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Datasheet for the decision of 21 June 2016

Case Number: T 2043/12 - 3.3.03

Application Number: 04721845.8

Publication Number: 1611165

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Language of the proceedings: EN

Title of invention:
COLOR-STABLE SUPERABSORBENT POLYMER COMPOSITION

Patent Proprietor:
BASF SE

Opponent:
Nippon Shokubai Co., Ltd.

Relevant legal provisions:
EPC Art. 54, 56
RPBA Art. 12(2), 12(4)

Keyword:

Novelty - (yes) impurities- subject-matter of claim a particle not a polymer per se
Inventive step - (no) (main request, auxiliary request)
Late-filed argument - admitted (no) argument could have been brought forward in first instance proceedings

Decisions cited:

G 0001/03, G 0002/10, G 0003/14, T 0069/83, T 0205/83, T 0793/93, T 1144/97

Catchword:

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Case Number: T 2043/12 - 3.3.03

DECISION
of Technical Board of Appeal 3.3.03
of 21 June 2016

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 30 July 2012 revoking European patent No. 1611165 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman F. Rousseau
Members: M. C. Gordon
R. Cramer

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division revoking European patent number EP-B1-1 611 165 (granted on European patent application number 04721845.8 derived from international application number PCT/EP2004/002878, published under the number WO 2004/085496).

II. A notice of opposition against the patent was filed in which revocation of the patent on the grounds of Art. 100(a) EPC (lack of novelty, lack of inventive step), Art. 100(b) EPC and Art. 100(c) EPC was requested.

The following documents were, *inter alia,* relied upon during the opposition:

D1: EP-A-1 178 059
D4: WO 01/25289
D5: JP 2000-327926 and an English language partial translation
D6: JP 2003-52742 and an English language partial translation
D8 and D11: Experimental reports in respect of D5 and D6 filed by the opponent and patent proprietor respectively.
D15: WO-A-03/059962 and D15a EP-A-1 466 928 (family member and English language version of D15)
D22 and D23: experimental reports in respect of D15 filed by the opponent and patent proprietor respectively.

III. The decision of the opposition division was based on a main request and two auxiliary requests all filed on 11 April 2012.

The main request was refused as it contained added subject-matter. It is not relevant for the present decision.

The first auxiliary request consisted of 23 claims, claims 1, 18 and 19 reading as follows:

"1. A method of manufacturing color-stable superabsorbent polymer particles comprising the steps of:

(a) forming a monomer mixture comprising:
    (i) at least one monomer capable of forming a superabsorbent polymer, that is an α,β-unsaturated carboxylic acid, or a salt or anhydride thereof,
    (ii) a crosslinking agent,
    (iii) an initiator system that contains 0 to 300 ppm of a persulfate,
    (iv) a photoinitiator, and
    (v) water;
(b) polymerizing the monomer and the crosslinking agent in the monomer mixture to form a superabsorbent polymer hydrogel having a water content of about 25 wt.% or less;
(c) subjecting the superabsorbent polymer hydrogel to a UV radiation of 2000 milliwatt/cm^2 or less;
(d) then comminuting the superabsorbent polymer hydrogel to provide superabsorbent hydrogel particles; and
(e) drying the superabsorbent polymer hydrogel particles for a sufficient time at a sufficient temperature to provide the color-stable superabsorbent polymer particles."

"18. The method of one of the claims 1 to 17 further comprising the step of:

(f) surface treating the color-stable superabsorbent polymer particles."

"19. Surface treated color-stable superabsorbent particles comprising a polymerized α,β-unsaturated carboxylic acid, or a salt or anhydride thereof, wherein the particles have a residual monomer content of 500 ppm or less, and, after a storage for 30 days at 60°C and 90% relative humidity, exhibit an HC60 color value of at least 63 and a maximum b-value of 10, wherein the particles are prepared by the method of claim 18."

Claims 2-18 were dependent method claims.
Claims 20 to 23 were directed to articles comprising the particles of claim 19.
The second auxiliary request differed from the first auxiliary request by omitting the product claims 19ff.

