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**D E C I S I O N**  
of 19 October 2000

**Case Number:** T 0074/98 - 3.3.3

**Application Number:** 88201843.5

**Publication Number:** 0311157

**IPC:** C08F 226/06

**Language of the proceedings:** EN

**Title of invention:**  
Dispersant

**Patentee:**  
EFKA-CHEMICALS B.V.

**Opponent:**  
BYK-Chemie GmbH

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Novelty - prior disclosure (no) - no reason to round up  
figures obtained by converting prior art values originally  
expressed in another unit"  
"Inventive step - non-obvious combination of known features"

**Decisions cited:**  
T 0513/90

**Catchword:**  
-



**Case Number:** T 0074/98 - 3.3.3

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.3**  
**of 19 October 2000**

**Appellant:** BYK-Chemie GmbH  
(Opponent) Abelstrasse 14  
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**Representative:** Leifert, Elmar, Dr.  
Böhm Rauch Krämer Leifert  
Burgplatz 21/22  
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**Respondent:** EFKA-CHEMICALS B.V.  
(Proprietor of the patent) Noorderlaan 11  
NL-2182 GZ Hillegom (NL)

**Representative:** Smulders, Theodorus A.H.J., Ir.  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office posted 2 December  
1997 concerning maintenance of the European  
patent No. 0 311 157 in amended form.

**Composition of the Board:**

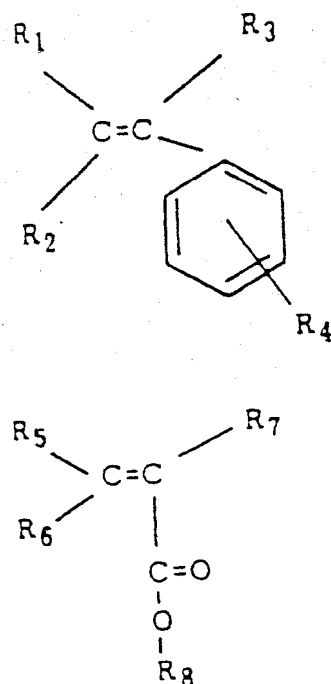
**Chairman:** C. Gérardin  
**Members:** B. ter Laan  
A. Lindqvist

### Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 311 157 in respect of European patent application No. 88 201 843.5, filed on 30 August 1988, claiming priority from an earlier application in the Netherlands (8702089 of 4 September 1987), was published on 10 November 1993 (Bulletin 93/45) on the basis of 17 claims, Claim 1 reading:

"A solution of a polymer in an organic solvent, said polymer comprising

A) 5-80 mol % of one or more monomers having the formula



in which R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> may be the same or different and represent H or alkyl, B) up to 70 mol % of one or more monomers having the formula in which R<sub>5</sub>, R<sub>6</sub> and R<sub>7</sub> may be the same or different and represent H or alkyl and R<sub>8</sub> is alkyl or substituted alkyl, and the alkyl group R<sub>8</sub> may also be interrupted by - O - groups,

C) 5-50 mol % of one or more monomers containing a heterocyclic group having at least one basic ring nitrogen atom, or to which such a heterocyclic group is

attached following polymerization,

D) 0-10 mol % of one or more monomers containing one or more groups reactive to cross-linking or coupling, and

E) 0-20 mol % of one or more monomers not falling within the groups A-D, wherein the amount of A and B together, must be at least 20 mol % and A and B are both present, as well as organic salts thereof."

Claims 2 to 11 referred to preferred embodiments of the solution according to Claim 1.

Claim 12 was directed to the use of the solution according to Claims 1 to 11 in the production of coatings and printing inks. Claim 13 referred to a preferred embodiment of Claim 12.

Claim 14 read:

"Powdered solids to be incorporated in liquid systems, coated with the polymer as described in claims 1-11."

Claim 15 referred to a preferred embodiment of Claim 14.

Claim 16 read:

"Pigment dispersions consisting mainly of one or more pigments, a polymer as described in claims 1-11 and water and/or non-aqueous liquid."

Claim 17 was directed to a preferred embodiment of Claim 16.

