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Datasheet for the decision of 15 July 2025

Case Number: T 1557/23 - 3.3.09

Application Number: 15863863.5

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Language of the proceedings: EN

Title of invention:
SUPERABSORBENT POLYMER AND METHOD FOR PREPARING THE SAME

Patent Proprietor:
LG Chem, Ltd.

Opponent:
Nippon Shokubai Co., Ltd.

Headword:
Superabsorbent Polymer/NIPPON SHOKUBAI

Relevant legal provisions:
EPC Art. 56, 100(a)
RPBA Art. 11

Keyword:
Inventive step - (no)
Remittal - special reasons for remittal (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Beschwerdekammern

Boards of Appeal

Chambres de recours

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

Case Number: T 1557/23 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 15 July 2025

Appellant: (Patent Proprietor)	LG Chem, Ltd. 128 Yeoui-daero Yeongdeungpo-gu Seoul 07336 (KR)
Representative:	Goddar, Heinz J. Boehmert & Boehmert Anwaltspartnerschaft mbB Pettenkoferstrasse 22 80336 München (DE)
Respondent: (Opponent)	Nippon Shokubai Co., Ltd. Kogin Bldg., 4-1-1 Koraibashi Chuo-ku Osaka 541-0043 (JP)
Representative:	Herzog IP Patentanwalts GmbH Steinstraße 16-18 40212 Düsseldorf (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 30 June 2023 revoking European patent No. 3070114 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	A. Haderlein
Members:	M. Ansorge
	N. Obrovski

Summary of Facts and Submissions

I. The appellant (proprietor) lodged an appeal against the opposition division's decision revoking the patent.

II. With its notice of opposition, the opponent had requested that the patent be revoked in particular on the ground for opposition of lack of inventive step.

III. The opposition division decided that claim 1 of the main request and claim 1 of auxiliary request 1 did not fulfil the requirements of Article 123(3) EPC.

IV. Claim 1 of the main request reads as follows:

"A method for preparation of a super absorbent polymer comprising a crosslinked polymer, the crosslinked polymer being obtained by surface-crosslinking a base polymer prepared by polymerizing a water-soluble ethylene-based unsaturated monomer including an acidic group in which at least a part of the acidic group is neutralized, wherein the super absorbent polymer has

a centrifuge retention capacity (CRC), measured according to EDANA WSP 241.2, of more than 20 g/g,

an absorbency under 0.9 psi load (AUL), measured according to EDANA WSP 242.2, of more than 18 g/g, and

ARUL shown in the following Equation 1 of 60% to 85%:

[Equation 1]

ARUL = 0.3AUL(5 min) / 0.3AUL(60 min)

in Equation 1,

0.3AUL(5 min) and 0.3AUL(60 min) are the values of absorbency under load (AUL) at 5 minutes and 60 minutes shown in the following Equation 2, respectively,

[Equation 2]

0.3AUL(g/g) = [Wb(g) - Wa(g)]/weight(g) of the absorbent polymer

in Equation 2,

Wa(g) is the sum of the weight of the absorbent polymer and the weight of the device capable of providing a load for the absorbent polymer, and

Wb(g) is the sum of the weight of the absorbent polymer in which moisture is absorbed after supplying water for the absorbent polymer under a load (0.3 psi) for 5 minutes or 60 minutes, and the weight of the device capable of providing a load for the absorbent polymer,

wherein the method comprises the steps of:

1) carrying out thermal polymerization or photopolymerization of a monomer composition including a water-soluble ethylene-based unsaturated monomer and a polymerization initiator to form a hydrous gel phase polymer;

2) passing the hydrous gel phase polymer through a chopper die and pulverizing the polymer;

3) drying the pulverized hydrous gel phase polymer;

4) pulverizing the dried polymer; and

5) surface-crosslinking the pulverized polymer,

wherein the chopper die is provided with a plurality of holes, the chopper die has an opening/closing rate of 30 to 40%, wherein the opening and closing rate of the chopper die refers to the total area of holes compared to the total area of the upper surface of the chopper die, and the chopper die satisfies the following Mathematical Formula 1:

[Mathematical Formula 1]

$$c > 2 \times \sqrt{0.4 \times \pi \times n \times A}$$

wherein

A is the total area of the upper surface of the chopper die, n is the number of holes, and c is the total circumference of the plurality of holes."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the feature "and wherein n is an integer of 10 to 30" is incorporated at the end of the claim.

V. The following documents were cited in the case at hand:

D11: EP 2 518 092 A1
D13: EP 2 557 095 A1
D14: WO 2006/026406 A2
D16: "Grinding of water containing pasty gels to improve drying", 1995

VI. The parties' relevant arguments are reflected in the reasons for the decision below.

VII. Requests

The appellant requested that the decision be set aside and that the patent be maintained on the basis of the main request or auxiliary request 1, both filed with the statement of grounds of appeal, corresponding respectively to the main request and auxiliary request 1 on which the decision was based.