According to the decision, documents filed after expiry of the nine month opposition period, including the aforementioned D15, D22 and D23 were admitted to the procedure. The decision records that the opponent did not raise objections pursuant to Art. 84 EPC or Art. 123(2) in respect of the first auxiliary request. Consistently therewith, the minutes record that the opponent indicated that they had no objection in respect of Art. 123(2) EPC. The requirements of Art. 83 EPC were met because the wording of claim 1 explicitly gave the sequence of the various steps defined. Furthermore the patent explained that a polymerisation initiator had to be present. Consequently in the absence of persulphate then another initiator had to be present to guarantee polymerisation of the monomers prior to the UV irradiation step, meaning that there was no insufficiency.

The process claim was held to be novel.
Regarding novelty of the product claim the opposition division held that the specified content of residual monomer, i.e. purity considerations, could not serve as a distinguishing feature. The specified colour values of the products obtained in the examples of D5, D6 and D15 fell within the defined ranges as shown by experimental reports D8 and D22. However none of D5, D6 or D15 related to processes involving photoinitiators. Hence the presence in the molecules of the claimed polymers, resulting from the defined process, of fragments derived from the photoinitiators was held to confer novelty.

Regarding inventive step D5 or D6, relating to colour stable superabsorbent polymers were held to represent the closest prior art. D4 would render obvious the step of using an additional UV-irradiation step for decreasing the residual monomer content, leading to particles having a low residual monomer content and carrying terminal groups on the polymer chains which were based on decomposition products of the photoinitiators used in the UV-irradiation step.

As a result neither the process (claim 1 of the first and second auxiliary requests) nor the product (claim 19 first auxiliary request) satisfied the requirements of Art. 56 EPC.

Consequently the patent was revoked.

IV. The appellant/patent proprietor lodged an appeal against the decision. With the statement setting out the grounds of appeal the appellant pursued the sets of claims according to the auxiliary requests as decided upon by the opposition division as main and first auxiliary requests.

V. In the rejoinder the respondent/opponent, in addition to objections pursuant to Art. 54 and 56 EPC raised objections pursuant to Art. 84, 123(2) and 123(3) EPC in respect of both requests. Objections in respect of Art. 83 EPC were maintained by reference to the submissions made before the opposition division.

VI. The board issued a summons to oral proceedings and a communication setting out its preliminary position.

VII. The appellant/patent proprietor submitted with letter of 20 May 2016 amended claims as the main and first auxiliary request which differed from those filed with the statement of grounds of appeal by deletion of the modifier "about" in section (b) of the respective claim 1.

VIII. Oral proceedings were held before the Board on 21 June 2016.

IX. The arguments of the appellant/patent proprietor can be summarised as follows:

(a) Art. 123(2) EPC
The objection in respect of claim 1 was raised for the first time during the appeal proceedings although the claim had been considered by the opposition division. There was no justification for raising this objection now. Consequently it should not be admitted to the procedure.

(b) The submissions in respect of Art. 83 EPC was not substantiated in the rejoinder to the statement of grounds of appeal and should not be admitted to the procedure.

(c) The objection pursuant to Art. 84 EPC was not admissible, since it related to a feature of the granted claims (basis of the amount of persulphate).

(d) Art. 54 EPC
The monomer content conferred novelty. Claim 19 was not directed to a chemical substance (polymer) *per se* but to surface crosslinked particles prepared from a polymer. The particles had a specific structure, as imposed by the reference to claim 18. The case law on the content of impurities as a criterion for novelty of chemical substances, in particular T 205/83 consequently did not apply. Furthermore the reproductions of D5 and D6 demonstrated that the claimed level of impurities did not inevitably arise when carrying out the examples thereof.

(e) Art. 56 EPC
Regarding the process of claim 1, it was concurred that the closest prior art was represented by the teachings of D5 or D6. It was not appropriate to focus on a single example of the documents, but the whole, self-contained, teachings of the documents had to be considered.
The examples of the patent showed the effect of the presence of the photoinitiator and the UV irradiation step.
The problem to be solved was to provide an alternative process for the provision of particles with low colour and low monomer content, however avoiding the potentially hazardous additives employed in D5 and D6.

Regarding the persulphate content, although D5 and D6 were silent on this aspect, this was not identical to a statement that persulphate was absent. Consequently this was a distinguishing feature of the claimed subject-matter over the disclosures of D5 and D6.