II. On 5 August 1994 a Notice of Opposition against the granted patent was filed, in which the revocation of

the patent in its entirety was requested on the grounds set out in Articles 100(a) and 100(b) EPC.

The opposition was, *inter alia*, supported by the following documents:

D1: DE-A-2 934 642,

D2: DE-A-2 145 950 and

D4: EP-A-0 154 678.

III. In a decision delivered orally on 21 January 1997 and issued in writing on 2 December 1997, the Opposition Division maintained the patent in amended form. That decision was based upon two sets of twelve claims, one filed on 13 January 1995 as the main request and one filed on 21 January 1997 as an auxiliary request. Claim 1 of that auxiliary request differed from the claim as granted in that component C was limited to vinylimidazole. The dependent claims referring to the components C now excluded were deleted and the other claims were appropriately renumbered.

According to the Opposition Division, the main request lacked an inventive step, since the technical problem in view of D1 (DE-A-2 934 642), to provide an improved dispersant, was solved in an obvious manner. By contrast, the auxiliary request fulfilled the patentability requirements of the EPC.

IV. On 19 January 1998 the Appellant (Opponent) lodged an appeal against the above decision and paid the prescribed fee simultaneously. In the Statement of Grounds of Appeal, filed on 28 March 1998, reference

was made to two documents that had not been mentioned before:

D7: DE-A-1 619 353 and

D8: DE-B-1 621 822

in support of a novelty objection.

The Appellant argued essentially that

(a) Regarding the new documents, since they were novelty destroying, they were more relevant than the documents already on file, so that they would influence the outcome of the case. Therefore, they should be introduced into the proceedings.

(b) As to novelty, both D7 and D8 disclosed a copolymer solution having a composition that fell within the terms of present Claim 1.

(c) For inventive step, D1 was considered to be the closest document. It disclosed all claimed components except, instead of vinylimidazole, vinylpyridine. The object of the patent in suit was to provide stable dispersants, which problem was already solved in the prior art. Therefore, an inventive step could only possibly be recognised if any special effects occurred, which, judging from the tests presented in the patent specification and throughout the proceedings, was not the case. Hence the problem to be solved could only be defined in terms of an alternative composition. The numerous documents demonstrating the possibility to use vinylimidazole as an alternative to vinylpyridine, in particular D4, rendered the use of the former obvious,

also in view of decision T 513/90.

Starting from D7 or D8, no solution of any technical problem could be seen in raising the lower limit for vinylimidazole by the small amount as now required.

V. The Respondent (Proprietor) argued in writing essentially as follows:

(a) The new documents, which, on the basis of more precise calculations, were not novelty damaging, should not be admitted to the proceedings (statement of 21 September 2000).

(b) Regarding inventive step, it was agreed that D1 was the closest document. The problem solved by the claimed subject-matter, as indicated in the patent specification, was to provide a dispersant polymer solution with high compatibility - which property was important for the stabilization of pigments -, imparting good resistance against flocculation, good rheological properties and a high gloss to the dispersions in which they were used. The examples and further tests showed that the use of vinylimidazole resulted in an improvement of those properties. None of the cited documents, taken alone or in combination, provided an incentive for the skilled person to substitute the vinylpyridine used in D1 for vinylimidazole (statements of 22 July 1998 and 18 September 2000).

(c) An alternative set of claims was filed as an auxiliary request on 22 July 1998, in case the Board would decide to admit the late filed documents.

VI. During oral proceedings held on 19 October 2000, following the preliminary discussion of the relevance of D7 and D8 filed late by the Appellant and the calculations submitted by the Respondent in reaction to those citations, the issues of novelty and inventive step were both considered.

The Appellant, which partly relied on the new documents in addition to the submissions made before the first instance and in writing before the Board, argued essentially along the lines of equivalence of vinylpyridine and vinylimidazole and that vinylimidazole was an obvious alternative for vinylpyridine.

The Respondent disputed these findings on the grounds that there were differences, though admittedly minor, between the specific compositions considered by the Appellant and the solutions as claimed and that it was not legitimate to round up the prior art figures as calculated in order to create an overlapping situation. Furthermore, the combination of compositional features required by the wording of the claims ensured improved properties not only in terms of gloss, but also in terms of protection against flocculation and agglomeration; this effect was unexpected and supported the presence of an inventive step.

