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# Datasheet for the decision of 11 June 2021

**Case Number:** T 1733/18 - 3.3.03

**Application Number:** 10820690.5

**Publication Number:** 2484702

**IPC:** C08F20/06, C08F2/00, C08F6/12

**Language of the proceedings:** EN

**Title of invention:**
POLYACRYLIC ACID SALT-BASED WATER ABSORBENT RESIN AND METHOD FOR PRODUCING SAME

**Patent Proprietor:**
Nippon Shokubai Co., Ltd.

**Opponent:**
Evonik Operations GmbH

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

**Keyword:**
Inventive step - unexpected improvement shown

**Decisions cited:**
T 0824/05

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**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

**Case Number: T 1733/18 - 3.3.03**

# DECISION
## of Technical Board of Appeal 3.3.03
## of 11 June 2021

| | |
|---|---|
| **Appellant:**<br>(Opponent) | Evonik Operations GmbH<br>45116 Essen (DE) |
| **Respondent:**<br>(Patent Proprietor) | Nippon Shokubai Co., Ltd.<br>4-1-1, Koraibashi 4-chome<br>Chuo-ku<br>Osaka-shi, Osaka 541-0043 (JP) |
| **Representative:** | Schön, Christoph<br>Dr. Schön, Neymeyr & Partner mbB<br>Bavariaring 26<br>80336 München (DE) |
| **Decision under appeal:** | **Interlocutory decision of the Opposition Division of the European Patent Office posted on 3 May 2018 concerning maintenance of the European Patent No. 2484702 in amended form.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | D. Semino |
| **Members:** | F. Rousseau |
| | A. Bacchin |

## Summary of Facts and Submissions

I. The appeal lies from the interlocutory decision of the opposition division posted on 3 Mai 2018 according to which European patent No. 2 484 702 as amended according to the first auxiliary request filed during the oral proceedings on 1 March 2018 and a description adapted thereto met the requirements of the EPC. The contested decision was also based on the patent as granted as the main request.

II. Claims 1, 7 and 15 of the granted patent read as follows:

"1. A polyacrylic acid (salt)-based water absorbent resin comprising formic acid in an amount of 1 to 500 ppm, wherein when the water absorbent resin has a cationic polymer content of 0.01 to 5 parts by mass, in 100 parts by mass of a polymer, the water absorbent resin has an iron content of not higher than 2 ppm and a formic acid content of 1 to 50,000 ppm.

7. A method for producing a polyacrylic acid (salt)-based water absorbent resin, sequentially comprising the steps of:
storing or producing acrylic acid;
mixing acrylic acid containing a polymerization inhibitor with water, a crosslinking agent, and optionally, a basic composition, and/or neutralizing them, to prepare an aqueous monomer solution;
polymerizing the aqueous monomer solution;
drying a water-containing gel-like crosslinked polymer thus obtained; and
optionally carrying out surface crosslinking,

wherein the acrylic acid containing the polymerization inhibitor has a water content of not higher than 1,000 ppm (by mass, the same applies hereinafter), and/or the aqueous monomer solution has a formic acid content of 1 to 700 ppm, relative to the monomer, and/or the following conditions (1) to (3) are satisfied:
(1) the basic composition has an iron content of 0.007 to 7 ppm;
(2) 0.01 to 5 parts by mass of a cationic polymer is mixed in the polymer, relative to 100 parts by mass of the polymer, after the drying step; and
(3) 0.0001 to 5 parts by mass of formic acid is allowed to be present and/or mixed in the monomer at the time of polymerization and/or the polymer after the polymerization, relative to 100 parts by mass of the monomer at the time of polymerization and/or the polymer after the polymerization, and wherein the monomer at the time of polymerization has a formic acid content of 0 to 700 ppm, relative to the monomer.

15. Use of acrylic acid in polymerization for water absorbent resins, the acrylic acid comprising 10 to 160 ppm of p-methoxyphenol as a polymerization inhibitor and having a water content of not higher than 1,000 ppm and/or a formic acid content of 0.5 to 700 ppm."

Claims 2 to 6 and claims 8 to 14 were dependent claims of claim 1 and claim 7, respectively.

