

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 26 February 2008**

Case Number: T 1240/04 - 3.3.03

Application Number: 97303809.4

Publication Number: 0811636

IPC: C08F 2/10

Language of the proceedings: EN

Title of invention:

Method for production of cross-linked polymer

Patentee:

NIPPON SHOKUBAI CO., LTD.

Opponent:

BASF Aktiengesellschaft

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Novelty - public prior use - (no) - insufficient evidence"

"Novelty - main request - yes"

"Inventive step - main request - yes"

Decisions cited:

T 0472/92, T 0782/92, T 0848/94

Catchword:

-



Case Number: T 1240/04 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 26 February 2008

Appellant: BASF Aktiengesellschaft
(Opponent) D-67056 Ludwigshafen (DE)

Representative: Riedl, Peter
Patentanwälte
Reitstötter, Kinzebach & Partner
Postfach 86 06 49
D-81633 München (DE)

Respondent: NIPPON SHOKUBAI CO., LTD.
(Patent Proprietor) 1-1, Koraibashi 4-Chome
Chuo-ku
Osaka-shi
Osaka-fu 541 (JP)

Representative: Rees, David Christopher
Kilburn & Strode
20 Red Lion Street
London WC1R 4PJ (GB)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office dated 17 June 2004 and
posted on 17 August 2004 rejecting the
opposition filed against European patent
No. 0811636 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: R. Young
Members: M. C. Gordon
H. Preglau
A. Däweritz
E. Dufrasne

Summary of Facts and Submissions

I. Mention of the grant of European Patent No. 0 811 636 in the name of Nippon Shokubai Co. Ltd., in respect of European patent application No. 97303809.4 filed on 4 June 1997 and claiming priority of JP 142708/96 dated 5 June 1996 was announced on 22 August 2001 (Bulletin 2001/34) on the basis of 18 claims.

Independent claim 1 read as follows:

"1. A method for the production of a cross-linked polymer by the polymerization of an aqueous polymerizable monomer solution containing a water-soluble ethylenically unsaturated monomer and a first cross-linking agent capable of forming a hydrogel polymer by polymerization, which comprises performing said polymerization in a substantially static state from the time at which said polymerization is initiated till the time at which the whole polymerization system is gelled, subsequently giving said polymerization system a thorough shearing force thereby granulating the hydrogel polymer before said polymerization system has the temperature thereof elevated by the heat of polymerization to the highest level, and further continuing said polymerization."

Claims 2-17 were dependent claims directed to preferred embodiments of the method of claim 1.

Independent claim 18 read as follows:

"18. An absorbent resin manifesting an absorption capacity with physiological saline solution without load of at least 30 g/g, an absorption capacity with physiological saline solution under load of at least 25 g/g, and a content of deteriorated soluble component

of not more than 15% by weight and assuming an irregular shape."

II. A notice of opposition to the grant of the patent was filed on 22 May 2002 by BASF AG. The grounds pursuant to Art. 100(a) EPC were invoked. Specifically, objections pursuant to Art. 54 EPC arising from an alleged public prior use were raised in respect of the subject matter of claim 18 (product) but not in respect of the subject matter of claim 1 (method). Objections pursuant to Art. 56 EPC were raised in respect of the subject matter of claims 1 (method) and 18 (product).

The following documents, *inter alia* were cited in support of the opposition:

- D1: Invoices and freight documents relating to the product "SANWET IM-4500"
- D2: A photograph of sample bottle bearing the legend "Tox Retain SANWET® IM-4500 (C-1973) July 26, 1996"
- D3: Sworn statement by witness Dr. Thomas Daniel dated 21 May 2002
- D9: EP-A-508 810
- D10: EP-A-467 073.

During the oral proceedings before the opposition division evidence was taken pursuant to Art. 117(1)(d) EPC, wherein the aforementioned Dr. Thomas Daniel was heard as witness.

III. In a decision announced on 17 June 2004 and issued in writing on 17 August 2004 the opposition division rejected the opposition.

(a) With respect to novelty, it was held, with reference to D1, to be established facts that the

product "SANWET® IM-4500" had been produced and sold by Hoechst Celanese Corporation well before the priority date of the patent in suit. Hence "SANWET® IM-4500" was comprised in the prior art under Art. 54(2) EPC.

