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D E C I S I O N
of 24 August 2000

Case Number: T 0051/97 - 3.3.1

Application Number: 89122649.0

Publication Number: 0373525

IPC: C09B 67/48

Language of the proceedings: EN

Title of invention:

Crystalline form of a dye and a process for preparing the same

Patentee:

NIPPON KAYAKU KABUSHIKI KAISHA

Opponent:

DyStar Textilfarben GmbH & Co. Deutschland KG

Headword:

Crystalline dye/NIPPON

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (no) - foreseeable improvement of properties - obvious to try"

Decisions cited:

T 0249/88, T 0536/88, T 0800/91, T 1053/93, T 0068/95

Catchword:

-



Case Number: T 0051/97 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 24 August 2000

Appellant:
(Opponent)

DyStar Textilfarben GmbH & Co.
Deutschland KG
Patent-und Lizenzabteilung
Werk Hoechst/Gebäude D706
D-65926 Frankfurt am Main (DE)

Representative:

-

Respondent:
(Proprietor of the patent)

NIPPON KAYAKU KABUSHIKI KAISHA
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Representative:

Gille Hrabal Struck Neidlein Prop Roos
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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 7 November 1996
rejecting the opposition filed against European
patent No. 0 373 525 pursuant to Article 102(2)
EPC.

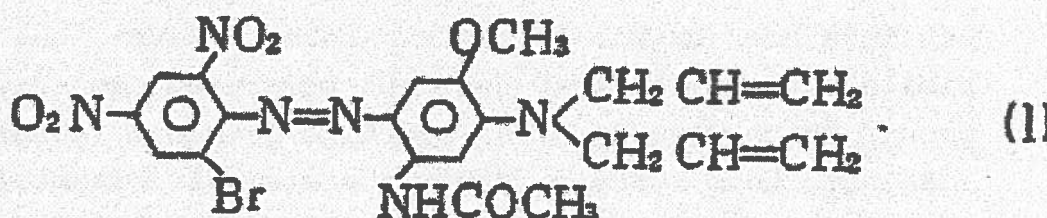
Composition of the Board:

Chairman: J. M. Jonk
Members: R. Freimuth
R. T. Menapace

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal on 15 January 1997 against the decision of the Opposition Division posted on 7 November 1996 rejecting the opposition against European patent No. 373 525 which was granted on the basis of ten claims, the independent claim 1 reading as follows:

"1. A crystalline form of the dye represented by the following formula (1):



characterized by an X-ray diffraction pattern having a strong peak at the angle of diffraction (2θ) of 23.2° and relatively strong peaks respectively at the angles of diffraction (2θ) of 8.3° , 12.3° , 20.8° , 21.9° , 25.0° , 27.1° , 29.2° and 30.8° according to X-ray powder diffractometry through the use of a Cu- K_α line."

II. Notice of Opposition had been filed by the Appellant requesting revocation of the patent as granted in its entirety for the sole ground of lack of inventive step. The following documents were submitted *inter alia* in opposition proceedings:

(6) EP-A-30 291

(18) Römpps Chemie-Lexikon, undated, keyword "Allyl".

III. The Opposition Division held that the subject-matter claimed involved an inventive step in the light of the state of the art. Starting from the closest prior art which was the azo dye of formula (1) in the form of its α -modification, the problem underlying the invention consisted in overcoming the dispersion instability at high temperatures of that known azo dye. The Opposition Division considered that problem to have been successfully solved by the claimed β -modification of the dye which was not contested by the parties. Furthermore it considered that it was known in the art that many azo dyes, including the structurally similar azo dye of document (6), showed a β -modification which was more heat stable than the α -form. However, the similar azo dye of that document comprised two allyl groups which were known as reactive from e.g. document (18) and, thus, were probably a source of instability of the dye. For that reason, the Opposition Division held that the person skilled in the art would not have expected the azo dye of formula (1) known in the form of its α -modification to be obtainable in the form of its β -modification showing improved heat stability and concluded that the prior art rather deterred the skilled person from looking at the β -modification for solving the problem underlying the patent in suit, namely to improve the heat stability. Therefore the state of the art addressed in opposition proceedings did not render obvious the subject-matter of the claimed invention.