III. The decision was taken having regard to the following documentary evidence amongst others:

D9: WO 2008/090961 A1 in Japanese language
D9a: EP 2 112 172 A1
D14: EP 1 535 894 A1
D17: EP 1 125 912 A2

D18: Ullmann's Encyclopedia of industrial chemistry, Vol. 35, pages 213 to 232: Superabsorbents, published online in 2012.

IV. According to the reasons for the contested decision which are pertinent in the appeal proceedings:

(a) Late filed document D18 was not prima facie relevant as it dit not contain more information than document D14 already on file concerning the importance of using acrylic acid of high purity to provide good polymer properties and the presence of ca. 200 ppm of monomethyl ether of hydroquinone as inhibitor in said monomer. D18 was therefore not admitted into the proceedings.

(b) On the contrary, late filed document D17 was admitted into the proceedings as it at least clarified that neither the amount of water nor the amount of formic acid would be higher than 360 ppm in highly pure acrylic acid.

(c) Sufficiency of disclosure and novelty were acknowledged.

(d) The embodiment of claim 1 concerning the absorbent resin comprising 1 to 500 ppm formic acid (referred to as alternative 1 of that claim) involved an inventive step over D9 representing the closest prior art. The resin of alternative 1 differed from the closest prior art in that it comprised 1 to 500 pm of formic acid. Having regard to Examples 2-1 to 2-3 and comparative example 2-1 said alternative 1 solved the problem of improving the resistance of water-absorbing resin to colour over time. This was not suggested by the available prior art. The embodiment of claim 1 concerning the absorbent resin comprising a cationic polymer (referred to as alternative 2 of that claim) also involved an inventive step.

(e) The embodiment of claim 7 concerning the method for producing an absorbent resin in which the acrylic acid contained a polymerization inhibitor and water in an amount not higher than 1000 ppm (referred to as alternative 1 of that claim) was distinguished from the closest prior represented by Example 4 of D9 by said content of water which, as shown by the data presented in Table 1 of the specification, resulted in a lower ΔL and a lower Δb value. Since neither D9 nor D14 indicated that the content of water defined for alternative 1 gave rise to such an effect, the method in accordance with alternative 1 of claim 7 involved an inventive step.

(f) The embodiment of claim 7 concerning the method for producing an absorbent resin in which the aqueous monomer solution had a formic acid content of 1 to 700 ppm, relative to the monomer (referred to as alternative 2) was the process for the preparation of an absorbent resin according to alternative 1 of claim 1. Since the absorbent resin according to alternative 1 of claim 1 involved an inventive step as such, the process for its preparation defined with alternative 2 of claim 7 also involved an inventive step for the same reasons.

(g) The additional and third alternative defined in claim 7 was the process for the preparation of an absorbent resin according to alternative 2 of claim 1. As the absorbent resin of alternative 2 of claim

1 involved an inventive step, the process for its preparation defined in the third alternative of claim 7 was also inventive for the same reasons.

(h) The use in accordance with claim 15 did not involve an inventive step both considering Example 4 of D9 and regarding document D17 as closest prior art. D17 could be taken as the closest prior art, as its Example 2 disclosed acrylic acid having a water content and a formic acid content of not more than 360 ppm taken together, paragraphs [0041] and [0002] of D17 furthermore describing the use of p-methoxyphenol as polymerization inhibitor and that of acrylic acid for preparing polymers, respectively. For this reason the main request was not allowable.

(i) The first auxiliary request consisted of claims 1 - 14 of the patent as granted which as shown for the main request fulfilled the requirements of the EPC.

V. An appeal against that decision was lodged by the opponent (appellant).

VI. After issuance of the summons to oral proceedings sent with letter of 8 June 2020 the appellant informed the Board with letter of 16 June 2020 that they would not be represented at the oral proceedings.

VII. In preparation of oral proceedings the Board issued a communication pursuant to Article 15(1) RPBA 2020 dated 23 February 2021. It conveyed the Board's preliminary opinion according to which the appellant's inventive step objections failed to convinced. Oral proceedings took place on 11 June 2021 in the absence of the appellant (Rule 115(2) EPC).

VIII. The appellant's submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

(a) Alternative 1 of claim 1 lacked an inventive step starting either from Example 2 of D17 or Example 1 of D9 as the closest prior art.