Although it was known from D4 how to reduce the amount of residual monomer, there would have been no reason to consult D4 because this related to a different technical area and did not address the colour properties of the polymer. Furthermore the skilled person would have been aware that there was a risk that introducing a photoinitiator might result in discoloration of the product following irradiation, leading away from such a method.

The claim did not require that the polymer be ground prior to irradiation and furthermore specified a maximum amount of water in the polymer subjected to irradiation. Comparative example 3 of the patent demonstrated the effect of the water content. Although this example employed a proportionately higher amount of photoinitiator than the examples according to the claim, a high residual monomer content was nevertheless obtained whereas a lower amount would have been expected. The only teaching in D4 with respect to the water content was that it was considered surprising that the process worked at water levels of less than 20%. Furthermore D4 irradiated comminuted particles, not the whole gel as operative claim 1 required.

X. The arguments of the respondent/opponent can be summarised as follows:

(a) Art. 123(2) EPC

Although not raised in proceedings before the opposition division specifically in respect of the subject-matter of claim 1, it was objected that this extended beyond the content of the application as filed, as the basis for the calculation of the amount of persulphate was no longer the overall monomer content, but only the α,β-unsaturated carboxylic acid or a salt or anhydride thereof. Furthermore, water was now specified to be a mandatory component.

(b) Art. 83 EPC

The objections as presented in the proceedings before the opposition division were maintained by reference thereto.

(c) Art. 84 EPC

The basis for the amount of persulphate in claim 1 was not clear.

(d) Art. 54 EPC – claim 19

The claim was directed to a polymer composition. The feature "particles" did not change this or give any reason to take a different approach. The content of impurities could consequently not serve as a distinguishing feature. This followed from the case law in particular T 205/83 and T 803/01. Even if the claim were to be interpreted as relating to some kind of formed article, i.e. the particles, the same considerations would apply. This subject-matter lacked novelty in view of the disclosures of D1, D5, D6 and D15. Technical means to attain the required degree of purity were known e.g. from D4. In any case the claimed subject-matter did not relate to a composition which had been subjected to a purification but one in which the impurities had been "masked" and remained - in a different form – in the composition.

(e) Art. 56 EPC

The closest prior art was D5 example 7. The problem was the provision of an alternative process for the preparation of polymers having good colour properties and low monomer content. The approach of the appellant of relying on the whole disclosure of D5 and then “assembling” features was not realistic. Rather the examples would be consulted. D5 employed hydrogen peroxide as an initiator which also functioned as a photoinitiator. Hence the only distinguishing feature of the process was the step of UV irradiation. D5 itself hinted at the claimed solution by referring in paragraph [0022] to the need for monomer reducing steps. D4 provided a method for reducing the content of residual monomer by inclusion of a photoinitiator and irradiation. This was the same objective as set out in D5 (page 1). Hence there was motivation to combine D4 and D5. There was no basis in the prior art for the argument of the patent proprietor that the photoinitiator might itself lead to discoloration - this was pure speculation. In any case, by the same token, the photoinitiators envisaged in the patent e.g. those specified in claim 11 could also potentially lead to discoloration. There was no evidence of any effect arising from the specified water content. Even accepting that the patent provided evidence of the effect of the water content, D4 itself suggested the specified range of water content of the polymer to be subjected to radiation.

Furthermore the problem of providing colour stable SAP could not be solved by the claimed subject-matter, because the amendment in claim 1 that the monomer capable of forming a superabsorbent polymer was at least an α,β-unsaturated carboxylic acid, or a salt or anhydride thereof, resulted in an amount of persulfate which could be above the value of 300 ppm.

XI. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or on the basis of the auxiliary request 1, both as filed with the letter of 20 May 2016.

XII. The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Art. 83 EPC
In the rejoinder to the statement of grounds of appeal the respondent referred to the objections "as outlined in detail in our opposition writ" and noted "that the Opposition Division did not follow our objections in the decision under appeal".

No details of the objections were given, nor was it explained why the conclusions reached by the opposition division were incorrect.

