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Datasheet for the decision of 28 January 2014

Case Number: T 2129/10 - 3.3.10

Application Number: 04707310.1

Publication Number: 1594556

IPC: A61L15/60, C08J3/24

Language of the proceedings: EN

Title of invention:
PARTICULATE WATER-ABSORBING AGENT

Patent Proprietor:
NIPPON SHOKUBAI CO., LTD.

Opponent:
BASF SE

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - (yes)
Inventive step - all requests (no) - obvious optimisation

Decisions cited:
T 0395/96, T 0409/90

Catchword:

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Case Number: T 2129/10 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 28 January 2014

Appellant: (Opponent)	BASF SE 67056 Ludwigshafen (DE)
Representative:	Schröder, Jürgen BASF SE Global Intellectual Property GVX - C6 67056 Ludwigshafen (DE)
Respondent: (Patent Proprietor)	NIPPON SHOKUBAI CO., LTD. 1-1, Koraibashi 4-chome Chuo-ku Osaka-shi, Osaka 541-0043 (JP)
Representative:	Glawe, Delfs, Moll Partnerschaft mbB von Patent- und Rechtsanwälten Postfach 26 01 62 80058 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 3 August 2010 rejecting the opposition filed against European patent No. 1594556 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman: P. Gryczka
Members: J. Mercey
C. Schmidt

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the decision of the Opposition Division rejecting the opposition against European patent No. 1 594 556. Claim 1 of the granted patent read as follows:

II. "A water-absorbing agent, which is a particulate water-absorbing agent comprising water-absorbent resin particles (α) and a liquid-permeability-enhancing agent (β), wherein the water-absorbent resin particles (α) are further-surface-crosslink-treated irregular-shaped pulverized particles of a crosslinked polymer of a monomer including acrylic acid and/or its salt;
wherein the particulate water-absorbing agent has:
a mass-average particle diameter in the range of 234 to 394 μm, a logarithmic standard deviation (σζ) of a particle diameter distribution in the range of 0.25 to 0.45, an absorption capacity of not less than 15 g/g without load, and a water-extractable component content of not higher than 15 mass %; and further
a liquid-permeability-enhancing agent (β) content in the range of 0.01 to 5 mass parts per 100 mass parts of the water-absorbent resin particles (α)."

III. Notice of Opposition had been filed by the Appellant requesting revocation of the patent in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC). *Inter alia* the following documents were submitted in opposition proceedings:

(1) EP-A-629 411,
(3) US-A-5 419 956,
(4) Modern Superabsorbent Polymer Technology, Wiley-VCH, 1998, pages 72 to 74, 93 to 103, 130 and 131, and

(6) Opponent's test report of 21 May 2010.

IV. The Opposition Division held that the subject-matter of granted claim 1 was novel over document (1), since *inter alia* the features that the water-absorbent resin particles had a mass-average particle diameter in the range of 234 to 394 µm, a logarithmic standard deviation of a particle diameter distribution in the range of 0.25 to 0.45 and a water-extractable component content of not higher than 15 mass % were not disclosed therein. The Appellant's experimental report (6), which repeated Example 14 of document (1) in order to demonstrate experimentally that document (1) was novelty destroying, was not admitted into the proceedings as it was late-filed. The Opposition Division also held that the claimed subject-matter involved an inventive step, since starting from document (3) as the closest prior art, the capillary suction force (CSF) and saline flow conductivity (SFC) of the claimed water-absorbing agent were optimised by virtue of its specific narrow particle size distribution, resulting in additional applications of urine to be passed through an already gelled upper region of a diaper to deeper regions while at the same time providing overall good qualities, in particular a dry feeling.

V. With letter dated 9 December 2013, the Respondent (Patent proprietor) filed auxiliary requests 1 to 9, replacing all previous auxiliary requests.

Claim 1 of auxiliary request 1 differs from claim 1 of the main request (patent as granted) in that the particulate water-absorbing agent is further defined as having a mass ratio (particles having particle diameters of not smaller than 300 µm)/(particles having

particle diameters of smaller than 300 µm) in the range of 80/20 to 20/80.

Claim 1 of auxiliary request 2 differs from claim 1 of the main request in that the particulate water-absorbing agent is further defined as having an absorption capacity without load in the range of 15 to 33 g/g, but not including 33 g/g.

Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the particulate water-absorbing agent is further defined as having a capillary absorption capacity of not less than 15 g/g for a 0.90 mass% physiological saline solution.

Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 in that the particulate water-absorbing agent is further defined as having a saline flow conductivity of not less than 50(10^{-7}.cm^3.s.g^{-1}) for a 0.69 mass % physiological saline solution.

Claim 1 of auxiliary request 5 differs from claim 1 of auxiliary request 2 in that the liquid-permeability-enhancing agent includes a water-soluble polyvalent salt.

Claim 1 of auxiliary request 6 differs from claim 1 of auxiliary request 2 in that the liquid-permeability-enhancing agent includes an aluminium compound.

Claim 1 of auxiliary request 7 is a combination of all the features of claim 1 of each of auxiliary requests 1 to 3.

Claim 1 of auxiliary request 8 is a combination of all the features of claim 1 of each of auxiliary requests 1, 2 and 4.

Claim 1 of auxiliary request 9 is a combination of all the features of claim 1 of each of auxiliary requests 6 to 8.

VI. The Appellant argued that the subject-matter of claim 1 of the granted patent was not novel over the disclosure of document (1). More particularly, this document disclosed a preferred particle diameter of 150 to 600 µm, wherein the particles were obtained by pulverisation and their size was adjusted by sieving. Since the required mass-average particle diameter and standard deviation of the particle diameter distribution according to the contested patent was also obtained by pulverising and sieving, similar technical measures necessarily resulting in similar products, the product of document (1) must be the same as that according to the patent in suit. In addition, the Appellant repeated Example 14 of document (1), the experimental conditions and results being provided in document (6), which was supplemented by *inter alia* document (15) filed with letter dated 6 December 2010. The product obtained had the parameters required by claim 1 of the patent in suit, document (15) showing that regardless of how one carried out the pulverisation, the logarithmic standard deviation of the particle diameter distribution did not change. Furthermore, according to *inter alia* textbook (4), particulate water-absorbing agents usually had a water-extractable component content no higher than 15 mass % such that this feature could also not confer novelty.

The Appellant argued that the claimed subject-matter was not inventive and submitted that document (1) represented the closest prior art. As document (1) taught that an absorbent composition having a small content of fine powders and a narrow particle size distribution led to no gel-blocking occurring and urine being widely diffused through the disposable diaper, no inventiveness could be seen in the particle size distribution claimed. In any case, since document (3) taught that the fluid processing limitations of absorbent structures containing particulate material, namely fluid uptake rate and distribution rate, could be significantly reduced or eliminated by using a specific, relatively narrow particle size distribution, it was obvious for the skilled person to adjust the particle size distribution in order to obtain the desired absorption profile. No additional effects had been shown for the subject-matter of any of the auxiliary requests, and any improvement in the avoidance of gel-blocking by the use of water-soluble polyvalent salts was already taught by document (4).

VII. With regard to novelty, the Respondent argued that document (1) did not clearly and unambiguously disclose the water absorbing agent of the patent in suit. The particle size of the absorbent resin of Example 14 of document (1) was adjusted in Production Example 10 to 150 to 600 µm by sieving, which merely defined the upper and lower limits of the particle size but gave no information on the distribution of particles within this range, such that the mass-average particle diameter and standard deviation of the particle diameter distribution could not be determined. The Respondent disputed the Appellant’s allegation that the particle diameter adjustment method was the same in the patent in suit and in document (1) such that the

products must have the same particle size distribution. More particularly, in Production Example 8 of document (1) leading to the final product of Example 14, it was merely stated that the hydrogel was "pulverized" prior to the particle size adjustment by sieving, no further information on said pulverisation step being provided. With regard to the Appellant's experimental reports (6) and (15), these merely showed that by optimisation of the "pulverization" step which was not more clearly defined in document (1), a product having the parameters mass-average particle diameter and logarithmic standard deviation of particle diameter distribution falling within the claimed ranges could be produced, not however, that the absorbent composition of Example 14 of document (1) inevitably had parameters falling in said ranges. On the contrary, the Respondent's own experimental report (19) filed with letter dated 14 June 2011 showed that it was quite possible to repeat the teaching of Example 14 of document (1) and not achieve a product having the mass-average particle diameter and logarithmic standard deviation of particle diameter distribution in the required ranges. The Respondent conceded that water-absorbent resins having a water-extractable component content no higher than 15 mass % were known, but that not every water-absorbent resin had a water-extractable component content below this limit, there being no information whatsoever in document (1) concerning this value.

