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D E C I S I O N
of 28 March 2001

Case Number: T 0261/97 - 3.3.1

Application Number: 87102710.8

Publication Number: 0234573

IPC: C09B 67/26

Language of the proceedings: EN

Title of invention:
Reactive-dye-containing aqueous liquid composition

Patentee:
Sumitomo Chemical Company, Limited

Opponent:
Ciba Spezialitätenchemie Holding AG
DyStar Textilfarben GmbH & Co. Deutschland KG

Headword:
Reactive dye composition/SUMITOMO

Relevant legal provisions:
EPC Art. 56
EPC R. 71(2)

Keyword:
"Inventive step (no) - obvious alternative composition"

Decisions cited:
T 0020/81, T 0355/97

Catchword:
-



Case Number: T 0261/97 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 28 March 2001

Appellant:
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Representative: -

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 23 December 1996
revoking European patent No. 0 234 573 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: J. M. Jonk
Members: P. F. Ranguis
S. C. Perryman

Summary of Facts and Submissions

I. The Appellant (Proprietor of the patent) lodged an appeal against the decision of the Opposition Division by which the European patent No. 0 234 573 (European patent application No. 87 102 710.8) was revoked under Article 102(1) EPC.

II. The oppositions filed by Opponents 1 and 2 (now Respondents 1 and 2 respectively) were supported by several documents including:

(1): DE-A- 25 29 658

(3): EP-A- 0 167 107

(4): EP-A- 0 059 782

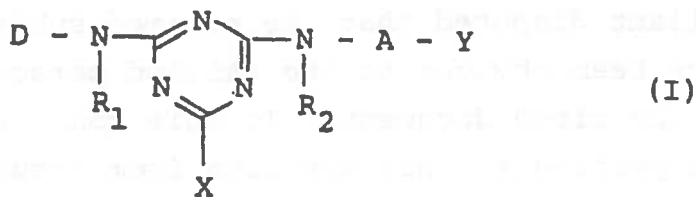
(5): GB-A- 1 060 063

(6): DE-A- 24 58 580

and based on the ground that the patent in suit did not involve an inventive step as indicated in Article 100(a) EPC.

III. The decision was based on the Claims 1 to 7 as granted, independent Claim 1 reading as follows:

"1. An aqueous liquid dye composition comprising 5 to 50% by weight of a reactive dye represented by the following formula (I)



wherein D denotes a sulfo group-containing organic dye residue, R₁ and R₂ independently of one another denote a hydrogen atom or a C₁ to C₄ alkyl group unsubstituted or substituted with a halogen atom or a hydroxyl, cyano, C₁ to C₄ alkoxy, carboxy, carbamoyl, C₁ to C₄ alkoxy-carbonyl, C₁ to C₄ alkyl-carbonyloxy, sulfo or sulfamoyl group, A denotes a phenylene group unsubstituted or substituted with one or two members selected from methyl, ethyl, methoxy, ethoxy, chlorine, bromine and sulfo, or a naphthylene group unsubstituted or substituted with one sulfo group, X denotes a halogen atom, and Y is a group of the formula -SO₂CH=CH₂ or -SO₂CH₂CH₂Z in which Z is a group which can be removed by the action of alkali, 0.1 to 10% by weight of ε-caprolactam and the balance of water, the composition having a pH value of 3 to 7."

- IV. The Opposition Division held that, starting from document (3) as the closest prior art, which disclosed aqueous liquid dye compositions differing from the claimed aqueous liquid dye compositions only in that they did not contain ε-caprolactam, it would have been obvious to the person skilled in the art in the light of documents (1) and (4) to use ε-caprolactam in order to achieve stable aqueous dye compositions at low temperatures.
- V. Oral proceedings before the Board were held on 28 March 2001. The Appellant, having been duly summoned, did not attend the oral proceedings. They thus took place in the absence of the Appellant (Rule 71(2) EPC).
- VI. The Appellant disputed that the claimed subject matter would have been obvious to the skilled person in the light of the cited documents. In this context, he argued in particular that starting from document (3) as the closest state of the art, the technical problem to

be solved was to improve the stability of aqueous bi-reactive dye containing compositions at low temperatures and that the solution of this technical problem by using 0.1 to 10% by weight of ϵ -caprolactam was not obvious to the skilled person for the following reasons:

- Document (3) taught that the aqueous bi-reactive dye containing compositions were stable up to -10°C , so that the person skilled in the art would have had no reason to improve the stability of the already stable compositions. This document represented, therefore, a clear prejudice against the use of further additives.
- Documents (1) and (4) related to mono-reactive dyes and not to bi-reactive dyes. Therefore, the person skilled in the art would not have considered the teaching of these documents for solving the technical problem underlying the patent in suit.
- The cited documents did not teach the use of ϵ -caprolactam as a stabiliser at low temperatures.
- ϵ -Caprolactam being a solid could precipitate at low temperatures.

VII. Respondent 1 submitted that document (3) was the closest state of the art and that starting from this prior art the use of ϵ -caprolactam for improving the solubility of reactive dyes and the stability of aqueous liquid compositions containing them did not involve an inventive step in view of documents (1), (4), (5) and (6). Moreover, the use of ϵ -caprolactam in amounts within the range of from 0.5% to 10% by weight did not involve an inventive step either, since the use of such amounts was already known from documents (4),

(5) and (6) and because the person skilled in the art, for economic reasons, would try to use the lowest possible amounts. In this context, he disputed the Appellant's point of view that the skilled person would not combine the teaching of document (3) with that of the other cited documents in view of the different types of dyes, since documents (4) and (1) - like document (3) and the patent in suit - clearly related to aqueous dye compositions comprising bi-reactive dyes.

Furthermore, he denied that the person skilled in the art would not have sought to improve the stability of the already stable compositions disclosed in document (3). This could, for instance, be desirable in the case of lower storage temperatures and/or higher dye concentrations and/or higher concentrations of alkali metal sulphates as followed from document (3) indicating that the membranes to be applied in in order to remove undesirable inert salts showed a poor permeability for sulphate ions.

Finally, he submitted that it was common general knowledge as supported by

(7) Römpps Chemie-Lexikon, 1979, page 585,

that ϵ -caprolactam was easily soluble in water and that therefore no risk existed that said compound would precipitate at low temperatures.

VIII. Respondent 2 concurred with the submissions put forward by Respondent (1). Moreover, he emphasised that the solubility of the reactive dyes was not, contrary to the assertion of the Appellant, substantially related to the number of the reactive groups, but rather depended on the presence of the sulfo groups and on the temperature, and that, therefore, there was no obstacle

for the person skilled in the art faced with the problem to improve the solubility of the dyes or to improve the stability of aqueous composition containing them, to look for relevant information in the cited documents (1), (4), (5) and (6).

IX. The Appellant requested in writing that the decision under appeal be set aside and the patent in suit be maintained as granted.

The Respondents requested that the appeal be dismissed.

X. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.
2. The only point at issue in these appeal proceedings is the question whether the claimed subject-matter involves an inventive step.
3. For deciding whether or not a claimed invention meets this criterion, the Boards of Appeal consistently apply the problem and solution approach, which involves essentially
 - (a) identifying the closest prior art,
 - (b) assessing the technical results (or effects) achieved by the claimed invention when compared with the closest state of the art established,

- (c) defining in the light thereof the technical problem which the invention addresses and successfully solves,
- (d) verifying that the defined technical problem is solved by the embodiments encompassed within the claimed solution, and
- (e) examining whether or not the claimed solution is obvious for the skilled person in view of the state of the art as a whole.

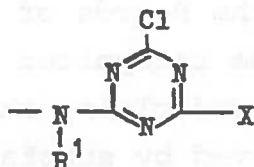
If the technical results of the invention provide some improvement over the closest prior art, the problem can be seen as providing such improvement, provided this improvement necessarily results from the claimed features for all that is claimed. If, however, there is no improvement, but the means of implementation are different, the technical problem can be defined as the provision of an alternative to the closest prior art.