It was also held that, although the sample of D2 was dated after the priority date of the patent in suit, in view of the submissions by the witness this sample could, beyond reasonable doubt, be considered as representative for the product as sold before the priority date of the patent in suit. It was however held that the analytical data advanced did not establish beyond reasonable doubt that "SANWET® IM-4500" exhibited the properties, in particular absorption capacity with and without load specified in operative claim 18.

Accordingly it was held that "SANWET® IM-4500" was not novelty destroying for the subject matter of claim 18 of the patent as granted.

Since "SANWET® IM-4500" was the only piece of prior art on the basis of which the opponent had based the objection of lack of novelty, it was concluded that the subject matter of claim 18 as granted was novel.

- (b) With regard to inventive step of the product (claim 18) the argumentation of the opponent according to which "SANWET® IM-4500" would be the closest state of the art could not be followed because it had not been established beyond reasonable doubt that the values of absorption capacity were only "marginally" different from those specified in claim 18. Thus the public had not been informed at the priority date of the patent in suit of the actual absorption capacities

of "SANWET® IM-4500". Accordingly the skilled person could not have had any incentive whatsoever to try to improve these properties.

It was however held that the data in Table 2 of the patent, and that submitted during the examination proceedings (letter of 23 November 1999) demonstrated that the product according to operative claim 18 exhibited improved values for the absorption capacities with and without load as compared to the state of the art D9 and D10. No further document had been cited which would have provided the skilled person with the necessary hint or incentive to improve the absorption capacities. Accordingly the subject matter of claim 18 was held to be founded on an inventive step.

With respect to the process (claim 1) it was held that both D9 and D10 dealt with the same problem as the patent in suit, namely the provision of superabsorbent resins improved in absorption capacities with and without load and reduced content of soluble components.

D9 disclosed a method for the preparation of such a resin, which was carried out under continuous agitation (shear force) whereas operative claim 1 required a static state from the time of initiation of the polymerisation until gelation of the polymerisation system.

The problem to be solved by the subject matter of operative claim 1 was to provide a process for the preparation of superabsorbent resins with improved absorption capacities with and without load and reduced content of soluble components.

This problem had been solved, as demonstrated by the evidence referred to above.

D9 was limited to a process in which exertion of a high shear force on the hydrogel upon polymerisation was required. D9 recommended gentle agitation while mixing the reactants and while the degree of polymerisation was low (below 10%). D9 however did not contemplate or suggest polymerisation under static conditions.

D10, cited in combination with D9 by the opponent, disclosed agitation only in order to mix the reactants and after completion of polymerisation to crush the hydrogel. Agitation after gelation and before attainment of the maximum reaction temperature was neither disclosed nor suggested in D10.

Accordingly, the teachings of D9 and D10 were incompatible with each other to the extent that their essential features were opposed: either polymerisation was to be carried out under a shear force (D9) or under static conditions (D10). Thus the skilled person would not consider combining the teachings of D9 and D10.

Even if nevertheless the skilled person did consider combining the teachings of D9 and D10 it would not be known when to start or stop agitation and it could not be expected that the absorption capacities and content of soluble components would be improved by such a combination of features. Accordingly the subject matter of the process claims 1-17 was held to be founded on an inventive step.

(c) Thus the opposition was rejected.

IV. A notice of appeal against this decision was filed by the opponent on 20 October 2004, the requisite fee being paid on the same day.

V. The statement of grounds of appeal was filed on 23 December 2004.

(a) With respect to the objection of lack of novelty of the subject matter of claim 18 with respect to the alleged public prior use of the product "Sanwet® IM-4500", it was submitted, contrary to the position of the opposition division, that all the requisite properties were exhibited by said product.

New measurements of the absorption capacities with and without load were submitted. These had been carried out on the Rückstellprobe (Retain sample) designated "SANWET IM-4500 (C-1973)", depicted in D2.

A further objection of lack of novelty of the subject matter of claim 18 was raised - for the first time - with respect to the disclosure of example 4 of D10.