The claimed subject-matter was inventive starting from document (1) as closest prior art, the problem underlying the patent in suit being to provide a water-absorbing agent showing a good compromise between its fluid uptake rate, as shown by the value capillary absorption capacity, also known as capillary suction

force (CSF), and its ability to prevent gel-blocking, as shown by the value saline flow conductivity (SFC). The effect of the lower and upper limits of the logarithmic standard deviation of particle diameter distribution claimed on the CSF and SFC of the water-absorbent resin was demonstrated by the experimental report (20), Figure 6 of the contested patent also showing that the Examples exhibited the desired compromise between these two values. The level of the water-extractable component content in the water-absorbent resin of below 15 mass % also contributed to a product with a better CSF and improved safety *vis-à-vis* a similar product with a higher water-extractable content. Since it was not previously known how exactly the particle size distribution affected the CSF and SFC, the skilled person had no motivation to adjust the mass-average particle diameter and particle diameter distribution of the absorbent particles disclosed therein to arrive at the water-absorbing agent according to the contested patent. The teaching in document (3) concerning the effect of the particle size distribution on fluid uptake rate and gel-blocking was only relevant to absorbent structures containing resin particles in combination with fibrous materials. With regard to the auxiliary requests 1 to 9, their subject-matter was additionally inventive, since they were more clearly restricted to those particulate water-absorbing agents which solved the problem underlying the patent in suit.

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

The Respondent requested that the appeal be dismissed or, subsidiarily, that the patent be maintained on the

basis of any of auxiliary requests 1 to 9 filed with letter dated 9 December 2013.

IX. At the end of the oral proceedings held on 28 January 2014, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Novelty

2.1 The Appellant challenged the novelty of the claimed invention with regard to the disclosure of document (1).

2.2 Document (1) discloses a particulate absorbent composition comprising water absorbing resin particles and a hydrophilic silicon dioxide powder, wherein said water absorbent resin particles comprise an acrylic acid salt and/or an acrylic acid as a main monomer of the resulting polymer, said water absorbent resin particles having a structure which is crosslinked with a first and then a second crosslinking agent, said composition having a particle size distribution such that the amount of particles having a particle size of larger then 600 µm is not more than 5 % by weight and the amount of particles having a particle size of smaller then 150 µm is not more than 5 % by weight, and wherein the content of hydrophilic silicon dioxide powder is 0.05 to 5 parts by weight (see claims 1 and 9), the product of Example 14 being an example of such a composition.

2.3 However, the particle size adjustment leading to the product of Example 14 in document (1), results merely in the proportion of particles between 150 and 600 µm being adjusted to 94%, but no information about the distribution of particles within this range is given, such that the mass-average particle diameter and standard deviation of the particle diameter distribution cannot be determined. Furthermore, the level of water-extractable component content in the particulate resins of document (1) is also not disclosed.

2.4 The Appellant argued that although none of these values were actually recited in document (1), the product of Example 14 was nonetheless novelty destroying for the subject-matter of claim 1 of the granted patent, since the particles therein were obtained by pulverisation and their size was adjusted by sieving. Since the required mass-average particle diameter and standard deviation of the particle diameter distribution according to the contested patent was also obtained by pulverising and sieving, similar technical measures necessarily resulting in similar products, the product of document (1) must be the same as that according to the contested patent. In order to support this argumentation, the Appellant relied upon its experimental reports (6) and (15), in which Example 14 was repeated and a product having the claimed particle size distribution was obtained.

2.4.1 However, as indicated above (see point 2.3), the particle size adjustment leading to the product of Example 14 in document (1), results in the proportion of particles between 150 and 600 µm being adjusted to 94%, but the effect on the particle size distribution

within these limits is not disclosed. The main factor affecting this value, as agreed by both parties, is the previous pulverising step. This step is, however, not more closely defined in Production Example 8 leading to the product of Example 14 of document (1). Depending on how one carries out this step, different mass-average particle diameters and standard deviations of the particle diameter distribution are obtained.