(b) Alternative 2 of claim 7 lacked an inventive step starting from Example 1 of D9 as the closest prior art.

(c) Alternative 1 of claim 7 lacked an inventive step starting from Example 2 of D17 as the closest prior art.

IX. The submissions of the patent proprietor (respondent), in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

(a) D17 did not represent the closest prior art.

(b) Both alternative 1 of claim 1 and alternative 2 of claim 7 involved an inventive step starting from Example 1 of D9 as the closest prior art.

X. The appellant requested that the decision of the opposition division be set aside and the patent be revoked. It was furthermore requested that D18 be admitted into the proceedings.

XI. The respondent requested that the appeal be dismissed. It also requested that document D18 be not admitted into the proceedings.

## Reasons for the Decision

1. The decision was taken in the absence of the duly summoned appellant, who indicated that they would not attend oral proceedings. In accordance with Article 15(3) RPBA 2020 and Rule 115(2) EPC the appellant was treated as relying on its written case. The appellant did neither react to the reply to the statement of grounds of appeal, nor to the board's preliminary opinion. The principle of the right to be heard under Article 113(1) EPC was observed and account was given to the impugned decision and all arguments and evidence submitted by the parties.

2. The sole substantive issues in dispute concern inventive step objections directed against parts of the subject-matter defined in claims 1 and 7 of the auxiliary request underlying the contested decision. Those have been identified by the appellant as alternative 1 of claim 1, alternative 2 of claim 7 and alternative 1 of claim 7.

*Alternative 1 of claim 1 - objection relying on Example 2 of D17 as the closest prior art*

3. The part of claim 1 referred to as alternative 1 by the appellant is directed to a polyacrylic acid (salt)-based water absorbent resin comprising formic acid in an amount of 1 to 500 ppm wherein the resin does not comprise a cationic polymer in a range from 0.01 to 5 parts by mass per 100 parts by mass of a polymer.

4. Whereas the respondent is of the opinion that the absorbent resin disclosed in Production Example 1 of D9 constitutes the closest prior art for analysing

inventive step of the subject-matter of claim 1, which corresponds to the position of the opposition division in point 12.1.1 of the Reasons for the contested decision apart from the fact that Production Example 1 was not specified, the appellant is of the opinion that the closest prior art can additionally be represented by the absorbent resin disclosed in Example 2 of D17.

4.1 According to the case law (Case Law of the boards of Appeal, 9th edition 2019, I.D.3.2) ideally the closest prior art should be a document that mentions the purpose or objective indicated in the patent in suit as a goal worth achieving. The aim thereof is that the assessment process should start from a situation as close as possible in reality to that encountered by the inventor, avoiding *ex post facto* considerations. Therefore a document not mentioning a technical problem that is at least related to that derivable from the patent specification does not normally qualify as the closest state of the art on the basis of which an inventive step is to be assessed, regardless of the number of technical features it may have in common with the subject-matter of the patent (see Case Law, supra, I.D.3.3, in particular T 686/91).

4.2 Having regard to paragraphs [0004] to [0011] of the specification of the patent in suit describing the background art of the claimed invention, paragraph [0014] describing the problem to be solved by the invention and paragraphs [0016] to [0017] describing the means for solving said problem, it is undisputed that the focus of the present invention is on the provision of polyacrylic acid(salt) based water absorbent resins remaining white over time, i.e. water absorbent resins which do not turn yellow during storage and shipment.

4.3 D17, whose disclosure in its Example 2 is proposed by the appellant as the closest prior art, concerns methods for purifying acrylic acid (claims 1, 5 to 7, 10, 13 and 15), as well as the purified acrylic acid obtainable by said methods. Although acrylic acid is indicated in paragraph [0002] of D17 to be a compound easily polymerized and known as raw material for commercial products, D17 does not describe even implicitly the production of absorbent resins based on the purified acrylic acid obtainable by the methods described in D17, let alone their ability to resist to yellowing. D17 is only concerned with improving the separation method used to retrieve pure acrylic acid from the acrylic-containing gas obtained during its production which separation method includes the step of bringing the produced acrylic acid into contact with a high boiling inert solvent and the step of separating the acrylic acid from said solvent (see paragraph [0013] and claims 1, 5 to 7, 10, 13 and 15). There is also no reason to consider that the mere provision of an extremely pure acrylic acid would be generally known to be sufficient to prevent yellowing of a water absorbent polymer produced therewith so as to suggest that D17 would constitute a promising starting point for the present invention.