In making this objection reference was made to the data submitted by the then applicant with the letter of 23 November 1999 (see section III.(b) above). It was submitted that the content of deteriorated soluble component was not suitable as a distinguishing feature. It was argued that the method specified in the patent in suit for determining this feature required, prior to the actual measurement, classification to a particle size of 300-600µm. Claim 18 contained no restriction in respect of the particle size, and

thus encompassed embodiments in which the stated particle size range made up only a minor proportion of the sample, or even was completely absent. In such a case the determination of said property on a sample of the specified particle size range would not yield any reliable information about the relevant property of the whole product.

Thus the feature relating to the content of deteriorated soluble component could not serve to establish a distinction with respect to the prior art, in particular D10.

- (b) The objection of lack of inventive step was maintained with respect to the method of claim 1. D9 was concerned with the preparation of absorbent resins with a high absorption capacity and a low content of water soluble components, i.e. the same problem as that of the patent in suit. Accordingly D9 represented the closest prior art. D9 disclosed in claim 1 a process for preparing a particulate hydrogel in which shearing forces were applied to the hydrogel. From page 5, line 6 of D9 it was derivable that the hydrogel subjected to shearing forces was a water containing gel which had already attained a degree of polymerisation of a few percent; on the other hand, the monomer components, prior to attaining the gel state should not be exposed to any excessive shear force as otherwise undesired phenomena such as a reduction in molecular weight arose. In particular D9 disclosed an embodiment in which the polymerisation of a hydrogel proceeded under simultaneous exposure to shearing forces. As the

polymerisation was an exothermic reaction, the continuation of the polymerisation resulted in the generation of heat, which resulted in a (further) increase in the temperature of the polymerisation system. Accordingly in this embodiment the exposure to shearing forces commenced before the reaction system had attained maximum temperature. Accordingly D9 disclosed all features of operative claim 1 without explicitly describing a polymerisation in a static state from initiation until gelation.

D10 also related to the production of absorbent resins with high absorption capacity and a low content of water soluble components.

The skilled person would expect that a superposition of the teachings of D9 and D10 would lead to a particularly advantageous solution to the technical problem.

D10 recommended to carry out polymerisation of the monomer solution without mechanical agitation. The thus obtained polymer could then be ground up.

The position of the opposition division that D9 and D10 were incompatible (see section III.(b) above) was disputed. The combination of D9 and D10 did not necessitate any modification of essential process features of either or both methods. D9 required the exertion of shearing forces on the hydrogel but not on the monomer solution before gelation. D10 on the other hand recommended static polymerisation of the monomer solution and imposed no restriction on the treatment of the hydrogel. Thus there existed no obstacle to combining these teachings.

No objections pursuant to Art. 56 were raised with respect to the subject matter of claim 18.

VI. The patentee, now the respondent replied with a letter dated 4 July 2005.

(a) With respect to the objection of lack of novelty of the subject matter of claim 18 in view of "SANWET® IM-4500" it was submitted that the material referred to in D2 as "IM-4500 (C-1973)" was not an instance of a material made available to the public pursuant to Art. 54(2) and hence was not citable as evidence of public prior use. Specifically it was submitted that there was no evidence that the sample of "SANWET® IM-4500" tested had been available before the priority date of the patent in suit. Instead there was a sample according to D2 dated after the priority date. The existence of the invoices of D1 did not establish that the products were the same since the conditions of storage and passage of time would necessarily have affected the properties. Further the end-user of the product which was the subject of the invoices D1 may have specified different physical properties of the product than those of the sample described by D2.

There was no evidence that the product "SANWET® IM-4500" had been freely available before the priority date and the appellant had not provided the necessary evidence to substantiate the allegation of public prior use.

Further the reliability of the evidence advanced by the appellant during the opposition procedure was disputed.

With respect to the objection of lack of novelty

of the subject matter of claim 18 raised with respect to the disclosure of D10 it was submitted that, in view of the text of paragraphs [0055], [0057] and of example 9 of the patent in suit it was clear that particles in the requisite size range would inevitably be contained in the invention. Hence there was no need to specify this. Thus the significant difference between D10 and the patent in suit was, as explained by the experimental data submitted with the letter of 23 November 1999, the content of deteriorated soluble component.

The difference between the invention in suit and D10 based on the experimental data submitted was significant, which result was not changed by any potential experimental errors in the measurement ranges given.