2.4.2 Thus, for example, the textbook (4) (see pages 93 to 94) teaches that to achieve the rather narrow particle size distribution advocated for use in diapers, two-stage milling is used in combination with product screening and recycling of the oversize stream back to the grinding step, roll crushers being commonly used in the particle sizing process. Said document goes on to teach that when using, for example, a two-pair-high roll crusher, the primary variable in setting the particle size distribution for a given set of rolls is the gap between the rolls. It is also stated that the rolls are typically corrugated, with the corrugation pattern also strongly affecting the particle size distribution. Other variables affecting the particle size distribution are the roll operational parameters, such as rpm of the rolls and differential rpm between the rolls.

2.4.3 However, neither the exact type of equipment nor the roll operational parameters for the pulverisation in Production Example 8 of document (1) are disclosed. Since the particle size distribution can be strongly affected by the grinding conditions, it is clear that not any pulverisation process leads to a product having a mass-average particle diameter and a logarithmic standard deviation of particle diameter distribution falling within the claimed ranges. Thus the Appellant's

experimental reports (6) and (14) merely demonstrate that by carrying out the pulverising step of Production Example 8 of document (1) using a roll mill, which is not further defined, but with various predefined gaps between the rolls, a product having the parameters mass-average particle diameter and logarithmic standard deviation of particle diameter distribution falling within the claimed ranges **can** be obtained, not however, that when following the process steps indicated for the preparation of the absorbent composition of Example 14 of document (1), a composition having the parameters falling in said ranges is **inevitably** obtained. More particularly, said experiments show that when repeating Example 14 of document (1) with the hindsight of the teaching of the patent in suit, it was well within the standard practice of the skilled person to choose suitable grinding conditions in order to obtain a product with the desired particle size distribution. The Respondent's experimental report (19) confirms, however, that it is possible to repeat the teaching of Production Example 8 of document (1) and not achieve a product having the required particle size distribution.

2.5 The Appellant also argued that although the level of water-extractable component content in the particulate resins of document (1) was not specifically disclosed therein, the value of less than 15 mass % claimed covered all useful water-absorbing products and cited *inter alia* document (4), page 131, in this respect, which taught samples containing about 1 to 15% extractables.

2.5.1 However, even if many particulate resins have a level of water extractables of less than 15 mass %, this does not mean that **all** particulate resins inevitably have the same level, such that the Board concludes that

document (1) does not directly and unambiguously disclose particulate resins having a level of water extractables of less than 15 mass %.

2.6 Thus, since document (1) does not directly and unambiguously disclose a composition having a mass-average particle diameter in the range of 234 to 394 µm, a logarithmic standard deviation of a particle diameter distribution in the range of 0.25 to 0.45, and a water-extractable component content of not higher than 15 mass %, the Board concludes that the subject-matter of claim 1 of the main request is novel within the meaning of Article 54 EPC over the disclosure of this document.

3. Inventive step

3.1 Document (1) discloses a particulate absorbent composition (see point 2.1 above) for use in thin type disposable diapers which has a suitable absorption rate, a good dry feeling and no gel-blocking occurs (see page 3, lines 6 to 7 and 18 to 25). The Board thus considers, in agreement with the Appellant and the Respondent, that the water-absorbing particulate resin of document (1) represents the closest state of the art and, hence, takes it as the starting point when assessing inventive step.

3.2 In view of this state of the art, the problem underlying the patent in suit (see paragraph [0032] of the specification) consists of the provision of a water-absorbing agent showing a good compromise between its fluid uptake rate, as reflected by the value capillary absorption capacity (CSF), and its ability to prevent gel-blocking, as reflected by the value saline flow conductivity (SFC).

3.3 As the solution to this problem, claim 1 of the main request proposes a water-absorbing agent comprising particulate water absorbent resin particles characterised by a mass-average particle diameter in the range of 234 to 394 µm, a logarithmic standard deviation of a particle diameter distribution in the range of 0.25 to 0.45, and a water-extractable component content of not higher than 15 mass %.

3.4 To demonstrate that the claimed solution achieves the alleged good compromise between fluid uptake rate and ability to prevent gel-blocking and thus solves the technical problem defined above, the Respondent relied upon Figure 6 of the specification of the patent in suit and the experimental report (20). The former showed that the Examples according to the invention resulted in the required compromise, whereas the Comparative Examples did not. The latter showed that when the logarithmic standard deviation of particle diameter distribution was below the claimed range, the CSF deteriorated, and when it was above, the SFC deteriorated. Furthermore, the upper limit of the water-extractable component content resulted in a better CSF and improved safety, as taught by paragraph [0126] of the specification of the patent in suit.