- 4. The Board considers, in agreement with the parties, that the closest prior art with respect to the compositions according to Claim 1 of the patent in suit is the disclosure of document (3), since this prior art document relates to the same purpose or objective and also concerns the same type of reactive dyes.
- 5. This document (3) relates to a process for removing alkali or alkaline earth metal halides from aqueous reactive dye compositions through electrodialysis in order to improve their storage stability. The obtained compositions comprise 5 to 60% by weight of dye and less than 1.0% by weight of halide, have a pH value of 3 to 7, and are stated to be stable at room temperature

after several months and up to -10°C after several days (cf. page 15, line 16 to page 16, line 11). The dyes correspond to those of the patent in suit as follows from their definition by the formula:



wherein, F is a rest of a chromophore chosen *inter alia* among anthraquinone, formazan, mono-, di-, or triazo, or phthalocyanine, possibly complexed with a metal, m is an integer from 1 to 8, n is an integer from 1 to 3 and Z is a fibre reactive group of formula:



wherein R¹ may be H or a C₁-C₄ alkyl group and X may be, in particular, -NR²R³, R² being, for instance, H or a C₁-C₄ alkyl group and R³ being, for instance, a phenyl group substituted by one or two substituents chosen among for instance β-sulfatoethylsulfonyl, β-thiosulfatoethylsulfonyl, β-chloroethylsulfonyl, and vinylsulfonyl (cf. page 6, line 20 to page 9, line 29). Consequently, document (3) makes available to the skilled person aqueous dye containing compositions which only differ from the compositions as claimed in that they do not comprise ε-caprolactam.

6. Regarding this prior art, the Appellant submitted that the technical problem to be solved was to improve the stability of aqueous compositions comprising a dye as defined in Claim 1 at low temperatures, such as 0°C to 5°C, and without a decrease in dyeing power.

It is true, that the Respondents agreed that under certain circumstances such as the use of dyes having a poor solubility in water, the use of high dye concentrations and the presence of high concentrations of inert salts in the liquid dye compositions resulting from the preparation of the dyes (see document (3), page 1, line 22 to page 3, line 16; and page 3, line 34 to page 4, line 6), improvements of the stability of the aqueous compositions by using ϵ -caprolactam could indeed be achieved both at lower temperatures and higher temperatures.

However, in accordance with the established jurisprudence of the Boards of Appeal, only such improvements can be recognized for defining the technical problem underlying the patent in suit which are actually achieved by substantially all the embodiments encompassed within the scope of the claim. In this context, the Board has serious doubts whether in the case of aqueous dye solutions comprising easily soluble dyes in low concentrations and low contents of inert salts, which solutions fall under the broad scope of Claim 1, an improvement of stabilisation of the dye solutions at a given temperature could be realised.

Thus, in view of these considerations and having regard to the fact that the Appellant did not submit any evidence showing that the alleged improvement could be achieved by the claimed compositions within the present broad scope of Claim 1, the technical problem as defined by the Appellant cannot be accepted by the Board and consequently a reformulation of this alleged technical problem becomes necessary to meet a less ambitious objective [see in this context e.g. T 20/81, OJ EPO 1982, 217, point 3 of the reasons; and T 355/97 dated 5 July 2000 (not published in the OJ EPO), point 2.6 of the reasons].

7. Therefore, in the Board's judgment, the technical problem underlying the patent in suit in the light of the closest state of the art can only be seen in the provision of further aqueous reactive dye containing compositions.
8. The patent in suit suggests as the solution to this problem, a composition according to Claim 1 which is characterised by the incorporation of 0.1 to 10% by weight of ϵ -caprolactam.

In view of the technical information in the patent in suit, in particular in the examples, the Board is satisfied that the problem as defined above has been solved. This was never challenged by the Respondents.
9. The remaining question is thus whether the prior art as a whole would have suggested to a person skilled in the art solving the technical problem indicated above in the proposed way.
10. As indicated above (see point 5), document (3) does not mention the use of ϵ -caprolactam at all, so that it cannot render the claimed subject-matter obvious by itself.
11. Document (4) relates to storage stable concentrated aqueous dyeing compositions containing at least one anionic dye, which compositions are stabilised by passing them over a specific semi-permeable membrane to remove inert salts, especially sodium chloride, deriving from the synthesis of the dyes (cf. page 1, first paragraph, and page 2, last paragraph to page 3, second paragraph). The compositions contain in particular 10 to 60% by weight of the anionic dye(s)

and less than 1% of the inert salts (cf. page 10, second and third paragraphs). They remain stable for at least several months at temperatures of from -10°C to +40°C (cf. pages 19 to 20, bridging paragraph).