The data of the appellant in any case showed variations which rendered it not reliable enough to consider.

- (b) With respect to inventive step it was submitted that the teachings of D9 and D10 were mutually exclusive. Further the appellant had not established any motivation for the skilled person to consider modifications to the teaching of D9, much less to import thereinto the teachings of D10. Thus the combination of D9 and D10 did not render the claimed subject matter obvious.
- (c) A set of 18 claims forming a first auxiliary request was also submitted, the details of which are not relevant for this decision.

VII. Further submissions were received from the appellant and respondent on 13 October 2005 and 14 December 2006,

respectively. As the substance of these submissions related to the auxiliary request referred to in section VI.(c) above, they are not relevant for the present decision.

VIII. The board issued on 28 August 2007 a summons to attend oral proceedings.

IX. With a letter dated 24 January 2008 the respondent submitted 13 sets of claims as first to thirteenth auxiliary requests. The previously filed auxiliary request (see section VI.(c) above) was withdrawn. The claims of these requests contained new features which had not previously been relied upon. The text of these requests is however not relevant for this decision.

X. In a letter dated 6 February 2008 the appellant objected to the submission of the auxiliary requests and requested either that these be rejected as late filed, or in the alternative that the oral proceedings be cancelled and the procedure be continued in writing.

XI. In a letter dated 19 February 2008 the respondent requested that the auxiliary requests be admitted. In the case that the Board were to accept the argumentation of the appellant that these requests were late filed, postponement of the oral proceedings was requested.

XII. Oral proceedings were held on 26 February 2008.

(a) *Main request - Novelty - claim 18*

(i) With respect to the argument relating to public prior use of the product "SANWET® IM-

4500", the appellant submitted that the material which had been analysed, i.e. the sample identified in D2 - had not been taken from one of the batches forming the subject of the sales invoices submitted as D1, and further that it had never been argued that this was the case.

It was submitted that the product was unambiguously identified by the assigned tradename, and that the sample of D2 was representative of material sold under this designation. The conventions and protocols employed by the manufacturer thereof stipulated that such a tradename was assigned only to products produced on a commercial scale. Any modification of such a product would be assigned a different designation. Thus it was excluded that the product referred to in D2 differed from that referred to in D1. The suffix "C-1973" was a unique number assigned for the purposes of toxicity testing. The letter "C" indicated that this sample was of a commercially produced product.

The toxicity test carried out on the sample of D2 was a statutory test. The material employed for the test was not sold as the sample was destroyed in the course of the testing. The date on the sample of D2 related to when the material had been returned from toxicity testing, and corresponded to the date on which it had been transferred to the depicted container for storage and the container placed in the

storage facility.

It was further explained that toxicity testing was one of the first tests carried out on the products, in particular to check for mutagenicity. This would typically be carried out on a product produced on a small scale. Subject to the outcome of this test, scale up and further testing e.g. for skin irritation would be carried out. Such irritation tests were not carried out on material taken from the same production batch as the samples employed for toxicity testing since as a result of the smaller scale employed (see above) a higher content of residual monomer would be present which would give unreliable results for the irritation tests.

The designation "C-1973" uniquely identified the batch from which the sample had been taken, which was a full production batch, and documentation to this effect existed. It was again confirmed that not all tests were necessarily done at the same time.

Production samples could be retested in order to confirm the initial results. It was however confirmed that the product was identical irrespective of the scale of production.

The respondent disputed that there was any evidence that the sample of D2 was representative of the product that was actually sold. In particular it was objected that there was no evidence linking the

sample of D2 to any material that had been the subject of a commercial transaction. Accordingly the case of public prior use had not been proven "up to the hilt" (with reference to T 472/92 (OJ EPO 1998, 161)).

- (ii) With respect to the objection of lack of novelty based on D10, the appellant submitted that the specification of the content of deteriorated soluble component had to be disregarded. Due to the absence of a specification of the particle size employed for the measurement, this was unclearly defined. Evidence submitted during the oral proceedings before the opposition division established that the result was affected by the particle size employed. As a consequence the disclosure of D10 anticipated this subject matter. The respondent submitted that the patent provided a full description of the method for determining the deteriorated soluble component. It was further submitted that the particle size was not critical - this was merely a convenient size range for carrying out the determination. The evidence submitted during the examination proceedings confirmed that the corresponding property of the composition of example 4 of D10 was outside the claimed range.