IV. The Appellant started from the α -modification of the azo dye of formula (1) as closest prior art which was known from the document JP-A-49-13 479 acknowledged in the specification of the patent in suit on page 2, lines 7 to 19. He maintained that document (6) gave a clear incentive to prepare the β -modification of the known azo dye for improving its dispersing stability at high temperature since that document was directed to

achieve that aim by providing an azo dye having a very similar chemical structure in the form of its β -modification. He disagreed with the finding in the decision under appeal that the allyl groups contained in the dye of formula (1) were a source of instability due to their chemical reactivity since the chemical reactions addressed in document (18) were irrelevant in dyestuff chemistry and submitted that dyes containing allyl groups, nonetheless, were chemically stable at high temperatures. The Appellant argued in particular that the stability of the dispersed state of the azo dye was at issue and that this was a matter different to any chemical reactivity thereof. Therefore there was no teaching in the art deterring the skilled person from following the avenue indicated by document (6) with a reasonable expectation of success thereby arriving without inventive ingenuity at the claimed invention.

- V. The Respondent also considered the known α -modification of the azo dye of formula (1) as the closest prior art and as the starting point for the assessment of inventive step. The problem underlying the invention was to improve the dispersion stability at high temperatures of the known dye. Numerous azo dyes, including that of document (6), were known to exist in the form of different modifications; however, their existence was not a general principle valid for any azo dye. Though document (6) taught to transform the azo dye disclosed therein from the α - into the β -modification in order to improve its dispersion stability, that dye was not structurally close enough to the known azo dye of formula (1) to contemplate applying that teaching to the latter dye and predicting the same result. The allyl groups in the azo dye of formula (1) were chemically reactive, thereby creating uncertainty as to the achievable result. Thus, it was unclear for the person skilled in the art in the sense

that the skilled person could not predict with certainty whether or not different modifications of the known dye existed, whether or not the β -modification of the known dye could successfully be prepared and whether or not the β -modification showed improved dispersion stability. To conclude, for those reasons the state of the art cited did not render obvious the claimed β -modification of the known azo dye for solving the problem underlying the invention.

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

The Respondent requested that the appeal be dismissed and the patent be maintained unamended.

- VII. Oral proceedings were held on 24 August 2000. At the end of the oral proceedings the decision of the Board was given orally.

Reasons for the Decision

1. The appeal is admissible.

2. *Inventive step*

- 2.1 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures assessing inventive step on an objective basis and avoids an *ex post facto* analysis.

2.2 Claim 1 of the patent in suit is directed to the azo dye of formula (1) in the form of its β -modification. The document JP-A-49-13 479 which is cited and acknowledged in the specification of the patent in suit on page 2, lines 7 to 19 as the closest prior art, refers to the same azo dye of formula (1), however, in the form of its α -modification. That document, though having not been expressly addressed in the notice of opposition, nevertheless forms part of the opposition appeal proceedings since any document indicated in a contested patent as closest prior art is automatically admitted thereto (see decision T 536/88, OJ EPO 1992, 638, point 2.1 of the reasons). Where the patent in suit has indicated a particular piece of prior art as being closest to the claimed invention and the starting point for determining the problem underlying the patent in suit, then the Board should adopt this as the starting point for the purpose of a problem-solution analysis unless it turns out that there is closer state of the art of greater technical relevance (see e.g. decisions T 800/91, point 6 of the reasons; T 68/95, point 5.1 of the reasons).

Thus, the Board considers, in agreement with the Appellant, the Respondent and the decision under appeal, that in the present case the α -modification of that azo dye of formula (1) disclosed in the document specified above represents the closest state of the art and, hence, takes it as the starting point when assessing inventive step.

2.3 As indicated in the specification of the patent in suit, the technical problem underlying the claimed invention consists in improving the dispersion stability at high temperatures of the known α -modification of the azo dye of formula (1).