VII. The Appellant requested that the decision under appeal be set aside and the patent be revoked.

The Respondent requested that the appeal be dismissed and that the patent be maintained as amended during the opposition proceedings, alternatively on the basis of Claims 1 to 12 filed on 22 July 1998 as an auxiliary

request.

## **Reasons for the Decision**

1. The appeal is admissible.

### *Procedural matters*

2. Regarding the new citations provided by the Appellant for the first time in the appeal proceedings, the Board invited the representative to justify the relevance of that evidence in the light of the Reasons for the Decision given by the first instance and the arguments put forward so far in writing. Since it appeared that those late submissions might contribute to clarify one or the other aspect of the relation between compositional features and properties of the solution, for which the parties had opposite interpretations, the Board did not formally exclude any of them, inviting however the parties not to rely primarily on them. The subsequent discussion of the substantive issues revealed that, depending on the views regarding the objections of novelty and inventive step, those documents might be relevant or not. Therefore, they will be evaluated herein below.

### *Novelty*

3. In both D7, Example 1, and D8, Example 3, compositions are described in which the amounts of the main components fall within the claimed range. However, the amounts of vinylimidazole as calculated by the Respondent are 4.96 and 4.98 mol%, respectively. Those results were not contested by the Appellant. Therefore,

the question to be answered is to which extent those figures are to be interpreted as 5, which is the lower limit of the range defining the amount of vinylimidazole.

3.1 The Appellant argued that, according to the usual rules for rounding up, 4.96 and 4.98 were to be read as 5. Since the amount of vinylimidazole was defined as 5-50 mol%, without any indication of decimals, the number of 5 also included the values of 4.96 and 4.98, which differed from 5 only in the second decimal, hence representing a very small difference.

3.2 The Board cannot follow that line of argument.

First, by just following rounding up rules, values deviating even more from the indicated value, like e.g. 4.60, would also lead to the number of 5. In the Board's view, to interpret the single number of "5" so as to include all values that, upon application of rounding up rules, would have that number as the outcome, would expand the scope of the claim beyond the indicated limits, thus casting doubt upon the meaning of ranges in general. This is not in conformity with the standard practice of the Boards of Appeal.

A second aspect to consider is the fact that the values of 4.96 and 4.98 correspond to mol% amounts which have been calculated from the original monomer compositions expressed in weight%. In the case of Example 1 of D7 this monomer composition consists of styrene (200 g), ethylhexylacrylate (720 g), N-vinylimidazole (30 g) and N-methylolmethacrylamide butylether (50g). Therefore, the amount of vinylimidazole, 30 g per 1000 g of comonomers, corresponds exactly to 3 weight%.

Similarly, in the case of Example 3 of D8, the monomer composition consists of ethylhexylacrylate (77 g), styrene (20 g) and vinylimidazole (3 g), the latter also corresponding to 3 weight% of the total comonomers. Those monomer compositions can hence be represented by the following weight ratios: 200/720/30/5 and 77/20/3, respectively. It is evident that any rounding-up following the conversion of these figures into molar amounts would affect the definition of those compositions; in particular, rounding up the critical figures of 4.96 and 4.98 to 5.0 mol% would imply a modification of the original weight ratios, since 5.0 mol% no longer corresponds to 30.0 g or 3.0 g, respectively. Therefore, following the Appellant's line of argument, in each case there would be two different versions of the composition, the original one expressed in weight and then calculated and slightly amended to mol%. It is evident that the true meaning of a specific disclosure cannot be influenced by the units chosen to express it and that the present objection of lack of novelty relies on an ambiguity introduced artificially by the Appellant.

Finally, the Respondent confirmed its intention as it appears from the wording of the claim itself, that the range was to be interpreted as it stands: from 5 to 50 mole %. Values lower than 5 were stated not to be included in the claim.

In the light of the above and since no other documents were cited against novelty, the Board concludes that the claimed subject-matter is novel.