(b) *Main request - inventive step - claim 1*

The appellant submitted that D9 represented the closest prior art. Like the patent in suit, this related to a polymerisation process in which stirring was limited. In particular D9 rendered

obvious the step of stirring from the point of gelation onwards (D9 page 7, line 12). In particular D9 taught on page 5, lines 21-27 that different stirring regimes could be adopted. There was no evidence of any technical effect arising from the method of operative claim 1. Thus the objective technical problem was to provide an alternative method. This technical problem had been solved in an obvious manner by modifying the stirring regime. Such a modification was also rendered obvious by the combination of D9 with D10. With reference to D10 it was submitted that this document did not contain any teaching about stirring during the hydrogel state, thus such a step was not excluded.

The respondent submitted that the technical problem to be solved was to provide an absorbent resin with improved properties and with control of the soluble components thereof as set out page 3 lines 9-11 of the patent in suit.

The examples and control examples 1-4 of the patent in suit demonstrated that said problem had been solved by the claimed method.

The process according to D9 required agitation whereas D10 taught to avoid agitation.

Thus D9 and D10 were incompatible and there would have been no incentive to combine these teachings.

XIII. The appellant (opponent) requested that the decision under appeal be set aside and that the European patent no. 811 636 be revoked.

The respondent (patentee) requested that the appeal be dismissed (main request) or in the alternative to set aside the decision under appeal and to maintain the

patent on the basis of one of the auxiliary requests 1 to 13 filed with letter dated 24 January 2008.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Novelty - Claim 18.*

Operative claim 18 is directed to an absorbent resin with defined absorption capacities with and without load and a defined content of "deteriorated soluble component" (see section I above).

Objections of lack of novelty have been raised based on an alleged public prior use, and in view of the disclosure of D10 (see sections II and V.(a) above).

- 2.1 *Public prior use - "SANWET® IM-4500"*

- 2.1.1 When deciding on objections of lack of novelty based on public prior use, the case law of the boards of appeal applies a very exacting standard of proof namely that of "up to the hilt" (T 472/92 OJ EPO 1998, 161). In particular three questions have to be answered, namely the "when", the "what" and the "how" of the alleged prior use (T 472/92 reasons 3.2; see also T 848/94, 3 June 1997, not published in the OJ EPO, reasons 3.1).:

- the date on which the prior use occurred ("when" issue);
- exactly what was in prior use ("what" issue);

- the circumstances surrounding the prior use, in particular issues of confidentiality ("how").

2.1.2 In the present case the appellant relies on one set of documents to address the "when" and "how" questions, namely D1 and a second set of documents to establish the "what" issue, namely D2, D3 and the witness statement made at the oral proceedings before the opposition division.

2.1.3 Each of the documents forming "D1" refers to "SANWET IM-4500", bears the term "invoice" and specifies a price and payment terms. The documents are addressed to a number of different recipients in different countries. The shipping dates are in the period from October-December 1995. The quantities reported on certain of these documents are of the order of a few tens of thousands of pounds. Further there is no evidence of any confidentiality obligations.

In view of this the Board is satisfied that the transactions referred to in D1 were of a commercial nature, i.e. that as of October 1995, some 9 months before the priority date of the patent in suit ("when"), a product designated "SANWET® IM-4500" had been made available to the public on a commercial basis ("how"). However D1 contains no information about the nature of "SANWET® IM-4500", i.e. does not address the "what" question.

In order to address this aspect the appellant relied on D2, the associated document D3 and the witness statement at the oral proceedings before the opposition division.

2.1.4 However, as explicitly stated by the appellant at the oral proceedings before the Board (see section XII.(a).(i) above) there is no link between D1 and D2 and the material referred to in D2 was not one of those batches forming the basis of the commercial transactions of D1.

2.1.5 It has been submitted, with reference to - undocumented - product naming conventions stated to be employed by the appellant that the tradename employed would unambiguously identify the product (see section XII.(a).(i) above). This submission is however supported by no evidence.