The respondent (opponent) requested that the appeal be dismissed.

Reasons for the Decision

MAIN REQUEST

1. Request for remittal to the opposition division

1.1 The appellant requested that, if the board found that the claim requests complied with Article 123(3) EPC, the case be remitted to the opposition division.

1.2 According to Article 11 RPBA the board is not to remit a case to the department whose decision was appealed, for further prosecution, unless special reasons present themselves for doing so. As a rule, fundamental deficiencies which are apparent in the proceedings before that department constitute such special reasons.

1.3 The board does not consider that there are any such fundamental deficiencies or special reasons in the case at hand which could justify remitting the case to the

opposition division for further prosecution. Moreover, both parties made submissions with respect to inventive step.

Thus, the board settled the case without remitting it to the opposition division for further prosecution and decided on the question of inventive step (see point 2 below).

2. Inventive step

2.1 The appellant argued that the claimed subject-matter involved an inventive step over D11 as the closest prior art.

2.2 As outlined below, the board comes to a different conclusion.

2.2.1 D11 discloses a process for production of a water-absorbable polyacrylic acid resin powder, comprising:

(a) polymerising an acrylic acid-based monomer aqueous solution containing bubbles, and
(b) drying a hydrogel crosslinked polymer thus obtained in the step of polymerising,

the process further comprising:

(c) lowering solubility of dissolved gas in a monomer aqueous solution in the presence of a surfactant and/or a dispersing agent, so as to generate the bubbles in the acrylic acid-based monomer aqueous solution (see claim 1).

2.2.2 The subject-matter of claim 1 differs from D11 in the feature "the chopper die satisfies the following

Mathematical Formula 1 ..., wherein A is the total area of the upper surface of the chopper die, n is the number of holes, and c is the total circumference of the plurality of holes". The board agrees with the respondent that this feature of claim 1, in essence, specifies that the holes of the chopper die are not circular in shape. A circular shape - by way of its special geometrical shape - leads to the smallest total circumference of a hole in a chopper die at a given cross-sectional area compared to any other potential hole shape of a comparable size.

2.2.3 With respect to the question of whether there is an effect resulting from this distinguishing feature over D11, the board comments as follows.

2.2.4 Comparative examples 1 and 2 of the patent are not representative for example 11 of D11 since, in the latter example, a diameter of the chopper die of 68 mm is used (vs. 81 mm in comparative examples 1 and 2 of the patent) as well as a die pore diameter of 6.4 mm (vs. 14 mm in comparative example 1 and 8 mm in comparative example 2). Thus, the comparative examples cannot be used to demonstrate an improvement over D11.

2.2.5 Example 1 of the patent is indicated in the specification as not being according to the invention. This declaration was included by the proprietor in response to a remark by the primary examiner during the examination proceedings that example 1 was not an inventive example, since it did not show an absorbency under 0.9 psi load (AUL) of more than 18 g/g (see point 3 of the communication pursuant to Article 94(3) EPC dated 28 January 2019). Accordingly, it is considered that example 1 is not an example falling within the scope of claim 1. The submission by

the respondent that example 1 of the patent is an example that is covered by the wording of claim 1 cannot change this assessment.

2.2.6 There is no information in the patent concerning the exact dimensions of the shamrock-shaped, the star-shaped or the banana-shaped holes in the chopper die of examples 1 to 5 of the patent; the diameter of the chopper die being 81 mm. The patent is also silent with respect to a specific calculation for these examples demonstrating that Mathematical Formula 1 of claim 1 is satisfied. The total circumference of the plurality of holes (c) is one of the variables in Mathematical Formula 1 of claim 1 and the feature "the chopper die satisfies the following Mathematical Formula 1 ..., wherein A is the total area of the upper surface of the chopper die, n is the number of holes, and c is the total circumference of the plurality of holes" is the only distinguishing feature over D11. The fact that it is not known from the patent whether examples 1 to 5 fall within the scope of claim 1 (as far as this claim feature is concerned) and exactly how they differ (with respect to the feature containing Mathematical Formula 1) from the closest prior art cannot be considered to support the appellant's case.