3.4.1 The Appellant argued that none of the Comparative Examples differed from the Examples according to the invention by virtue of the characterising features of the invention only, such that any comparisons shown in Figure 6 were not fair comparisons and thus meaningless. With regard to the experimental report (20), when the logarithmic standard deviation of particle diameter distribution was below the claimed range (see Sample B), the CSF did indeed deteriorate,

the SFC, however, improved. Similarly, when it was above the claimed range (see Sample C), although the SFC deteriorated, the CSF improved, which was not surprising as it was well known that the SFC and CSF had a correlation such that if either one was enhanced, the other deteriorated, as reflected in paragraph [0134] of the specification of the patent in suit.

3.4.2 The Board accepts that by selecting certain limits for the logarithmic standard deviation of particle diameter distribution, a certain compromise between the SFC and CSF has been achieved, since the experimental report (20) appears to show that when one is improved, the other is simultaneously deteriorated. However, the limits chosen for this desired compromise are arbitrary, the Respondent itself stating at the oral proceedings that the line drawn in Figure 6, above which the Examples were considered to solve the technical problem, whereas below it they did not, was arbitrarily drawn and depended on practical needs. It has not, however, been shown that said compromise leads to an actual improvement in the properties of the absorbent in use compared to an absorbent not fulfilling the claimed parameters. Experimental report (20) merely shows that when the logarithmic standard deviation of particle diameter distribution is below the claimed range, the CSF deteriorates by about 50% and the SFC improves by about 50%. Which of these absorbents actually has the overall better fluid-processing properties cannot be deduced herefrom, since a reduced CSF results in residual liquid not taken into the water-absorbent resin increasing on the surface layers, whereas a reduced SFC results in gel-blocking that hinders permeation and diffusion of liquids (see paragraphs [0004] and [0023] of the specification of the patent in suit), such that both parameters

ultimately affect the absorption properties of the water-absorbent resin and, hence, the dryness feeling for the user. In addition, no conclusions can be drawn for the effect of increasing said logarithmic standard deviation to above the claimed range, since Sample C differs from Sample A according to the invention not only by virtue of said logarithmic standard deviation of particle diameter distribution, but also by virtue of a vastly different mass-average particle diameter (250 vs 389 µm), both values, however, falling within the claimed mass-average particle diameter range.

No comparative examples are available which differ from one another only by virtue of the mass-average particle diameter and/or the water-extractable component content such that it has not been shown that said features contribute towards the desired compromise between fluid uptake rate and ability to prevent gel-blocking of the claimed water-absorbing agent, with the consequence that they are to be discarded when assessing obviousness.

3.4.3 Thus, the Board holds that the particulate water-absorbing agent according to claim 1 represents a compromise, albeit an arbitrary one, between its fluid uptake rate and its ability to prevent gel-blocking in view of having a logarithmic standard deviation of particle diameter distribution in the range of 0.25 to 0.45, such that it is credible that the problem is solved.

3.5 Finally, it remains to be decided whether or not the proposed solution to the problem underlying the contested patent is obvious in view of the cited prior art.

3.5.1 An object of document (1) (see page 3, lines 18 to 25) is to provide an absorbent composition having a suitable absorption rate, a good dry feeling and a narrow particle size distribution whereby no gel-blocking occurs when it absorbs urine in case of application for disposable diaper and urine can be widely diffused through the disposable diaper. Thus document (1) itself already teaches that particle size distribution affects the absorption properties of absorbent compositions, and teaches (see claim 9) a composition wherein 90% by weight of the particles are between 150 and 600 µm as a solution thereto.

3.5.2 Document (3), on the other hand, teaches more specifically (see column 7, lines 45 to 62) that by using a specific, relatively narrow, particle size distribution in absorbent structures containing superabsorbent hydrogel-forming material, the fluid processing limitations of both large particles, which significantly decrease the potential fluid uptake rate, and fine particles, which decrease the rate of fluid distribution throughout the structure resulting in gel-blocking, can be significantly reduced or eliminated. Document (3) (see column 8, lines 9 to 17) then defines the desired particle size distribution of that invention in terms of percentages of particles within a certain number of microns of a particular average particle size.