2.1.6 In this connection, although it was stated at the oral proceedings that the sample referred to in D2 was produced on a commercial scale, a portion of which was sold, and was representative of the product sold according to D1, (see section XII.(a).(i) above) there is no evidence of such a sale, let alone an indication of the date thereof. There is also no evidence that would establish that the nature of the product of D2 was in fact "representative" of those batches forming the object of the commercial transactions documented by D1.

2.1.7 The question of whether the sample of D2 was in fact "representative" of that product commercially sold according to D1 is rendered doubtful in the light of a number of inconsistencies in the submissions of the appellant regarding the origins of the sample of D2 made before the opposition division, particularly in the witness statement and the statements made at the oral proceedings before the Board.

- (a) According to the statement made by the witness heard by the opposition division, parts of the batch submitted for toxicity testing were - after being released ("Wenn die Freigabe erfolgt") - employed for the purposes of customer trials and sampling. This follows from the following passage at page 2 fourth complete section of the minutes of the taking of evidence:

"In der Regel ist es die erste Testversuchsproduktion, aus der man diese Muster nimmt. Dieses kommt dann zum Toxizitätstest. Wenn die Freigabe erfolgt, wird der Rest dieser Produktion für Kundenversuche verwendet, d.h. die Kunden werden damit bemustert. Sie können dieses Produkt testen im Hinblick auf ihre Windelkonzepte." ("As a rule the sample is taken from the first test production. This is then submitted to toxicity testing. When the product has been released, the remainder of the production is employed for customer tests, i.e. the customers are provided with samples of the product. They can test the product in view of their diaper concepts." translation by the Board).

This statement indicates, in particular due to the use of the wording "in der Regel" ("as a rule") that this is a general indication of the procedure which is - as a rule - followed, but that this statement is not based on information relating specifically to the "C-1973" sample under discussion. Thus this statement does not establish

that any portions of the "C-1973" sample were ever submitted to customers for testing.

- (b) Even if, for the sake of argument, this procedure was that which had been followed in the case of the sample in question and customers had been provided with portions of the batch from which the "C-1973" sample had been withdrawn, the indicated procedure does not predicate that such provision of samples would have been in the nature of an arms-length commercial transaction and therefore amount to an unrestricted public disclosure but rather would have been a restricted disclosure to selected third parties (cf T 782/92, 22 June 1994, not published in the OJ EPO, reasons 2.2 in particular 5th paragraph).

Thus even if customers had been provided with portions of the "C-1973" batch for testing or sampling, this would not itself necessarily have constituted a disclosure placing the said product into the state of the art pursuant to Art. 54(2) EPC.

- (c) During the oral proceedings before the Board it was submitted, in contrast to the statements made by the witness before the opposition division according to which the C-1973 sample had been taken from a "Testversuchsproduktion" (Trial production run) that toxicity testing - the purpose for which the "C-1973" sample had apparently been employed - was carried out at a stage of product development before full scale-up (see section XII.(a).(i) above). Further as a consequence of the smaller scale employed, - according to the submission of the appellant - certain tests, e.g. skin irritation, would not

have been carried out since the higher content of residual monomer would give unreliable results. Thus it is evident that there is a discontinuity between the production of sample "C-1973" for toxicity testing and the full scale production of a commercially sold product since, according to the submissions made to the Board, "C-1973" had been made at a smaller scale and thus was not in a state to undergo supplementary skin irritation tests. This is however inconsistent with the submissions made in the witness statement before the opposition division according to which the "C-1973" sample was derived from a (test) production batch, i.e. manufactured at the full scale (see section 2.1.7.(a) above).

- (d) In view of the inconsistencies in the submissions made with respect to the origin and source of the "C-1973" sample there is doubt as to the precise link between, and therefore as to the compositional identity of the sample "C-1973" and the product which was actually commercially sold under the designation "SANWET IM-4500" such as that of D1. In particular it has not been shown up to the hilt that the composition of these two products was the same, and therefore that the properties of the "C-1973" sample were in fact representative of the properties of the product "SANWET IM-4500" sold according to D1.

2.1.8 Accordingly neither the evidence of D2 itself, nor the statements made by the appellant either before the opposition division or before the Board serve to establish "up to the hilt" that the properties of the product designated "Tox Retain SANWET® IM-4500 (C-1973) July 26, 1996" of D2 would reflect the properties, in

particular the absorption capacities with and without load of the product made available to the public by way of commercial transaction according to D1.

