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Datasheet for the decision of 28 January 2016

Case Number: T 0233/13 - 3.3.09

Application Number: 98919817.1

Publication Number: 0979250

IPC: C08J3/12

Language of the proceedings: EN

Title of invention:
SUPERABSORBENT POLYMERS HAVING IMPROVED PROCESSABILITY

Patent Proprietor:
Evonik Degussa GmbH

Opponents:
Nippon Shokubai Company Limited
BASF SE
Stockhausen GmbH (Opposition withdrawn by letter dated 19 October 2006)

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Main request and auxiliary request 1 - novelty (no)
Auxiliary requests 2 to 5 - inventive step (no)

Decisions cited:

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It can be changed at any time and without notice.

Catchword:

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European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0233/13 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 28 January 2016

Appellant: (Patent Proprietor)	Evonik Degussa GmbH Rellinghauser Strasse 1-11 45128 Essen (DE)
Representative:	Herzog, Fiesser & Partner Patentanwälte PartG mbB Immermannstrasse 40 40210 Düsseldorf (DE)
Respondent 1: (Opponent 1)	Nippon Shokubai Company Limited 1-1, Koraibashi 4-chome Chuo-ku, Osaka-shi Osaka 541 (JP)
Representative:	Glawe, Delfs, Moll Partnerschaft mbB von Patent- und Rechtsanwälten Postfach 26 01 62 80058 München (DE)
Respondent 2: (Opponent 2)	BASF SE Patentabteilung - C6 Carl-Bosch-Strasse 38 67056 Ludwigshafen (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 23 November 2012 revoking European patent No. 0979250 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman W. Sieber
Members: N. Perakis
E. Kossonakou

Summary of Facts and Submissions

I. This decision concerns the second appeal relating to European patent No. 0 979 250. In the first appeal, this board, in a different composition, decided that the subject-matter of the claims as granted did not extend beyond the content of the application as filed and that the European patent disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (T 624/08 of 17 February 2011).

The second appeal was filed by the patent proprietor against the decision of the opposition division to revoke the European patent.

II. The patent was granted with 19 claims, claim 1 reading as follows:

"1. A composition comprising aqueous fluid absorbent polymer particles which have been heat-treated at temperatures greater than 170°C for more than 10 minutes, wherein the composition has been remoistunzed (sic), after the heat-treatment, with an aqueous additive solution containing a mono- or multivalent metal salt in the absence of an organic solvent or water-insoluble, non-swellable powder, wherein the composition comprises 1 to 10 percent by weight, based on the total weight of the composition, water and wherein the composition is characterized by the ability to absorb at least 20 grams of a 0.9 weight percent aqueous saline solution under a pressure of 0.3 psi (21,000 dynes/cm2), that is, a 60 minute 0.3 psi (21,000 dynes/cm2) absorption under load (AUL) greater than 20 grams/gram."

The claims included three further independent claims, namely claim 15 (process), claim 16 (product by process) and claim 17 (process). The remaining claims were dependent claims.

III. The documents filed during the opposition proceedings included:

D1: US 5 147 343 A;
D2: EP 0 761 241 A2;
D4: WO 94/20547 A1;
D5: US 4 771 105 A;
D6: "Modern Superabsorbent Polymer Technology" edited by F.L. Buchholz and A.T. Graham, Wiley-VCH, 1997, pages 56-59, 86-89 and 142-145;
D7: US 5 002 986 A;
D13: EP 0 605 215 A1; and
D16: US 5 322 896.

IV. The decision of the opposition division was based on the claims as granted and eight auxiliary requests. According to the opposition division:

- The composition of claim 1 as granted was novel over D7 in view of the water content. However, the process of claims 15 and 17 and the superabsorbent polymer of claim 16 lacked novelty in view of either D2 (example 5) or D16 (example 1).

- The claims of auxiliary requests 1 to 7 did not meet the requirements of Articles 123(2) and 84 EPC.

- Claim 1 of auxiliary request 8 did not involve an inventive step in view of D5 considered alone.

V. On 23 January 2013 the patent proprietor (in the following the appellant) filed an appeal against the decision of the opposition division. The statement setting out the grounds of appeal was filed on 2 April 2013 including new auxiliary requests 1 to 5, the appellant's main request being that the decision of the opposition division be set aside and that the patent be maintained as granted.