3.5.3 The skilled person in the art thus knows that the particle size distribution plays a significant role in the fluid uptake rate and prevention of gel-blocking in a particulate superabsorbent. It is within the standard practice of such a skilled person to perform routine experiments to determine that particle diameter distribution which results in the particular compromise

between SFC and CSF which he deems acceptable and to express said particle diameter distribution in terms of a logarithmic standard deviation, which is a measure of the breadth of the particle diameter distribution, and a mass-average particle diameter. Thus similarly to the cases underlying the decisions T 409/90 (point 4.6 of the reasons, not published in OJ EPO) and T 395/96 (point 4.8 of the reasons, not published in OJ EPO), it belongs to the activities deemed normal for the skilled person to optimise a physical parameter, in this case the logarithmic standard deviation of the particle diameter distribution, in such a way as to reach an acceptable compromise between contradictory effects which are dependent on this parameter, according to his wishes and in view of practical needs. Thus, the subject-matter of claim 1 does not involve an inventive step.

3.6 For the following reasons the Board cannot accept the Respondent's arguments designed for supporting inventive step.

3.6.1 The Respondent argued that the passages in document (3) concerning the effect of the particle size distribution on fluid uptake rate and gel-blocking were only relevant to absorbent **structures** containing, for example, resin particles in combination with fibrous materials, such that the skilled person would not have transferred said teaching to a particulate water-absorbing agent *per se*.

However, said passages all fall under the subtitle "A. The Particulate Material Composition" (see column 5, line 12), which is then followed by the subtitle "B. The Absorbent Structures of the Present Invention" (see column 11, line 28). Said passages are also preceded by

the statement "The size distribution of the particles of superabsorbent hydrogel-forming material is of critical importance to the performance of absorbent structures. This is particularly true in the case of absorbent structures containing relatively high concentrations of th particulate superabsorbent hydrogel-forming material" (see column 7, lines 32 to 37), such that the skilled person would read said passages as providing a teaching concerning the effect of the particle size distribution on the superabsorbent hydrogel-forming material *per se*, regardless of the presence of other structural elements such as fibrous materials. In any case, the invention underlying the patent in suit is also directed to a material which comprises a water-absorbent resin in an amount of 50 to 100 mass % and another component (see paragraph [0050] of the specification of the patent in suit), the absorbent structures of document (3) (see column 13, lines 45 to 48) preferably containing from about 5 to 98 % by weight of the polymer. Thus, this argument of the Respondent does not convince the Board.

3.6.2 The other main argument of the Respondent was that document (3) (see column 8, lines 4 to 5) taught that the breadth of distribution of particle sizes should be "very small", whereas it could be seen from experimental report (20) that when the particle size distribution was too narrow, the desired compromise between SFC and CSF was not achieved.

However, as indicated in point 3.4.2 above, the logarithmic standard deviation of particle diameter distribution in the range of 0.25 to 0.45 is arbitrary, there being no special effect achieved within this range, such that the lower limit is not critical and cannot provide a basis for inventive step.

Auxiliary request 1

4. Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the particulate water-absorbing agent is further defined as having a mass ratio (particles having particle diameters of not smaller than 300 µm)/(particles having particle diameters of smaller than 300 µm) in the range of 80/20 to 20/80.

4.1 The Respondent conceded that no technical effect over and above that already shown for the subject-matter of the main request was achieved by this additional feature which merely further restricted the particle size distribution of the particulate water-absorbing agent. This additional feature thus does not alter the assessment of inventive step made above for the subject-matter of the main request.

4.2 Thus, auxiliary request 1 is also not allowable for lack of inventive step pursuant to Article 56 EPC.

Auxiliary request 2

5. Claim 1 of auxiliary request 2 differs from claim 1 of the main request in that the particulate water-absorbing agent is further defined as having an absorption capacity without load in the range of 15 to 33 g/g, but not including 33 g/g.

5.1 The subject-matter of claim 1 of this request thus differs from that of the main request only in that an upper limit for the absorption capacity without load is now defined. The Respondent conceded that said upper

limit did not alter the assessment of inventive step, which position the Board also holds.

5.2 Thus, auxiliary request 2 is also not allowable for lack of inventive step pursuant to Article 56 EPC.

Auxiliary request 3

6. Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the particulate water-absorbing agent is further defined as having a capillary absorption capacity (CSF) of not less than 15 g/g for a 0.90 mass% physiological saline solution.