*Problem and solution*

4. The patent in suit concerns a dispersant. Dispersants are described in D1, which the Board, in common with the parties and the Opposition Division, regards as the closest state of the art.

4.1 D1 describes a dispersant especially for the dispersion of pigments in resin-containing coating compositions, characterized in that said dispersant is the polymerization product of a mixture of monomers comprising:

(i) 20 to 85 % of an alkyl methacrylate having from 3 to 8 carbon atoms in the alkyl group;

(ii) 5 to 60 % of a hardening monomer selected from the groups of styrene, methyl methacrylate, ethyl methacrylate and mixtures thereof,

(iii) 1 to 25 % of an ethylenically unsaturated carboxylic acid selected from the group of acrylic acid, methacrylic acid, itaconic acid, crotonic acid, maleic acid, fumaric acid and mixtures thereof or a monomer having an olefinic double bond in alpha-beta position to a carbonyl group, which provides carboxyl functionality when reacted with water, alcohol, amine or anhydride,

(iv) 1 to 25 % of a monomer having an olefinic double bond in an alpha-beta position to a carbonyl group and at least one hydroxyl group or a monomer which provides such groups when further reacted with an acid or an epoxide; and

(v) 0.1 to 15 % of a compound having a functional amine or amine salt group, wherein the dispersant has a

weight average molecular weight of about 1000 to about 10000, determined by gel permeation chromatography using a polystyrene standard (Claim 1). The functional amine or amine salt group containing compound can be an aliphatic or alicyclic amine compound that forms a salt with a carboxyl group, an acrylic- or methacrylic compound having amino groups or it can be obtained by opening a nitrogen containing ring (Claims 13 to 15). According to page 34, line 7, the fifth component may, amongst many other compounds listed (page 32 to page 35), be 2- or 4- vinylpyridine. In the examples dimethyl octadecyl amine, dimethyl aminoethyl methacrylate, propylene imine and a ring-opened acridine are used as the compound containing functional amine or amine salt groups. Only in Example 9, which refers to Example 3, styrene is present as one of the components of the dispersant, replacing the methyl methacrylate of Example 3. In Example 22G that dispersant is tested for its compatibility with and influence on the properties of film-forming resins.

The object of D1 is to provide multi-purpose dispersants suitable for use as dispersants for pigments that can be used in coating compositions containing a wide variety of film-forming resins (page 23, first paragraph).

- 4.2 According to the Respondent, in conformity with the specification of the patent in suit, the claimed dispersant should have excellent compatibility with all kinds of binders for coatings and printing inks and pigments stabilized with the claimed polymers should have high resistance to flocculation, good rheological properties as well as a proper strength and a high gloss (page 3, lines 25 to 28). However, the Appellant

denied that all the aspects of the thus defined technical problem had been effectively solved by the combination of features according to Claim 1.

The examples in the patent in suit compare the properties of the claimed dispersant with compositions according to D4, so that no conclusion can be drawn whether the present dispersants effectively have improved properties vis-à-vis D1, the closest prior art document. A comparison of the effects of vinylpyridine and vinylimidazole was however filed during the opposition proceedings, in a letter dated 19 July 1995, in which two compositions, one containing vinylpyridine and the other vinylimidazole, the other components being the same, were compared. It was shown that the gloss of a lacquer comprising the latter was higher than that of a lacquer comprising the former. Counter-experiments were filed by the Appellant (letter of 5 December 1995), showing no difference either in the gloss of a number of lacquer compositions with and without vinylimidazole, or, in some, a gloss reduction. Those results were however contested by the Respondent in view of the lacquers used, which were not in accordance with realistic conditions, and because an experiment without the presence of a dispersant (zero experiment) had not been performed. Further experiments were filed by the Respondent to demonstrate that lacquers containing vinylimidazole had improved gloss and flocculation resistance over compositions containing one of vinylpyridine or methacrylate (letter dated 29 November 1996).

- 4.3 In view of the conflicting interpretations of the experiments by the parties regarding the effects of vinylimidazole on the gloss of lacquer compositions,

the Board takes the view that the technical problem may be seen in providing dispersants suitable for use with binders for coatings and printing inks and in pigment dispersions, which, apart from good compatibility, stability and high gloss, also have a high resistance to flocculation and good rheological properties.

