 4 correspond to original Claims 4, 5 and 6 respectively; and Claims 6 to 9 correspond to original Claims 11 to

14 respectively. Thus, the set of claims meets the requirement of Article 123(2) EPC.

#### 4.2 Novelty

Since the claimed pigment compositions differ from the ones described in the available prior art documents at least by the relative amounts of the perylene and the anthanthrone components, the set of claims meets the requirement of novelty.

#### 4.3 Inventive step

##### 4.3.1 Since document

(A) W. Herbst and K. Hunger, *Industrial Organic Pigments*, New York: VCH Publishers, Inc., 1993, page 511,

acknowledged in the description, teaches that 4,8-dibromoanthanthrone (Pigment Red 168) is useful for altering the shade of perylenetetracarboxylic acid pigments and since it is the only available prior art document describing pigment mixtures of a perylene and an anthanthrone, document (A) can be considered as the closest prior art and, thus, as a suitable starting point for evaluating the inventive merit.

4.3.2 The problem underlying the invention is to be seen in the provision of pigment compositions with enhanced transparency and depth (see page 2, lines 13 and 14, of the published patent application).

4.3.3 Since, according to Claim 1, this problem is solved by the pigment compositions defined in Claim 1, which essentially differ from the pigment compositions according to the closest state of the art in that the claimed pigment compositions comprise a co-precipitated blend of both components instead of a physical mixture thereof, the question arises whether it has been plausibly shown that with all claimed pigment compositions enhanced transparency and depth are obtained.

4.3.4 The Examining Division was of the opinion that this was not the case, since the only possible valid comparison between pigment compositions comprising a co-precipitated blend of perylene and anthanthrone and those comprising a physical mixture thereof was the comparison between examples 5 and 7. As it was indicated in the first paragraph of comparative example 7 that it illustrates a dry-mixed composition containing **80%** by weight of a perylene pigment and **20%** by weight of an anthanthrone, whereas example 5 described a pigment composition comprising a co-precipitated blend of **90%** by weight of a perylene pigment and **10%** by weight of an anthanthrone, and thus pigment compositions containing different amounts of the components were compared, the data provided in Table 2 were not suitable for showing enhanced transparency and depth.

However, in the second paragraph of example 7 the dry blending of a 1.8 g portion of anthanthrone with 16.2 g of the perylene pigment is described and, in Table 2, it is confirmed that the pigment composition of example 7 contains 16.2 g (90%) perylene and 1.8 g (10%)

anthanthrone. From the whole teaching of example 7 it is thus clear that an error occurred. Moreover, since in example 7 and in Table 2 dry blended compositions containing 90% perylene and 10% anthanthrone are described twice and those relative amounts are confirmed by the amounts of both components in the mixture, it is clear to a skilled reader that the relative amounts indicated in the first paragraph of example 7 are not the correct ones and that nothing else could have been intended than the relative amounts cited in the second paragraph of example 7 and in Table 2.

Considering the data presented in Table 2 for example 5 and comparative example 7, the Board has no reason to question that, with the claimed pigment compositions, the problem underlying the invention is effectively solved.

4.3.5 Therefore, it remains to be decided whether in the light of the teachings of the cited documents a skilled person seeking pigment compositions providing **enhanced** transparency and depth would have arrived at the claimed compounds in an obvious way.

4.3.6 As document (A) is silent about co-precipitating a perylene pigment with an anthanthrone, it may not be derived from document (A), in isolation, that enhanced transparency and depth would be obtained by co-precipitation of the components.



Moreover, since document (1) describes neither pigment compositions comprising an anthanthrone nor co-precipitated blends, this document likewise does not suggest the proposed solution.

4.3.7 Examination of the remaining prior art documents cited in the European Search Report revealed that co-precipitation of a perylene pigment with an anthanthrone was not suggested in any of those documents either.

4.3.8 The pigment compositions of Claim 1 are thus not rendered obvious by the teaching of either of documents (1) or (A), taken in isolation or in combination, or by the combined teaching of either of those documents and one or more other documents cited in the European Search Report.

Dependent Claims 2 to 4 and process Claims 5 to 9 derive their patentability from the same inventive concept as Claim 1.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to grant the patent with the following documents
  - Claims 1 to 9 according to the third auxiliary request.
  - A description to be adapted thereto.

The Registrar:

The Chairman:

N. Maslin

A. Nuss