Suitable dyes are *inter alia* sulfonic acid groups containing metal-free or metallised mono-, di-, polyazo dyes, formazan dyes, anthraquinone dyes and phthalocyanine dyes, which contain at least one reactive group such as β -chloroethylsulfonyl and a halogenotriazinyl group (cf. page 3 bottom paragraph to page 6, first paragraph).

Moreover, this document discloses that ϵ -caprolactam may be added in an amount ranging from 4 to 20% by weight in order to improve the solubility of the reactive dye (cf. page 11, second paragraph) and that an aqueous dye solution as indicated in Example 6(d) containing 27.8% by weight of a dye, 0.7% by weight of NaCl and 5.0% of ϵ -caprolactam shows a still better stability than the same composition (indicated in Example 6(b)) without ϵ -caprolactam.

Therefore, document (4) provides a clear incentive to the skilled person that by using ϵ -caprolactam in amounts falling within the range indicated in Claim 1 of the patent in suit the solubility of reactive dyes and the storage stability of the aqueous dye solutions can be improved, or maintained, for instance, at lower storage temperatures and/or higher dye concentrations and/or when using dyes having a poor solubility, even at low inert salt concentrations of at most about 1% by weight as required in accordance with the technical teaching of both document (4) and document (3) (see points 11 and 5 above, respectively).

12. Thus, document (4) gives, in the Board's judgment, a clear pointer to the skilled person that the technical problem defined above can be solved by providing an aqueous dye composition falling under the scope of Claim 1 of the patent in suit.
13. The Appellant argued that the person skilled in the art, in view of the teaching of document (3) that by reducing the inert salt concentration, the aqueous reactive dye containing compositions were stable up to a low temperature of -10°C , would have had no reason to improve the stability of the already stable compositions, and that therefore a prejudice would have been created distracting the person skilled in the art against the use of further additives. However, according to the established jurisprudence of the Board's of Appeal a prejudice must be supported by documents representing common expert knowledge in the field concerned, whereas the Appellant did not provide any evidence at all. Moreover, the Board concurs with the view of the Respondents that, for instance, under the circumstances indicated under point VII above, second paragraph, a person skilled in the art would have sufficient reasons to look for measures for improving or maintaining the storage stability of reactive dye containing aqueous solutions. Therefore, the Board cannot accept the Appellant's submissions in this respect.
14. The Appellant also submitted, that document (4) related to compositions containing mono-reactive dyes, and that therefore the skilled person would not have combined the teaching of this document with that of document (3), which last document concerned aqueous solutions comprising bi-reactive dyes. However, this submission is in contradiction of the facts, since the teaching of document (4) is not limited to mono-reactive dyes, but encompasses the use of dyes having more than one

reactive groups (see page 4, lines 1 to 3 of the third paragraph; and page 6, second paragraph, indicating a preferred embodiment of using dyes having one or two triazinyl groups which at least contain one removable halogen atom). Furthermore, the Board shares the opinion of Respondent 2 that the solubility in water of the dyes indicated in document (4) is to a very large extent related to the solubilizing groups of the dyes, such as sulfo groups (cf. page 3, last paragraph, and page 6, second paragraph). It is, therefore, the conclusion of the Board that when looking for alternatives to the compositions disclosed in document (3), the person skilled in the art would have considered as relevant the information contained in document (4).

15. Furthermore, it is the Board's view that the person skilled in the art would not have been deterred from adding ϵ -caprolactam to the aqueous solution because of the risk of precipitation, since as supported by document (7) submitted by the Respondent 1 at the oral proceedings and admitted by the Board as common general knowledge, ϵ -caprolactam is easily soluble in water. Moreover, as indicated above, it was already known from document (4) to use ϵ -caprolactam in aqueous dye solutions in order to render them stable at low temperatures up to -10°C .
16. Finally, the Board observes that in view of the considerations above a discussion of the other cited documents has become superfluous.
17. It follows that the subject-matter of Claim 1 lacks inventive step and, thus, does not comply with Article 56 EPC.

The further claims fall with Claim 1, since the Board can only decide on the Appellant's request as a whole.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:



N. Maslin

The Chairman:



J. M. Jonk