4.4 According to the patent in suit that problem is solved by a polymer solution containing vinylimidazole moieties, as specified in Claim 1.

4.5 The examples in the patent in suit as well as the additional experiments filed during the proceedings demonstrate that the above-defined problem is effectively solved. In particular, lacquer systems containing the polymer solution as defined in Claim 1 have a high gloss and good flocculation resistance, as well as a good viscosity.

#### *Obviousness*

5. It remains to be decided whether the claimed subject-matter is obvious having regard to the documents on file.

5.1 As can be seen from point 4.1 above, the compositions according to D1 contain five components, one of which is selected from the groups of styrene, methyl methacrylate, ethyl methacrylate and mixtures thereof (component (ii)), another of which being a compound having a functional amine or amine salt group (component (v)). As confirmed by the examples (Examples 1 to 8, application Examples 10 to 22F), the presence of styrene is therefore not obligatory, whereas vinylimidazole is not mentioned at all.

Furthermore, D1 aims at compatibility of the dispersant, without specifically indicating the other desirable properties as mentioned in the patent in suit. Therefore, D1 contains no incentive for the skilled person to start from a styrene containing composition in the first place and to add vinylimidazole to that styrene containing composition in the second place in order to solve the above-defined problem (point 4.3). It follows that D1 by itself does not render the claimed combination of features obvious.

5.2 D2 describes a dispersion of finely divided pigment particles characterized by

(i) a solid solution of a copolymer formed by polymerizing copolymerizable unsaturated monomers and a dye that is dissolved in the copolymer, the dye not being copolymerizable with the monomers, and

(ii) a protective coating layer consisting of a stabilizer around the solid solution (i), the stabilizer being compatible with and chemically bonded to the copolymer and comprising a long chain carbohydrate soluble in an organic liquid having a low or no polarity, so that the solid solution (i) can form a stable dispersion in the organic liquid, the particles having an average size of 0.1 to 5  $\mu\text{m}$  (Claim 1).

The monomers from which the copolymer in solution (i) is formed, can be divided in three groups (Claim 4). The monomers of type A have a low affinity with dyes. They are exemplified by e.g. acrylic acid esters, methacrylic acid esters, styrene and vinylchloride (paragraph bridging pages 5 and 6). The monomers of

type B contain one or two cyano groups, through which they possess a relatively high affinity with the dyes, e.g. acrylonitrile (page 6, second paragraph). The monomers of type C have a functional group that provides a very high affinity with the dye. They can have an acid group, like e.g. acrylic acid or itaconic acid, or a basic group, such as, amongst many other compounds, N-vinylimidazole, vinylpyridine and acrylamide (page 6, third and fourth paragraph). N-vinylpyridine is actually used in Example 5 (out of 29) and N-vinylimidazole in Example 28. The composition described in Example 5 contains no styrene, the composition of Example 28 does.

The stabilizers of component (ii) contain organic compounds which are either compatible with or bonded to the unsaturated monomers forming the copolymer and have a long hydrocarbon chain. They are exemplified by e.g. esters such as hexylacrylate and octyl methacrylate or dihexylfumarate and dioctylfumarate, polymeric vinyl esters such as polyvinyl stearate, waxes (e.g. depolymerized polyethylene wax), resins, oils, etc. (paragraph bridging pages 4 and 5).

In the light of the disclosure of D2, especially Examples 5 and 28 as well as the general listing on page 6, third full paragraph, no equivalence of vinylpyridine and vinylimidazole for the present purposes can be derived, since D2 does not refer to the same technical field as the patent in suit. The object of D2 is to provide a dispersion of finely divided pigment particles which is suitable for printing purposes by polymerizing certain monomers in the presence of dyes. In contrast to the pigments of the patent in suit, the latter may be water soluble, as in

Examples 5 and 28. Therefore, the product described in D2 is in fact a coloured polymer and not a dispersant as such. For that reason, the skilled person would not turn to D2 when trying to find a dispersant having the above-described properties. Even if the skilled person would combine D2 with D1, he would still not be led to the specific composition of the dispersant as claimed. In particular, the obligatory presence of both monomer (a)(e.g. styrene) and vinylimidazole could not be derived from D2 or from a combination of D2 with D1.