4.4 Accordingly, D17 does not represent a realistic starting point for the skilled person who aims at solving the problem mentioned in the patent in suit. The choice of D17 as the closest prior art which relies only on the similarity of structural features of D17 with operative claim 1, i.e. only on elements of the claimed solution, lacks the objectivity required for assessing inventive step.

4.5 The sole reason advanced by the appellant as to why Example 2 of D17 could constitute a suitable starting point for assessing inventive step of alternative 1 of claim 1 is that it was considered by the opposition division as the closest prior art for the use in accordance with claim 15 of the main request underlying the contested decision, i.e. claim 15 of the granted patent. The Board observes that claim 15 of the granted patent concerns the use of acrylic acid in polymerization for water absorbent resins, which kind of polymerization process is not addressed in D17 as mentioned above. The contested decision does not provide any reason as to why D17 would constitute a suitable starting point for assessing inventive step of the particular use defined in claim 15. The mere indication by the appellant that D17 was considered by the opposition division as a suitable starting point for assessing inventive step of claim 15 is therefore not sufficient to arrive at the conclusion that D17 is also the closest prior art in relation to alternative 1 of present claim 1.

5. Therefore, the appellant's objection based on D17 as starting point for assessing inventive step is based on hindsight knowledge of the present invention and therefore cannot convince.

*Alternative 1 of claim 1 - objection relying on Production Example 1 of D9 as the closest prior art*

6. D9 is the publication in the Japanese language of a Euro-PCT application whose translation in English in accordance with Article 153(4) EPC is D9a. In the following the passages of D9 cited refer to the corresponding passages in D9a. It is a matter of consensus that the polyacrylic acid salt-based water

absorbent resin described in Production Example 1 of D9 represents a suitable starting point for assessing inventive step of alternative 1 of claim 1, as it is also concerned with the problem of producing water absorbent resins having improved long-term color stability (paragraphs [0012], [0013], [0141] to [0143], Table 1, page 22). The Board having no reason for a different opinion takes therefore the water-absorbent resin described in Production Example 1 of D9 as the starting point for analysing inventive step of alternative 1 of present claim 1.

The parties also agree that the sole feature distinguishing the product in accordance with alternative 1 of claim 1 from the closest prior art is that the water absorbent resin comprises formic acid in an amount of 1 to 500 ppm.

*Problem successfully solved*

7. The appellant and the respondent take differing positions as to which problem can be considered to be successfully solved by alternative 1 of operative claim 1 vis-à-vis the closest prior art. The appellant argues that the problem solved over the closest prior art would be the provision of an alternative (statement of grounds of appeal, page 10, 5th paragraph), whereas the respondent formulates the technical problem solved over the closest prior art as the provision of a particulate polyacrylic acid (salt)-based water-absorbent resin for absorbers which has excellent coloring prevention performance over time (rejoinder to the statement of grounds of appeal, page 5, second paragraph).

7.1 Considering that the problem to be defined is that solved over or in comparison with the closest prior art, it is questionable whether the formulation of the problem submitted by the respondent, seemingly defined in absolute terms for the coloring prevention performance over time, i.e. without reference to the corresponding property obtained in the closest prior art, and on the vague term "excellent", provides the basis for an objective comparison with the closest prior art as required for an assessment of inventive step. The question to be answered is rather whether any technical benefit or improvement in respect of the properties addressed by the respondent is achieved in comparison to the closest prior art.

7.2 The respondent in its written submissions relies on the experimental results summarized in Table 3 on page 43 of the specification, reference being made to Examples 2-1 to 2-3 and 2-5 and Comparative Example 2-1. It was not disputed that the absorbent resin described in the latter is representative of that of Example 1 of D9 constitutive of the closest prior art.