6.1 The Respondent submitted that by defining a minimum CSF, the particulate water-absorbing agents were now more clearly restricted to those which solved the problem underlying the patent in suit.

However, since the Board accepts that the problem underlying the patent in suit has indeed been solved (see point 3.4.3 above), the additional feature not contributing to any new effect, the assessment of inventive step made above for the subject-matter of the main request is not altered thereby.

6.2 Thus, auxiliary request 3 is also not allowable for lack of inventive step pursuant to Article 56 EPC.

Auxiliary request 4

7. Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 in that the particulate water-absorbing agent is further defined as having a saline flow conductivity (SFC) of not less than

$50(10^{-7}.cm^3.s.g^{-1})$ for a 0.69 mass % physiological saline solution.

7.1 The Respondent argued that by now defining both a minimum CSF and a minimum SFC, the subject-matter of the claim was even narrower and defined more closely those particulate water-absorbing agents which solved the problem underlying the patent in suit.

However, for reasons given in point 6.1 above, the assessment of inventive step made for the subject-matter of the main request is not altered by said additional features.

7.2 Thus, auxiliary request 4 is also not allowable for lack of inventive step pursuant to Article 56 EPC.

Auxiliary request 5

8. Claim 1 of auxiliary request 5 differs from claim 1 of auxiliary request 2 in that the liquid-permeability-enhancing agent includes a water-soluble polyvalent salt.

8.1 That multivalent cations function as liquid-permeability-enhancing agents and thus help solve the problem of gel-blocking in superabsorbent polymers is taught by document (4) (see page 97), as conceded by the Respondent, such that the replacement of the hydrophobic silicon dioxide of document (1) by a water-soluble polyvalent salt is obvious.

8.2 The Respondent submitted that in view of the presence of the water-soluble polyvalent salt, which increased the SFC and thus helped prevent gel-blocking, it was surprisingly possible to indirectly increase the CSF,

these two effects otherwise being contradictory (see point 3.4.1 above).

However, since it was known from document (4) that multivalent cations increased the SFC, no inventive ingenuity is required to add such a compound to a particulate superabsorbent polymer which already has a high CSF in order to obtain a superabsorbent in which both SFC and CSF are high.

8.3 Thus, auxiliary request 5 is also not allowable for lack of inventive step pursuant to Article 56 EPC.

Auxiliary request 6

9. Claim 1 of auxiliary request 6 differs from claim 1 of auxiliary request 2 in that the liquid-permeability-enhancing agent includes an aluminium compound.

9.1 Document (4) (see page 101, Table 3.6) specifically teaches the use of aluminium acetate as an example of a multivalent cation which prevents gel-blocking in superabsorbent resins, such that the reasons given in point 8.1 above apply *mutatis mutandis* to the subject-matter of this request, such that it too is obvious.

9.2 The Respondent argued that a particulate absorbent containing aluminium acetate had a vastly improved SFC compared to absorbents containing other permeability enhancing agents, as could be seen by from Example 22 of the patent in suit.

However, this Example differs from the other examples not only by virtue of the different liquid permeability enhancing agent but also by virtue of the mass-average particle diameter (D50), such that the increased SFC

cannot be clearly attributed to the nature of the liquid permeability enhancing agent. Hence no unexpected effect has been shown for a particulate absorbent containing aluminium acetate, this compound being known for the same purpose from document (4).

9.3 Thus, auxiliary request 6 is also not allowable for lack of inventive step pursuant to Article 56 EPC.

Auxiliary requests 7 to 9

10. Claim 1 of auxiliary request 7 is a combination of all the features of claim 1 of each of auxiliary requests 1 to 3.

Claim 1 of auxiliary request 8 is a combination of all the features of claim 1 of each of auxiliary requests 1, 2 and 4.

Claim 1 of auxiliary request 9 is a combination of all the features of claim 1 of each of auxiliary requests 6 to 8.

10.1 The Respondent presented no arguments in support of inventive step for the subject-matter of these requests over and above those already submitted in connection with the main and auxiliary requests 1 to 6.

Since no unexpected effect has been shown for the combinations of features of these requests, the Board holds that the subject-matter thereof is obvious for reasons already given for the individual requests.

10.2 Thus, auxiliary requests 7 to 9 are also not allowable for lack of inventive step pursuant to Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

C. Rodríguez Rodríguez P. Gryczka

Decision electronically authenticated