The submissions of the respondent in respect of Art. 83 EPC thus fail to set out expressly all the facts, arguments and evidence relied upon. As a consequence they do not meet the requirements set out in Art. 12(2) of the Rules of Procedure of the Boards of Appeal and for this reason are not taken into account by the Board pursuant to Art. 12(4) RPBA.

3. Art. 123(2) EPC

It is recorded in the minutes of the oral proceedings held before the opposition division (page 2, penultimate paragraph) that the opponent "indicated that they had no objection based on Art. 123(2) EPC" in respect of the first auxiliary request which is, with the exception of deletion of the term "about", identical to the present main request.

A similar statement is made in paragraph 16.1 of the decision.

The opponent- now the respondent - in its rejoinder to the statement of grounds of appeal did not challenge the accuracy of these statements.

Since the claims as now under consideration are, apart from the deletion of the word "about", unchanged compared to those considered by the opposition division as the first auxiliary request, and this sole amendment has not been argued to constitute added subject-matter, the Board comes to the conclusion that the objections advanced during the appeal proceedings pursuant to Art. 123(2) EPC could have been raised in the earlier proceedings.

Furthermore the respondent's arguments give no cause for the Board to have doubts that the conclusions of the opposition division that the requirements of Art. 123(2) EPC were complied with was correct. Having regard to the conclusion concerning inventive step, it is not necessary for the present decision to provide any further details on this aspect.

Consequently in exercise of the discretion allowed pursuant to Art. 12(4) RPBA the objections under Art. 123(2) EPC are not admitted to the procedure.

4. Art. 84 EPC

Claim 1 as granted specified the amount of persulphate in the terms “an initiator system that contains 0-300ppm of a persulfate”.

The wording of this part of the claims has not changed in the present main request. The restriction to a specific monomer in part (a)(i) of claim 1, or the requirement that water is now mandatory (claim 1, (a)(v)) does not affect the definition of the amount of persulphate as given by the claims.

Accordingly the amount of persulphate is not a feature which is available for discussion pursuant to Art. 84 EPC (following G 3/14).

5. Art. 54 EPC

5.1 Four documents were cited as potentially anticipating the particles of claim 19, namely D1, D5, D6 and D15.

5.2 The particles of claim 19 are characterised *inter alia* by the content of residual monomer and the HC60 colour value and b-value after storage under defined conditions. The particles are further characterised by the features that they are surface treated and by the "product-by-process" feature that they are prepared by the process of claim 18. This last aspect of the definition will only give rise to a characterising feature insofar as the defined process implicitly results in (a) specific feature(s) of the resulting product. Hence the particles of claim 19 are characterised not only by the properties of the polymer which they contain, but also by the content of residual monomer and by the colour properties. These features are properties of the defined particles forming the subject-matter of claim 19 but not, in the context of the wording of the claim, of the polymer of which the particles are formed. The content of residual monomer present can indeed be considered as a characterising and potentially distinguishing feature of the particles according to claim 19, as was also found in particular in case T 1144/97 (see Reasons 5.1).

5.3 The finding of T 205/83 invoked by the opponent, however, is not applicable to the particles according to present claim 19, at least because these do not correspond to a chemical substance (compound) *per se*, as was considered in T 205/83, but are three-dimensional objects, which can be characterized by their composition. In other words, the residual monomers are part of the components characterizing the particles. The definition of present claim 19 excludes particles that comprise more than 500 ppm of residual monomers which content undisputedly can be determined by conventional analytical methods.

5.4 The matter to be addressed in the present situation in order to establish whether the requirements of Art. 54 EPC are satisfied is whether a skilled person would derive the subject-matter of claim 19, i.e. all the above features in combination directly and unambiguously, using common general knowledge, and seen objectively relative to the pertinent date of publication, from the whole of any of the above-referenced documents (see G 2/10 points 4.3 und 4.6 and G 1/03 point 2.2.2 in which passages it is noted that a uniform concept of disclosure is applied for the purposes of Articles 54, 87 and 123 EPC). In particular it has to be established whether any of those documents either explicitly or implicitly describes not only the colour properties, but also the content of residual monomer or alternatively measures leading to a reduction of the residual monomer content to the level as defined in operative claim 19. Alternatively put, it has to be established whether in the context of the disclosure of those documents it is implicit that the technical measures applied would result in reduction of the amount of residual monomers to the required level.