2.2.7 The board does not agree with the appellant that the respondent failed to provide any calculations and, instead, merely alleged that the opening/closing rate of 30% to 40% defined in claim 1 was not fulfilled by the examples. The respondent made significant efforts to try to determine whether examples 1 to 3, exemplified in Figures 1 to 3 of the patent, fulfilled Mathematical Formula 1 of claim 1 (the same seems to be true for examples 4 and 5, which have the same chopper die as in example 2 or 3). In the absence of exact

dimensions for the shamrock-shaped, the star-shaped and the banana-shaped holes in the chopper die of examples 1 to 5 of the patent, the only possible option for the respondent was to try to calculate the total circumference of the plurality of holes (c) based on Figures 1 to 3 of the patent. In certain cases it might be difficult to determine absolute dimensions from the figures, which, typically, are purely schematic and may not allow exact dimensions to be deduced. However, the respondent calculated values for the total circumference of the plurality of holes (c) which are so close to those given in examples 1 to 3 of the patent (549 mm for example 1 vs. 550 mm mentioned in paragraph [0073] of the patent; 640 mm for example 2 vs. 650 mm mentioned in paragraph [0076] of the patent; and 622 mm for example 3 vs. 640 mm mentioned in paragraph [0077] of the patent) that this supports the view that, in this specific case, Figures 1 to 3 are not purely schematic drawings.

2.2.8 In the absence of any indication in the patent, the board cannot see that examples 1 to 5 of the patent unambiguously fulfil the feature "the chopper die has an opening/closing rate of 30 to 40%" of claim 1.

2.2.9 Under these circumstances and considering, in particular, that the comparative examples of the patent are not representative of the closest prior art, D11, an improvement resulting from the distinguishing feature over D11 cannot be acknowledged.

2.2.10 In view of the above, the problem to be solved as proposed by the appellant, i.e. to provide a method for preparing a superabsorbent polymer with improved absorbency under load (AUL) while maintaining a high centrifuge retention capacity (CRC) and superior

initial absorption (ARUL), by optimising the chopper die design to ensure efficient pulverisation and avoid excessive load on the chopper die, cannot be acknowledged. Rather, the objective technical problem to be solved is to provide an alternative method for preparing a superabsorbent polymer.

2.2.11 With respect to the question of obviousness, a skilled person seeking a solution to the above problem would consider D13, D14 or D16. These documents teach a hole shape of the chopper die that differs from the circular shape (see paragraph [0092] of D13; paragraph [0035] of D14; and Figure 4 of D16). In addition, D13 teaches that a preferred hole area rate is in a range of 30% to 55% (see paragraph [0092] of D13), thus overlapping with the range of claim 1. A skilled person seeking a solution to the above problem would contemplate a non-circular hole shape in the chopper die, as taught in D13, D14 or D16. Document D13 teaches, e.g., a rectangular, elliptic or slit shape, D14 teaches a round, star or ribbon shape and D16 teaches a star shape or other shapes similar to those described in the patent.

2.2.12 When contemplating a chopper die having a hole shape that differs from a circular shape, as taught in D13, D14 or D16, the result is that Mathematical Formula 1 of claim 1 is fulfilled. This is, for instance, the case for a star shape as taught in D14 and D16. The board is also of the opinion that a certain variation of the hole shape in a chopper die amounts to a routine modification for a skilled person in the present technical field.

2.2.13 The appellant argued that D13 and D14 did not provide a teaching or motivation to combine a non-circular hole

in the chopper die with D11 to achieve the technical effects of the present invention. In its view, neither D13 nor D14 suggested the specific relationship defined by Mathematical Formula 1 or the advantageous effects on AUL, CRC, ARUL and chopper die load achieved by the claimed non-circular hole design. With respect to D16, the appellant submitted that this document merely stated that chopper die holes might have different sizes and shapes but did not provide any teaching that a specific technical effect was associated with the distinguishing feature.

2.2.14 The board is not convinced by this line of argument. As outlined above, no improvement can be acknowledged over D11 as the closest prior art. Thus, a skilled person seeking a solution to the problem posed does not need to show that a document specifically hints at a particular technical effect. A skilled person would arrive at the claimed subject-matter without requiring inventive effort. The claimed subject-matter is considered an obvious alternative to D11 as the closest prior art.

In view of the above, the subject-matter of claim 1 of the main request does not involve an inventive step in view of D11 as the closest prior art in combination with D13, D14 or D16.

AUXILIARY REQUEST 1

3. Claim 1 of auxiliary request 1 differs from claim 1 of the main request in the feature "wherein n is an integer of 10 to 30". The appellant argued that the requirements of Article 56 EPC were fulfilled for the same reasons as those discussed in relation to the main request. Under these circumstances, the board does not

see why the subject-matter claimed in auxiliary request 1 should be judged differently compared to the main request.

Moreover, as argued by the respondent, there is no advantage resulting from this feature. It was obvious to a skilled person to contemplate a number of holes falling within this range, as taught, e.g., in example 24 of D11 using 10 holes in the chopper die.

In view of the above, the subject-matter of claim 1 of auxiliary request 1 does not involve an inventive step in view of D11 as the closest prior art.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Götz-Wein A. Haderlein

Decision electronically authenticated