VI. By letter of 13 August 2013 opponent 2, BASF SE (in the following respondent 2), filed observations on the appeal, and requested that it be dismissed.

VII. By letter of 21 August 2013 opponent 1, Nippon Shokubai Co., Ltd. (in the following respondent 1), filed observations on the appeal, and requested that it be dismissed.

VIII. On 28 October 2015 the board issued a communication in preparation for the oral proceedings.

IX. By letter of 22 December 2015 respondent 1 filed a copy of the experimental report (D38) of the tracing test disclosed in its opposition brief. The tracing test was intended to show that D13, in particular example 2, control 1 and control 3, disclosed water-content and AUL values in accordance with the independent claims of the patent as granted.

X. On 28 January 2016 oral proceedings were held before the board. The appellant confirmed that auxiliary requests 2 to 5 contained only a single claim.

XI. The appellant's auxiliary requests were the following:

Auxiliary request 1
Claims 1 to 14 as granted.

Auxiliary request 2
A single claim based on claim 1 as granted, with the limitation that the aqueous additive solution contains only a multivalent metal salt.

Auxiliary request 3
A single claim which corresponds to claim 1 as granted, with the limitation that the aqueous additive solution is a mixture of a multivalent metal salt and propoxylated polyol.

Auxiliary request 4
A single claim based on the claim of auxiliary request 3 with the further limitation that the propoxylated polyol is employed in an amount from 500 to 5,000 ppm, based on the total weight of the dry absorbent polymer particles.

Auxiliary request 5
A single claim which differs from the claim of auxiliary request 4 only in that the amount of the propoxylated polyol is further narrowed to 1,000 to 2,500 ppm.

XII. The arguments put forward by the appellant in its written submissions and during the oral proceedings may be summarised as follows:

- No comments were made concerning the lack-of-novelty objection raised against claim 1 of the main request and auxiliary request 1 on the basis of D13 and the experimental report D38.

- Claim 1 of auxiliary request 2 was novel over D13 since the aqueous additive solution contained only a multivalent metal salt. The technical problem solved was improved behaviour regarding particle agglomeration. This was not obvious from D13, which disclosed a monovalent metal salt, or from the other prior-art documents.

- Claim 1 of auxiliary request 3 was novel over D13 since the aqueous additive solution contained a mixture of a multivalent metal salt and a propoxylated polyol. The effect of improved particle behaviour against agglomeration was shown in table V and paragraph [0064] of the patent. This effect was neither disclosed nor implied in the art.

- Claim 1 of auxiliary requests 4 and 5, which additionally required that the amount of propoxylated polyol was within a specific range - the range in auxiliary request 5 being narrower than in auxiliary request 4 - was novel over D13. It was also inventive, since the skilled person would have found no hint in the prior art regarding the claimed amount. In particular, D5 (example 2) disclosed polyethylene glycol in amounts higher than those of claim 1 and pointed towards a different direction.

XIII. The arguments put forward by the respondents in their written submissions and during the oral proceedings may be summarised as follows:

- The subject-matter of claim 1 of the main request lacked novelty in view of D13 in the light of the experimental report D38.

- As claim 1 of auxiliary request 1 was the same as claim 1 of the main request, it also lacked novelty in view of D13.

- Claim 1 of auxiliary request 2 was novel over either D4 or D13, each of which could be considered as the closest prior art. The difference was the metal salt used in the aqueous additive solution. The use of a multivalent metal salt in claim 1 instead of a monovalent metal salt in D4 or D13 did not provide any technical effect. Therefore the technical problem was merely the provision of an alternative composition based on a different metal salt. However, use of multivalent metal salts in aqueous solutions for the remoisturisation of heat-treated fluid absorbent polymer particles was already known in the art from D5 and D6. Thus the skilled person would have combined D4 or D13 with D5 or D6 and would have arrived at the subject-matter of claim 1 without the exercise of inventive skills.

- Claim 1 of auxiliary request 3 also lacked inventive step for the reasons given for auxiliary request 2, since D5 disclosed a multivalent metal salt with a propoxylated polyol. Contrary to the assertions of the appellant, table V and paragraph [0064] of the patent did not show any surprising effect resulting from that combination.