5.5 Experimental reports were submitted in support of the positions of the parties (see above).

5.5.1 D1 does not disclose explicitly the required monomer content or the colour properties and no further evidence (e.g. experimental data) has been advanced in respect thereof. The context of D1 does not imply that measures were taken as to reduce the content of residual monomer to the level specified in claim 19. Consequently D1 has not been shown to anticipate the subject-matter claimed.

5.5.2 D5 relates to particles of a water absorbent resin (cf page 12 second paragraph, examples). The document reports the colour properties as determined and reported on the basis of the X, Y, Z, L, a and b coordinate system, although the HC60 value - which is specified in the operative claim - is not reported. The residual monomer content of the particles is not reported. Example 7 of D5 was invoked. This relates to a particulate surface crosslinked hydrogel polymer on the basis of sodium acrylate and acrylic acid. According to experimental report D8 of the respondent and experimental report D11 of the appellant the particles obtained in example 7 of D5 exhibit the colour values required by claim 19. D5 reports the post treatment (drying) of the particles only to the extent that this is carried out in a through flow band drier having a defined temperature and air flow velocity. The residence time in the drier is not reported. D11 showed that, following a residence time of 10 minutes under the conditions specified in D5, particles were obtained having a saline absorbency of 51.52g/g which was close to, or depending on the rounding convention applied, identical to, the value reported in example 7 of D5, namely 52 g/g. The amount of residual monomer in the particles was, according to experimental report D11, 3000 ppm and hence outside the range required by operative claim 19. The experimental report of the respondent (D8) did not record the residual monomer content. The context of D5 also does not imply that measures were taken or had to be carried out so as to reduce to content of residual monomer to the level specified in claim 19.

5.5.3 D6 also relates to particles of a water absorbent resin. In example 1 a polymer is prepared based on acrylic acid and the polymer is "chipped" (paragraph [0045]) which would appear to indicate a particulate form. D6 reports the colour but appears to employ a different method to that of the patent in suit. Residual monomer contents are not reported. The context of D6 does not allow it to be concluded that measures were taken in order to reduce to content of residual monomer to the level specified in claim 19. Experimental reports D8 and D11 show that the colour values required by the claim are satisfied but that the residual monomer content is too high (D11). In this case two sets of conditions were investigated (10 minutes and 20 minutes). These two sets of drying conditions resulted in crosslinked particles having saline absorbency of 51.49 and 52.71 g/g respectively, compared to a value of 53 g/g as reported in D6, table 1. The residual monomer amounts were 2530 ppm and 1650 ppm respectively and hence outside the claimed range of 500 ppm or less.

5.5.4 Common to D5 and D6 is a degree of uncertainty as to the properties of the products prepared according to the examples thereof. Although certain of the drying conditions are reported in D5 and D6, the disclosure is not complete since in neither document is the time of the drying step reported. The consequence is that the result of carrying out the processes of the examples, and hence the properties of the resulting products is not unambiguously disclosed (cf T 793/93).

5.5.5 Regarding D15 the drying conditions are also not precisely disclosed. It is merely stated that the resin is dried but with no indication of the drying apparatus or the time and temperature employed. The consequence is that the result of carrying out the process exemplified in D15 is not certain (evidence D23 of the appellant and D22 of the respondent). The evidence of the appellant (D23) furthermore indicates that the colour stability requirements are not satisfied.

5.6 Due to the uncertainties in the drying conditions employed in the cited documents D5, D6 and D15, it has not been shown and indeed cannot be shown, that the inevitable result of carrying out the teachings of the cited documents is particles corresponding to the definition of operative claim 19.

5.7 Consequently novelty of the subject-matter of claim 19 is acknowledged.

5.8 Novelty of process claim 1 was not challenged.

5.9 The main request meets the requirements of Art. 54 EPC.

6. Art. 56 EPC

6.1 The patent in suit - the technical problem

The patent in suit relates to a superabsorbent polymer (SAP) composition. As set out in the introduction, SAPs have the tendency to undergo discoloration upon storage over long periods of time. This tendency is exacerbated when stored under conditions of elevated temperature and humidity. It was found that the cause of the problem was oxidation of the compound added to the monomer as a stabilizer, the cause of the oxidation being a component of the initiator system (sodium persulphate), which was also added in order to reduce the content of residual monomer in the SAP. Hence the problem was to provide a process which yielded colour stable SAPs with low monomer contents which retained these desirable properties even when stored under high temperature and humidity conditions (paragraphs [0010] and [0011] of the patent.)