- 2.4 As solution to this problem the patent in suit suggests the β -modification of the azo dye of formula (1) as defined in claim 1.
- 2.5 The specification of the patent in suit demonstrates in Table 1 on page 5 that the claimed β -modification of the azo dye of formula (1) achieves an improved dispersion stability at high temperatures. That table specifies the experimental results in the heat agglomeration test of the dispersion of that dye, in the form of the claimed β -modification, on the one hand, and in the form of the known α -modification, on the other. Therefore, the comparison of the experimental results for both modifications indicated in Table 1 truly reflects the achievement of the solution proposed by the claimed invention over the closest prior art. The β -modification of the azo dye according to the invention shows in that test the best of five ranks, i.e. the 5th grade (excellent); the comparative α -modification of the same azo dye known from the closest prior art, however, shows under the same test conditions a significantly inferior rank, i.e. the 3rd grade. The Respondent has provided additional evidence of those test results by producing in opposition proceedings on 20 May 1995 the samples of that heat agglomeration test. Therefore, the experimental results presented demonstrate the improvement in dispersion stability at high temperatures of the claimed β -modification compared to the known α -modification.

For these reasons, the Board is satisfied that the problem underlying the patent in suit vis-à-vis the closest prior art has been successfully solved. This finding has not been challenged by the Appellant.

The Respondent also addressed his test report submitted on 4 September 1996 in opposition proceedings allegedly showing improved dyeing properties of the claimed azo dye of formula (1) compared to that of document (6). As that document does not represent the closest prior art in the present case (cf. point 2.2 above), any purported superiority of the claimed invention over document (6) is thus irrelevant in the assessment of inventive step and cannot be taken into account by the Board.

- 2.6 Finally, it remains to be decided whether or not the proposed solution to the problem underlying the patent in suit is obvious in view of the state of the art.

When starting from the known α -modification of the azo dye of formula (1), it is a matter of course that the person skilled in the art seeking to improve the dispersion stability at high temperatures thereof would turn his attention to that prior art in the field of azo dyes just dealing with the same technical problem. As a skilled person, he would be struck by document (6) which aims at improving the dispersion stability at high temperatures of the α -modification of a particular azo dye (page 2, lines 1 to 6). Moreover, he would take that document into consideration since it is particularly relevant for the reason that it is directed to an azo dye having the formula (1) of the claimed dye apart from the exclusive structural difference of substituting the allyl for the ethyl groups on the amino substituent. Document (6) teaches to transform the α -modification of that particular azo dye into the β -modification thereof for improving its dispersion stability at high temperatures (page 2, lines 8 to 14; page 4, lines 19 to 24). The dispersion stable β -modification of that particular azo dye is prepared by heating the α -modification thereof dispersed in water (page 2, lines 16 to 24).

Furthermore, the Respondent conceded that numerous azo dyes exist in different modifications and that therefore the teaching of document (6) is embedded and not unique in the field of azo dyes.

The Board concludes from the above that the state of the art, in particular document (6), gives the person skilled in the art a concrete hint as to how to solve the problem underlying the patent in suit as defined in point 2.3 above, namely by transforming the α -modification of the azo dye of formula (1) known from the closest prior art document (cf. point 2.2 above) into the β -modification thereof, thereby arriving at the solution proposed by the patent in suit. In the Board's judgement, it was obvious to try to follow the avenue indicated in the state of the art with a reasonable expectation of success without involving any inventive ingenuity.

- 2.7 For the following reasons the Board cannot accept the Respondent's arguments designed for supporting inventive step.
- 2.7.1 The Respondent submitted that for the person skilled in the art the azo dye of document (6) was not structurally close enough to the azo dye of formula (1) known from the closest prior art to contemplate applying the teaching of that document to the latter azo dye.

However, document (6) is directed to a particular azo dye having the same chemical structure of formula (1) as the azo dye known from the closest prior art apart from substituting ethyl groups for the allyl groups on the amino substituent in that formula. Thus, a mere single structural variation exists between the azo dye of document (6) and that of formula (1) known from the closest prior art. Moreover, in the light of the fact

that numerous other azo dyes exist in different modifications, the character of that structural variation is considered by the Board to be insignificant with respect to variation of the morphology since the ethyl and the allyl group are both small aliphatic groups. For those reasons, the alleged lack of structural closeness of the azo dye of document (6) and that of formula (1), on which the Respondent's argument was based, is not supported by the facts.

Therefore, in the Board's judgement, the person skilled in the art is not diverted from translating but rather encouraged to translate the teaching of document (6) to the known α -modification of the azo dye of formula (1), thus arriving at the β -modification of that dye according to the claimed invention without involving any inventive activity.