- Claim 1 of auxiliary requests 4 and 5, which specified the amount of the propoxylated polyol, also lacked inventive step in the absence of any technical effect. Contrary to the assertions of the appellant, D5 did not teach away from the amounts employed in the claim, since column 4,

line 52, disclosed the range of 0.01-50 %wt which included the amounts claimed.

XIV. The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of any of auxiliary requests 1 to 5.

XV. The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. **Main request** (claims as granted)

1.1 Claim 1 concerns a composition:

- comprising
  - aqueous fluid absorbent polymer particles (**feature 1**), which have been heat-treated at temperatures greater than 170°C for more than 10 minutes (**feature 2**), and
  - 1-10 wt% water, based on the total weight of the composition (**feature 3**),

- which has been remoisturised after the heat treatment
  - with an aqueous solution containing a mono- or multivalent metal salt (**feature 4**)
  - in the absence of an organic solvent or water-insoluble, non-swellable powder (**feature 5**)

- having the ability to absorb at least 20 grams of a 0.9 wt% aqueous saline solution under a pressure of 0.3 psi (21,000 dynes/cm2) (**feature 6**).

1.2 The most relevant prior art in the present case is D13, and in particular control 1 and control 3. The document relates to a method of producing an absorbent resin, ie aqueous fluid absorbent polymer particles, and an absorbent resin.

1.2.1 D13 discloses a composition comprising aqueous fluid absorbent polymer particles (control 1 and control 3), and thus feature 1 of claim 1.

1.2.2 D13 also discloses that the absorbent resin powder of controls 1 and 3 prepared via conventional gel polymerisation, drying, pulverisation and sieving had been heat-treated at a temperature of 180°C for 30 minutes (referential example: column 10, lines 48-50). Thus D13 discloses feature 2 of claim 1.

1.2.3 D13 also discloses that the heat-treated polymer was remoisturised with an aqueous liquid containing sodium hydrogen sulfite, ie a monovalent metal salt, in the absence of any organic solvent or water-insoluble, non-swellable powder (column 18, lines 5-9 and 33-37). Thus D13 discloses features 4 and 5 of claim 1.

1.2.4 D13 discloses only the water content for control 3 (3.3 wt.%) but not for control 1 (feature 3). Furthermore, D13 does not disclose the absorbency under pressure, ie the 60 minute 0.3 psi AUL (feature 6). However, in order to demonstrate that the water-absorbent powders prepared in control 1 and control 3 of D13 inherently had features 3 and 6 of claim 1 as granted, respondent 1 had repeated the experiments of D13 and had measured the water content and the 60 minute 0.3 psi AUL. Already in its opposition brief filed on 28 December 2004, respondent 1 provided the

following data for the water content and AUL for the absorbent particles of controls 1 and 3 of D13:

Absorbent (final product)	water content wt%	AUL (60 minutes, 0.3 psi g/g)
Control 1	8.9	28.8
Control 3	3.3	24.0

Respondent 1 confirmed that the AUL parameter was measured in the same manner as in the patent in suit (see paragraph [0008]), namely according to the test disclosed in D1 (column 6, lines 9-14 and column 9, lines 1-3). D38 was filed merely to confirm this aspect. Thus, D38 did not contain any new data; in fact it showed the same data as the opposition brief.

The appellant did not dispute these values. Thus, in view of the supplementary evidence, the board acknowledges that D13 inherently discloses also features 3 and 6 of claim 1.

1.3 In view of the above, the subject-matter of claim 1 is not novel and the main request is not allowable.

2. Auxiliary request 1

Claim 1 of this request is identical to claim 1 of the main request which has been found to lack novelty. Thus, for the same reasons, auxiliary request 1 is also not allowable.

3. Auxiliary request 2

3.1 The sole claim of auxiliary request 2 differs from claim 1 as granted in that the metal salt contained in the aqueous additive solution now has to be a multivalent metal salt.

3.2 Closest prior art

3.2.1 D13, as indicated above, also relates to an absorbent resin and its manufacture, which are very similar to the claimed subject-matter. Therefore, the board considered D13 to represent the closest prior art, in particular control 1 and control 3.