6.2 Processes for preparing SAPs with good colour stability are known from D5 and D6 which are considered by both parties equally to represent the closest prior art. Taking D5 as representative of these teachings, according to this document, oxidation of the stabiliser is identified as the source of discoloration of the SAPs. The solution proposed is to add an acidic compound (an organic carboxylic acid or a combination thereof with a phosphoric acid). The discussion of the polymerisation initiator in D5 – which is only a partial translation of the original document - in paragraph [0012] discloses that radical polymerisation, using “normal” conditions and initiators, can be employed. According to paragraph [0022] a residual monomer diminishing agent e.g. sodium sulphite or hydrogen peroxide can be included. However neither the amount of this agent, nor the required final level of residual monomer is disclosed. According to example 1, the polymerisation is initiated by a solution of hydrogen peroxide, ascorbic acid and 2,2’-azobis-amidinopropane dihydrochloride. A persulphate compound was not employed.

6.3 The problem to be solved compared to the closest prior art was formulated by the appellant as the provision of a process to provide colour stable SAP with low residual monomer, while avoiding the use of potentially hazardous additives employed in D5 and D6.

6.4 That problem was solved according to the appellant by the process according to claim 1, characterized in that:

- the level of persulphate in the initiator was limited and
- a photoinitiator was included and the resulting polymer, prior to comminution, subjected to UV radiation, whereby
- the water content of the material subjected to irradiation was 25% or less.

Since the process of D5 does not involve a persulphate, the defined limit on persulphate content of claim 1 does not provide a distinguishing feature and hence cannot play any role in the assessment of inventive step.

6.5 As to whether the claimed process provides a successful solution to the above problem, the argument that the claimed subject-matter would also solve the problem of avoiding the potentially hazardous additives employed in D5 and D6 is not accepted, since claim 1 contains no corresponding feature reflecting this exclusion. The requirement of a photoinitiator, notwithstanding that the purpose of this component is to avoid such hazardous initiators as explained in paragraph [0011] of the patent, does not however mean that such undesirable additives are absent.

As to the examples of the patent in suit, it is to be noted that example 2 contains a typographical error. The amount of acrylic acid is reported as “29.4 g”. Example 1 and comparative examples 1 and 2 employ 92.4g of acrylic acid with the same content of initiator system and other components. In the light of the otherwise identity of the details in the examples the amount of acrylic acid reported in example 2 is considered to be erroneous and should in fact be 92.4 g. The following analysis will proceed on this basis. According to the examples of the patent, employing the irradiation step results in SAPs with levels of residual monomer of 50ppm (8 minutes exposure to UV - example 1) or 20ppm (12 minutes exposure – example 2). Comparative example 2 shows that omitting the UV step, but maintaining the presence of the photoinitiator (“Darocur”) results in products with similar colour properties to example 1 but with significantly higher residual monomer content (890 ppm). Finally comparative example 3 shows that if the moisture content of the polymer subjected to irradiation is above the limit of 25 wt% then the residual monomer content is high (970ppm). It is recognised that comparative example 3 differs in a number of respects from example 2. It was submitted by the appellant that these differences were necessary in order to obtain a polymer with the higher residual water content for comparative purposes. This argument provides a logical and technically reasonable justification of the discrepancies noted. Consequently comparative example 3 is considered to represent a correct comparison with the other examples, in particular example 2. It is further shown by comparative example 2 that the polymers exhibit good colour stability as demonstrated by the colour values after aging at 60°C and 90% relative humidity even if the steps of inclusion of a photoinitiator and UV treatment are not jointly employed.