5.3 D4 (Claim 1) describes addition compounds suitable as dispersants which are obtainable by reacting polyisocyanates having an average functionality of 2.5 to 6 with

(a) monohydroxy compounds of the formula Y-OH, in which Y is an aliphatic and/or cycloaliphatic hydrocarbon group having 8 to 30 carbon atoms, in which the hydrogen can be partly replaced by halogen and/or alkyl rests, in such a way as to convert 15 to 50% of the NCO groups, then

(b) by further reacting the so obtained product with a compound of the formula G-(E)<sub>n</sub>, in which E means -OH, -NH<sub>2</sub> and/or -NHR (R being an alkyl group with 1 to 4 carbon atoms), n is 2 or 3 and G is an aliphatic group, cycloaliphatic and/or aromatic group having at least 2 carbon atoms and a molecular weight of at most 3000 and which can contain -O-, -COO-, -CONH-, -S- and/or -SO<sub>2</sub>- groups, in such a way that further 15 to 45% of the originally present -NCO groups are converted, the sum of converted -NCO groups in both steps a) and b) being from 40% to 75%, and

(c) further reacting the thus obtained product with a compound of the formula Z-Q in which Q is -OH, -NH<sub>2</sub>, NHR (R being an alkyl group with 1 to 4 carbon atoms) or -SH and Z is an aliphatic group with 2 to 10 carbon atoms having at least one tertiary amino group or a heterocyclic group with at least one basic ring nitrogen atom which does not contain any hydrogen atom, in which the heterocyclic group can be bonded to group Q via an alkylene group having at most 10 carbon atoms, in such an amount that for each remaining, in steps a) and b) not converted -NCO group at least one molecule of the compound Z-Q is present.

Preferably, Z is a one or two core heterocyclic compound the ring nitrogen atom of which is (preferably via an alkylene group of 2 to 5 carbon atoms) bonded to group Q (Claim 7). Compounds of the formula Z-Q are exemplified by triazole, pyrimidine, imidazole, pyridine, morpholine, pyrrolydine, piperazine, benzimidazole, benzothiazole and/or triazine, which can be substituted (paragraph bridging pages 12 and 13). Neither amongst the numerous examples given for a compound of formula Z-Q, nor in the worked examples, N-vinylpyridine or N-vinylimidazole are mentioned (page 13, lines 14 to 22; Examples 1 to 19).

The object of D4 is to provide dispersants that reduce reagglomeration or flocculation without reduction of the gloss and colour properties in lacquers and coatings (page 2, lines 8 to 35).

Since D4 refers to a different kind of polymer composition and does not even mention vinylimidazole, it contains no teaching regarding its effects on the kind of compositions such as the present ones, so that

D4 alone or any combination with D1 and/or D2 would not lead to the claimed subject-matter, even if the technical problem would be broadly defined as to provide an alternative dispersant.

- 5.4 The mere fact that vinylimidazole is a compound that was available to the skilled person and could have been used in any kind of suitable application, is not sufficient to establish obviousness (see T 513/90, OJ EPO 1994, 154). As pointed out by the Respondent during oral proceedings, the present situation is much more a typical "could/would" situation which the skilled person had no particular reason to solve the technical problem in the manner as required in the patent in suit in view of the definition of that problem and the teaching of the various documents relied upon by the Appellant.
- 5.5 In view of the above considerations, the Board comes to the conclusion that the subject-matter of Claim 1 involves an inventive step.
6. That conclusion would not be any different if both late filed documents D7 and D8 would also be taken into account. The mere mentioning of compositions "close" to those now claimed cannot be interpreted as a teaching to combine the specific features of the claimed subject-matter for any general purpose, or, more specifically, in order to solve the above-defined technical problem.
7. As Claim 1 of the main request is allowable, the same is valid for dependent Claims 2 to 6, the patentability of which is supported by that of Claim 1. The above considerations also apply to Claims 7 to 12 since their

subject-matter is based on the same combination of features as in Claim 1.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

C. Gérardin