Respondent 1 referred to D4 as a possible alternative starting point for the assessment of inventive step. D4 discloses water-absorbent resin particles, but their preparation method does not require a remoisturising step (see claims). Although rehumidifying the resin particles is disclosed in D4 as a possible step to reduce or prevent static electricity (see page 14, lines 9-219), there is no disclosure that the aqueous additive solution contains a metal salt, be it mono- or multivalent. Furthermore, D4 discloses a solution containing inert inorganic particles which are excluded by claim 1 (see above point 1.1, feature 5). Thus D4 is more remote than D13 from the subject-matter of claim 1.

3.2.2 The claim differs from the disclosure of D13 only in that it requires the aqueous additive solution to contain a multivalent metal salt, whereas D13 discloses a monovalent metal salt.

3.3 Problem and solution

3.3.1 The appellant asserted that this difference led to an improved agglomeration behaviour of the absorbent polymer particles. However, there is no technical evidence in the patent or on file to support this assertion. On the contrary, according to the wording of claim 1 as granted, additive solutions of monovalent and multivalent metal salts are considered to be equivalent alternatives.

3.3.2 In the absence of any technical evidence, the problem underlying the claimed invention in view of D13 is to provide an alternative composition of aqueous fluid absorbent particles.

3.4 Obviousness

3.4.1 The skilled person starting from the composition of the aqueous fluid absorbent particles of D13 and aiming at the provision of an alternative composition would arrive at the claimed composition in an obvious manner, since the use of aqueous additive solutions involving a multivalent metal salt to remoisturise absorbent polymer particles is known in the art. Reference is made to D5 and D6.

3.4.2 D5 discloses water-absorbent polymer particles with high water-absorbing capability due to the treatment of the particle outer surface with aluminium compounds, ie multivalent metal salts, in the presence of a polyhydric alcohol and water (column 2, lines 55-63; column 3, lines 50-55). The obviously aqueous solution remoisturises the absorbent polymer particles, which has not been disputed by the appellant. Furthermore, D5

discloses that the resulting polymer particles do not agglomerate (column 2, lines 64-68).

3.4.3 D6 discloses that the surface treatment of particulate gels with aqueous solutions of multivalent cation salts, such as aluminium, improves absorption under pressure (see paragraph 2.7.2, in particular page 57, penultimate paragraph). Such an aqueous solution certainly remoisturises the polymer particles.

3.4.4 Thus the skilled person would find in D5 and D6 the hint to use a multivalent metal salt instead of the monovalent metal salt of D13, and would arrive at the subject-matter of the sole claim of auxiliary request 2 without the exercise of inventive skills.

3.5 Consequently, auxiliary request 2 is not allowable.

3.6 In the first appeal proceedings there was a long discussion, in the context of sufficiency of disclosure, as to whether the 60 minute 0.3 psi AUL parameter in the claim was a meaningful parameter at all (point 3.1 of T 624/08). Since, however, the absorbent material of D13 has a 60 minute 0.3 psi AUL as required by the claim, when measured according to the method described in the patent (see point 1.2.4 above), the whole issue of a possibly meaningless parameter and its relevance for assessing inventive step became moot.

4. Auxiliary request 3

4.1 The sole claim of auxiliary request 3 differs from the claim of auxiliary request 2 in that it requires the aqueous additive solution to be a mixture of a multivalent metal salt and a propoxylated polyol.

4.2 D13 is still the closest prior-art document.

4.3 Problem and solution

4.3.1 The appellant alleged that remoisturising the polymer particles using an aqueous additive solution containing a multivalent metal salt and a propoxylated polyol improved the particles' agglomeration behaviour. In this context it referred to table V, which provided a comparison of the properties of particles treated with an aqueous additive solution containing:

- a polyol (examples 22),
- aluminium cations, ie multivalent metal cations, (example 23), and
- a combination of aluminium cations and a polyol (example 24).

4.3.2 However, as correctly pointed out by the respondents, the polyol in examples 22 and 24 is not specified. Thus, it is not clear whether these examples are even relevant to the claimed subject-matter of auxiliary request 3.

4.3.3 But even if assuming, in favour of the appellant, that the polyol in these examples is in accordance with claim 1, the board notes that the agglomeration rating for these examples is not significantly different. Thus example 22 and 23 have an "oversize" of 0.02%, whereas example 24 has one of 0%. Apart from the fact that the values are not given with the same accuracy after the decimal point, it appears difficult to attribute any significance to such a minor difference without any uncertainty analysis.