6.6 The respondent argued that the problem of providing colour stable SAP could not be solved, because the amendment in claim 1 that the monomer capable of forming a superabsorbent polymer was at least an α,β-unsaturated carboxylic acid, or a salt or anhydride thereof, resulted in an amount of persulfate which could be above the value of 300 ppm indicated in paragraph 50 of the patent in suit. That argument does not convince, because the limit of 300 ppm in claim 1 is not defined to be based on the amount of α,β-unsaturated carboxylic acid, or a salt or anhydride thereof.

6.7 Consequently, the Board is satisfied that the problem successfully solved over the closest prior art is the provision of a process to provide colour stable SAP with low residual monomer.

6.8 Obviousness

D5 mentions a monomer reducing agent (see section 6.2 above) but this aspect is not emphasised in the discussion in D5 nor is any limit on the amount of residual monomer given. Nevertheless D5 establishes that the reduction of residual monomer in SAPs was a problem of which the skilled person was aware, as indeed is acknowledged in the patent in suit.

D4 relates to polymers of, *inter alia*, acrylic acid and addresses specifically the problem of obtaining polymers with low residual monomer. These polymers are disclosed as usable for flocculants for water treatment or for use as drag reduction, adhesives, coatings and textile and paper sizes. The use thereof in or as SAPs is not disclosed. Nevertheless, D4 does relate to an aspect of the problem addressed by the patent in suit, namely reduction of residual monomer content. Furthermore the chemical nature of the polymers of D4 is the same as in the patent, and indeed as in the closest prior art D5, namely based on acrylic monomers whereby acrylic acid is explicitly mentioned. Furthermore the problem of residual monomers in SAPs is indicated in the closest prior art D5 as a relevant consideration. Accordingly the absence of a common end use of the polymers of D4 and D5 notwithstanding, the technical aspects considered in D4 are relevant and applicable to the problem and polymers of D5. Consequently it is appropriate to consider the teachings of the two documents in combination. This problem of reducing residual monomer content is addressed according to the method of claim 1 of D4 by subjecting the polymer to UV radiation in the presence of a photoinitiator. According to claim 1 and page 9 line 28ff of D4 the irradiation step is carried out simultaneously with or after comminuting the polymer. Page 10 line 12ff states that preferably 90% or more by weight of the particles have a size of less than 9.5mm for the reason that larger particles would be difficult to dry and would not be expected to work well "in the invention" which statement is interpreted as relating to the irradiation step. On page 12 lines 3-6 it is stated that comminuting a thick section of gel and then irradiating is more efficient in terms of residual monomer reduction than irradiation of the same mass as a thick section followed by pulverisation and drying. Regarding the water content of the gel submitted to irradiation, it is taught in the subsequent paragraph of page 12, starting at line 8 of D4 that irradiation of gel particles containing less than about 20% by weight of moisture is “quite effective”. This last teaching renders obvious the requirement - defined in

operative claim 1 – of limiting the water content of the polymer to be subjected to UV irradiation. Regarding the aspect of comminution, the operative claim specifies that UV irradiation is carried out prior to comminution. This is contradictory to the teaching of D4 (see above) which emphasises that better results are obtained by comminution prior to irradiation. Nevertheless, it is apparent from Table 1, example 1 (comminution prior to irradiation, residue 25 ppm) and comparative example 1 (no prior comminution, residue 375 ppm) of D4 that irradiation of the whole (uncomminuted) gel does result in reduction of the amount of monomer even if the reduction is not as efficient, i.e. less advantageous as when the gel is comminuted prior to irradiation.
However the adoption of a procedure which is taught in the prior art be less advantageous - in this case poorer reduction of the amount of residual monomer - cannot, in the absence of any evidence for an unexpected technical effect arising as a result thereof, confer an inventive step (by analogy with T 69/83).

6.9 The method according to operative claim 1 is therefore an obvious modification of that taught by the closest prior art D5 in the light of the further teachings of D4 with the result that an inventive step has to be denied.

6.10 Claim 1 of the main request does not meet the requirements of Art. 56 EPC. The main request is therefore not allowable.

First auxiliary request

7. Claims 1 to 18 of the first auxiliary request are identical to claims 1 to 18 of the main request. Consequently the conclusions reached for the main request that the requirements of Art. 56 are not met apply also to the first auxiliary request which consequently is also not allowable.

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 F. Rousseau

Decision electronically authenticated