7.3 Examples 2-1 to 2-3 and 2-5 and Comparative Example 2-1 concern in particular a long-term storage color stability accelerating test carried out for various polyacrylic acid salt based water absorbent resins comprising either no formic acid in Comparative Example 2-1 or amounts of formic acid ranging from 5 to 346 ppm in Examples 2-1 to 2-3 and 2-5. It is undisputed that the absorbents of Comparative Example 2-1 and Examples 2-1 to 2-3 were apart from varying the amount of formic acid prepared in an identical manner (paragraphs [0306] to [0314]) before measuring coloring over time. It is uncontested that the test whose results are shown in Table 3 on page 43 convincingly shows that in the context of the absorbent resin of Comparative Example 2-1 representative of the closest prior art the addition of formic acid in an amount of 6 ppm (Example 2-1), 67 ppm (Example 2-2) and 346 ppm (Example 2-3) brings about higher whiteness after storage in an accelerated test (paragraph [00278] and [0279]), i.e. higher resistance to colouring upon storage.

7.4 More particularly, the presence of 346 ppm of formic acid in the tested polyacrylic acid (salt)-based water-absorbent resin provides in comparison to the absence thereof a noticeable increase of the L value from 63 to 67, an increase of the L value to 66 being already obtained in the presence of 6 ppm of formic acid, while a L value of 68 is obtained with 67 ppm of formic acid. There is no reason based on an extrapolation of these results to consider that an improved colour stability on storage is not obtained over the whole range of concentration of formic acid defined in operative claim 1. The appellant's argument that no data were provided for an amount of formic acid of 500 ppm in accordance with the upper limit defined in claim 1 (statement of grounds of appeal, page 7, last paragraph) cannot question the validity of that extrapolation. The mere fact that no value was submitted for a compound comprising 500 ppm of formic acid is not sufficient to cast doubt on the achievement of the alleged effect over the whole scope claimed. When an effect is used for the purpose of demonstrating an inventive step, there is no obligation for the proprietor to provide data for the end points of that range, but rather to render credible that the range selected can be associated with said alleged effect, which in view of an extrapolation of the experimental results available, i.e. those of the patent in suit, is presently the case. The appellant argument that the upper limit for the amount of formic acid is arbitrary is therefore not convincing.

7.5 Concerning Example 2-5, the test performed in that example differs from Comparative Example 2-1 in that, in addition to the presence of 5 ppm of formic acid in the polyacrylic acid (salt)-based water-absorbent resin, an acrylic acid derived from plants rather than from petroleum was used for preparing the absorbent. As it is unknown whether the acrylic acid used in that example has the same degree of purity as that of the acrylic acid of petroleum origin used in Comparative Example 2-1, a comparison between Example 2-5 and Comparative Example 2-1 as done by the respondent cannot demonstrate any advantage in term of colour stability arising from the use of formic acid.

7.6 While the appellant argues that a comparison between Example 2-4 and Comparative Example 2-1 shows that the addition of formic acid does not lead to any improvement in term of colour stability on storage, the respondent argues that this comparison is not justified because in Example 2-4 formic acid was added to a water-absorbent resin, but not to a starting acrylic acid monomer. The respondent's argument is not pertinent as operative claim 1 only requires the presence of formic acid in the absorbent irrespective of the process step leading to its presence in the claimed resin. However, neither is the appellant's argument pertinent as the comparison offered is not suitable to demonstrate the influence of the formic acid on the properties of the resin, because the tests described in Comparative Example 2-1 and Example 2-4 do not only differ by the additional use of formic acid. More specifically, the preparation of the absorbent resin in Example 2-4 includes in addition the measures already employed in Comparative Example 2-1 not only the addition of formic acid, but also a treatment with ethylene carbonate, followed by an additional treatment with aluminum sulfate 14-18 hydrate and sodium lactate. In the absence of any indication of the effect of these additional process steps on the colour behaviour of the absorbent, no conclusion can be drawn from a comparison between Comparative Example 2-1 and Example 2-4 on the effect of formic acid, in the amount defined in claim 1, on the color behaviour of the absorbent resin under storage.

7.7 The respondent's argument that the coloring over time values of Example 2-4 should be in fact compared with those of Comparative Example 2-2, because in said Comparative Example 2-2 formic acid was not added to the water absorbent resin fails also to convince for the same reasons, as the absorbent resin prepared in Comparative Example 2-2 (paragraphs [0317] and 0318) is also not prepared with the additional treatment steps mentioned in the preceding paragraph.