4.3.4 The appellant stressed that no agglomeration was definitively better than some, even minor,

agglomeration, and relied in this context on paragraph [0064] of the patent, which discusses the results of table V:

"The data in Table V again show how the polyol and the aluminum sulfate suppress the cohesiveness of wetted resin particles. Each of the additives used separately performed similarly in this experiment. However, when used together as in Example 24, no resin agglomeration was detectable at these moisture addition levels. This was a significant improvement over the level of agglomerate formation caused by adding water without the additives (Example 21)".

However, upon closer examination, this paragraph cannot support the appellant's argument. Especially the last sentence of the paragraph makes it clear that even the inventors themselves saw a significant improvement only in comparison with no additives at all, ie only water. Thus, this paragraph supports the respondents' rather than the appellant's case.

4.4 In conclusion, the technical problem underlying the invention of the claim of auxiliary request 3 in view of D13 is still to provide an alternative composition of aqueous fluid absorbent particles.

4.5 Obviousness

4.6 The skilled person starting from D13 and looking for an alternative polymer particles composition would find in D5 the hint to replace the monovalent metal salt of D13 with the combination of a multivalent metal salt and a propoxylated polyol. As indicated above, D5 discloses the use of aqueous solutions comprising aluminium compounds in the presence of polyhydric alcohols

(column 2, lines 55-68). These polyhydric alcohols include propoxylated polyols such as polypropylene glycol and glycerin-propylene oxide-addition products (column 4, lines 4-8, 43-44). Thus the skilled person would arrive at the claimed subject-matter by the obvious combination of D13 with D5.

4.7 The sole claim of auxiliary request 3 lacks inventive step and this request is not allowable.

5. Auxiliary request 4

5.1 The claim of auxiliary request 4 differs from the claim of auxiliary request 3 only in that it specifies that the propoxylated polyol is used in an amount of 500 to 5,000 ppm, based on the total weight of the dry absorbent polymer particles.

5.2 D13 is still the closest prior-art document, and the technical problem underlying the invention as defined in the claim in view of D13 is still the provision of an alternative composition of aqueous fluid absorbent particles.

5.3 For the reasons given for the claim of auxiliary request 3, the subject-matter of the claim of auxiliary request 4 also does not involve an inventive step. The appellant has not shown that the additional feature, namely the specific amount of propoxylated polyol, has a technical effect. This is therefore considered to be an arbitrary limitation which the skilled person would perform without exercising any inventive skills.

5.4 The appellant asserted that the skilled person reading D5 would consider higher amounts of propoxylated polyol rather than the low amounts envisaged by the invention.

Although the polyhydric alcohol used in example 2 of D5 was polyethylene glycol and not a propoxylated polyol, it was employed in a much higher amount than required by the claim of auxiliary request 4.

5.5 The board disagrees. First of all, the teaching of D5 is not limited to the specific example. The skilled person would certainly consider propoxylated polyols as an alternative to the polyethylene glycol used in example 2, since they are explicitly disclosed in D5 (column 4, lines 4-8, 43-44). As regards the low amount required by the claim of auxiliary request 4, D5 discloses a range of 0.01 to 50 %wt for the polyhydric alcohol (column 4, lines 51-55), and thus includes the range now claimed. Since it has not been demonstrated that the amount of propoxylated polyol now required provides an unexpected effect, its selection from the broader range of D5 is merely arbitrary.

5.6 There was also a discussion as to whether the agglomeration referred to in D5 (column 2, lines 64-66) was comparable to the agglomeration measured in table V of the patent. However, the procedure to obtain the wetted resin particles of table V was apparently quite similar to the conditions mentioned in D5. There is no evidence in the patent to support the appellant's allegation that the agglomeration measured in table V was associated with an agglomeration phenomenon different from the one mentioned in D5.

5.7 Thus auxiliary request 4 is not allowable.

6. Auxiliary request 5

6.1 The sole claim of auxiliary request 5 differs from the claim of auxiliary request 4 only in that the amount

for the propoxylated polyol has been limited to 1,000 to 2,500 ppm. Again no specific effect has been demonstrated for this now even narrower range, so that the subject-matter of the claim of auxiliary request 5 also does not involve an inventive step for the reasons given for auxiliary request 4.

6.2 Consequently, auxiliary request 5 is not allowable.

7. In conclusion, none of the appellant's requests is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Cañueto Carbajo W. Sieber

Decision electronically authenticated