2.7.2 The Respondent argued furthermore that the allyl groups in the azo dye of formula (1) according to the closest prior art were chemically reactive, thereby creating uncertainty as to the achievable result when applying the teaching of document (6) on that azo dye of formula (1), i.e. when transforming the α - into the β -modification thereof. He solely indicated the polymerization of the allyl groups as a possible chemical reaction.

However, the teaching of document (6) is directed to a variation of the morphology of the azo dye, not to any chemical reaction thereof. The process taught in that document for achieving the variation of morphology, i.e. for transforming the α -modification of the particular azo dye into the β -modification thereof, consists in the sole process feature of heating up an aqueous dispersion of that α -modification for some hours.

The azo dye of formula (1) comprising allyl groups is known from the closest prior art to be used in a process for dyeing synthetic fibers (specification of the patent in suit page 2, lines 18 and 19). When heating the dye bath at high temperatures, the dispersed state of that azo dye in the aqueous dispersion is destroyed without decomposition of the dye itself (cf. specification of the patent in suit page 2, lines 26 to 29; Respondent's letter dated 11 September 1997, page 2, last paragraph to page 3, first paragraph), i.e. without reporting any chemical reaction of the allyl groups thereof. Thus, when applying the teaching of document (6) on the known α -modification of the azo dye of formula (1) by heating an aqueous dispersion thereof for some hours to transform it into the β -modification, there is no reason for the skilled person to suspect any chemical reaction of the allyl groups in that azo dye deterring him from doing so.

Additionally, the Respondent remains vague and indistinct about the deterring chemical reaction which he alleges to be suspected by the skilled person when merely heating an aqueous dispersion of the azo dye of formula (1) comprising allyl groups. A polymerisation of those allyl groups mentioned by the Respondent in this respect as a possible chemical reaction and generally addressed in document (18), however, is discarded in the present case by the person skilled in the art simply for lack of an initiator necessary for any polymerisation thereof, as submitted by the Appellant. Thus, in the absence of any corroborating evidence the Respondent's allegation is speculative and does not convince the Board.

For those reasons, the person skilled in the art is not deterred from applying the teaching of document (6) on the α -modification of the azo dye of formula (1) known from the closest prior art in order to solve the problem underlying the patent in suit.

- 2.7.3 The Respondent also argued that the person skilled in the art could predict with certainty neither the existence of different modifications of the azo dye of formula (1), nor the successful preparation of the β -modification thereof, nor its improved dispersion stability. Due to that lack of predictability of success and the possibility of failure, the claimed invention was not obvious.

However, when assessing inventive step it is not necessary to establish that the success of an envisaged solution of a technical problem was predictable with certainty. In order to render a solution obvious it is sufficient to establish that the skilled person would have followed the teaching of the prior art with a reasonable expectation of success (see decisions T 249/88, point 8 of the reasons; T 1053/93, point 5.14 of the reasons; neither published in OJ EPO).

In the present case, the Board cannot agree with the Respondent's argument that due to some uncertainty about the predictability of success the skilled person would not have contemplated transforming the known α -modification of the azo dye of formula (1) into the β -modification thereof in order to improve the dispersion stability at high temperatures. The skilled person has a clear incentive from document (6) to do so (see point 2.6 above). Nothing was submitted by the Respondent from which the Board could reasonably conclude that the skilled person has been deterred from following the straight teaching of the art. It was only necessary for him to confirm experimentally by routine

work that the obvious β -modification of the azo dye of formula (1) is in fact obtained and that it successfully shows an improved dispersion stability, thus arriving at the claimed invention without inventive ingenuity.

- 2.8 Therefore, in the Board's judgement, the subject-matter of claim 1 represents an obvious solution to the problem underlying the patent in suit and does not involve an inventive step.

Since a decision can only be taken on a request as a whole, none of the further claims need to be examined.

3. As a result, the Respondent's request is not allowable as the subject-matter of claim 1 lacks inventive step pursuant to Article 56 EPC.

Order

For these reasons it is decided that:

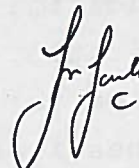
1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:



N. Maslin

The Chairman:



J. M. Jonk