7.8 The argument by the appellant that Examples 3-1 and 3-2 which have been cited by the opposition division as showing "an effect on the b-value of the coloring over time" were not relevant for assessing inventive step of the alternative 1 because these experiments concern resin containing a cationic polymer was not disputed by the respondent. In the absence of any argument based on these experimental data by the respondent, the Board has no reason to consider that these test results are pertinent to elucidate the influence of the formic acid on the properties of the resin in accordance with alternative 1.

7.9 Summing up, having regard to the above finding in respect of the comparison between Comparative Example 2-1 and Examples 2-1 to 2-3 of the patent in suit, and to the fact that the additional comparisons offered by the parties cannot invalidate said finding, the problem successfully solved over the closest prior art by alternative 1 of claim 1 is to be formulated as the provision of a particulate polyacrylic acid (salt)-based water-absorbent resin for absorbers which has improved coloring prevention performance over time.

*Obviousness of the solution*

8. It remains to be decided whether the skilled person desiring to solve the problem identified above would, in view of the disclosure of D9, possibly in combination with other prior art documents or with common general knowledge, have modified the water-absorbent resin of Example 1 of D9 in such a way as to arrive at alternative 1 of operative claim 1. The finding of the opposition division in section 12.1.1 of the contested decision according to which the available prior art did not suggest that the resistance of water-absorbing resin to colour over time could be improved by using 1 to 500 ppm formic acid was not contested by the appellant. The Board has no reason to have a different opinion. It was also not argued that D18 whose admittance has been requested (see point 17. below) would suggest that such improvement can be brought about by formic acid, so that there is no need to analyse this document in this respect.

9. It is therefore concluded that alternative 1 of claim 1 involves an inventive step within the meaning of Article 56 EPC.

*Alternative 2 of claim 7 - objection relying on Example 1 of D9 as the closest prior art*

10. The embodiment of claim 7 which is referred to as alternative 2 by the appellant has been formulated at the top of page 13 of the statement of grounds of appeal as a method for producing a polyacrylic acid (salt)-based water absorbent resin, sequentially comprising the steps of:

storing or producing acrylic acid;

mixing acrylic acid containing a polymerization inhibitor with water and a crosslinking agent to prepare an aqueous monomer solution;

polymerizing the aqueous monomer solution;

drying a water-containing gel-like crosslinked polymer thus obtained; and

wherein the acrylic acid containing the polymerisation inhibitor has a formic acid content of 1 to 700 ppm, relative to the monomer.

It was not disputed by the respondent that said alternative 2 is an embodiment of claim 7 and the Board has no reason to have a different view.

*Closest prior art*

11. The appellant in agreement with the respondent's submissions argues that the closest prior art for the method in accordance with alternative 2 of operative claim 7 is the production Example 1 of D9 from which the method of alternative 2 differs by the presence in

the acrylic acid containing the polymerisation inhibitor of 1 to 700 ppm formic acid relative to the monomer. The Board has no reason to have a different opinion.

*Problem successfully solved*

12. The appellant is of the opinion that for the same reasons as provided in relation to alternative 1 of claim 1, no plausible correlation between the formic acid content and colour stability has been demonstrated. This would be all the more true for alternative 2 of claim 7, as only Examples 2-1, 2-2 and 2-5 would be example of said alternative, while Example 2-4 and Comparative Example 2-2 would not be in accordance with alternative 2. In addition, the upper limit of 700 ppm would be even further away from the maximum amount of 100 ppm used in Example 2-2. The appellant argued therefore that the achievement of an improved colour stability would be even less credible for the method of alternative 2 than for the product of alternative 1 of claim 1. Accordingly, the objective technical problem solved over the closest prior art would be the mere provision of a further process. In contrast, the respondent is of the opinion that the problem successfully solved over the closest prior art should be formulated in the same manner as for alternative 1 of claim 1 based on the experimental results shown in Table 3 of the specification and the arguments also submitted in relation to alternative 1 of claim 1.

12.1 The Board for the same reasons as provided in relation to alternative 1 of claim 1 concludes that the problem solved over the closest prior art by alternative 2 of claim 7 is the provision of a process leading to a particulate polyacrylic acid (salt)-based water-absorbent resin for absorbers which has improved coloring prevention performance over time. In particular, in view of Examples 2-1 to 2-3 and Comparative Example 2-1 of the specification which differ only in the amount of formic acid present in the monomer solution (no formic acid being used for Comparative Example 2-1), it is not only shown that an amount of formic acid in the monomer solution (relative to the monomer) of 10, 100 and 500 ppm results in an amount of formic acid in the resin of 6, 67 and 346 ppm, respectively (paragraphs [0307], [0311], [0312] and Table 3 on page 43), but also that an amount of formic acid in the monomer solution corresponding to three values within the range according to alternative 2 of claim 7 and the consequent amount in the obtained absorbent resin correlate with higher whiteness after storage in an accelerated test, i.e. higher resistance to colouring upon storage. It is therefore also credible based on an extrapolation of said experimental results that the problem of improving the colour stability of the absorbent resin on storage is successfully solved over the whole range of concentration of formic acid in the monomer solution defined for alternative 2 of claim 7.

*Obviousness of the solution*

13. As in relation to alternative 1 of operative claim 1, no reference was made to a prior art which would suggest that the presence of formic acid in the absorbent resin, let alone its introduction in the absorbent resin by having this compound present in the acrylic acid containing the polymerisation inhibitor in an amount of 1 to 700 ppm relative to the monomer, would improve the resistance of the water-absorbing

resin to colour over time. It is therefore concluded that alternative 2 of claim 7 also involves an inventive step.

*Alternative 1 of claim 7 - objection relying on Example 2 of D17 as the closest prior art*

14. The embodiment of claim 7 which is referred to as alternative 1 by the appellant has been defined at the bottom of page 15 of the statement of grounds of appeal as a method for producing a polyacrylic acid (salt)-based water absorbent resin, sequentially comprising the steps of:

storing or producing acrylic acid;

mixing acrylic acid containing a polymerization inhibitor with water and a crosslinking agent to prepare an aqueous monomer solution;

polymerizing the aqueous monomer solution;

drying a water-containing gel-like crosslinked polymer thus obtained;

wherein the acrylic acid containing the polymerization inhibitor has a water content of not higher than 1000 ppm relative to the monomer.

15. The assessment of inventive step made by the opposition division in relation to this alternative 1 starting from Example 4 of D9 as the closest prior art was not disputed by the appellant. The appellant, however, argues with reference T 0824/05 that acknowledging an inventive step starting from a first prior art, while denying the existence of an inventive step starting

from a second prior art means that said first prior art cannot be considered to represent the closest prior art.

16. While the Board acknowledges that the subject-matter of operative claim 1 should be inventive over any suitable starting point for assessing inventive step, it remains that D17 does not qualify as a possible starting point for assessing inventive step, as it does not concern even implicitly the production of absorbent resins, let alone their ability to resist to yellowing (see reasons provided above in relation to the inventive step assessment of alternative 1 of claim 1). This is also not in disagreement with T 0824/05 cited by the appellant in support of its submissions. In that case it was considered that at best the Board was faced with the situation of two alternative starting points equally suitable for the assessment of inventive step, but leading to different conclusions (point 6.2 of the reasons). This is not the situation here, as the Board considers that for the reasons given above D17 is not a suitable starting point. Indeed the question wether a prior art document qualifies as the closest prior art is not determined on the basis of whether it leads to the conclusion that an inventive step is missing, but, in order to avoid an inadmissible *ex post facto* analysis, on the basis of whether it qualifies first as a realistic and therefore suitable starting point for the skilled person faced with the problem mentioned in the patent in suit.

17. On that basis the appellant's objection against alternative 1 of claim 7 which starts from Example 2 of D17 cannot succeed either as it is based on an inadmissible *ex post facto* analysis.

*Admissibility of D18*

18. As shown above, the teaching of D18 was of no relevance for deciding on the objections raised by the appellant. There was therefore no need to decide whether or not admitting this document into the procedure.

## Order

## For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

Beschwerdekammern des Europäischen Patentamts ✦ Boards of Appeal of the European Patent Office ✦ Chambres de recours de l'Office européen des brevets

B. ter Heijden D. Semino

Decision electronically authenticated