2.1.9 No other evidence has been submitted that would support the position that the properties of the material of the sample referred to in D2 were identical to or representative of those of the product referred to in D1.

2.1.10 Since there is no evidence relating to the properties of "SANWET® IM-4500" sold according to D1, let alone evidence establishing that the properties thereof corresponded to those specified in operative claim 18, the case of public prior use in respect of the sales of "SANWET® IM-4500" documented in D1 has not been proven.

2.1.11 Consequently the subject matter of claim 18 is novel over the product "SANWET® IM-4500".

2.2 *D10*

With respect to D10 it was submitted that the content of deteriorated soluble component could not establish a distinguishing feature since the measurement method, in particular the particle size employed was not defined in the operative claim (see sections V.(a) and XII.(a).(ii) above).

In this respect the Board observes that there is not even a mention of the property in question in D10 in general terms, let alone an explicit disclosure of a composition exhibiting the required property.

It is true that evidence has been submitted by the then opponent during the oral proceedings before the opposition division (reported in Annex I of the Minutes)

that the value obtained is influenced by the particle size, and the degree of classification. This evidence showed that the result obtained for the unclassified sample was ca. twice that obtained when the sample had been classified to 300-600 μm as set out in the method disclosed in the patent in suit. This evidence however did not relate to example 4 of D10, which was cited as novelty destroying, but was carried out on the D2 sample of "SANWET® IM-4500 (C-1973)" (see also submission of the respondent reported in section VI.(a) above).

Critically the appellant has advanced no evidence with respect to example 4 of D10.

- 2.3 Even if, for the sake of argument one were to assume the same influence of particle size on the measured value of deteriorated soluble component as identified by the appellant for "SANWET® IM-4500 (C-1973)" this would not alter the conclusion. Based on the evidence submitted by the then applicant during the examination procedure, which found a value of 35 wt.% for example 4 of D10 when classified according to the method set out in the patent in suit, and thus outside the scope of operative claim 18, it can be concluded, by analogy with the results reported in section 2.2 above that the non-classified sample would be determined to have a content of deteriorated soluble component of ca. twice this amount i.e. ca 70 wt. % which is also outside the scope of operative claim 18. Accordingly D10 provides neither an explicit nor an implicit disclosure of the content of deteriorated soluble component as defined in operative claim 18.

2.4 As the allegation of public prior use has not been proven, and since D10 does not disclose an absorbent resin with the requisite properties, the subject matter of claim 18 is novel in the sense of Art. 54 EPC.

2.5 No objections of lack of novelty have been advanced with respect to the subject matter of operative claim 1, nor has the Board any objections of its own in this respect.

2.6 The subject matter of the claims of the main request is therefore novel (Art. 54 EPC).

3. *The patent in suit - the technical problem*

3.1 According to paragraph [0001] of the patent in suit the invention relates to a method for the production of a cross-linked polymer for the formation of an absorbent resin. The invention further relates to an absorbent resin manifesting large absorption capacity without load and under load and suffering only a small deteriorated soluble component.

In paragraph [0007] it is explained that a decrease in the cross-link density adds to the absorption capacity and at the same time increases the content of soluble component. The soluble component in the cross-linked resin is such that, when the polymer forms a hydrogel on contact with a liquid such as water, urine or body fluid, it is exuded from the hydrogel. The extracted soluble component not only lowers the absorption capacity of the polymer but also aggravates deterioration thereof. Further the ropiness of the soluble component can result in offensive feeling or pollution of the liquid being absorbed. In this

connection, in paragraph [0013] it is taught that the aforementioned phenomena are accompanied by a conspicuously offensive feeling of ropiness when the absorbent resin is swelled with urine.

In paragraph [0011] it is stated a method which, by a convenient and expeditious process produces a cross-linked polymer having high absorption capacity and a small content of soluble component with high operational efficiency has not been established.

Accordingly the problem to be solved was to provide a method of production which enabled such a polymer to be produced with high operational efficiency (paragraph [0012]), and the polymer itself (paragraph [0014]). This aim was realised by the method of operative claim 1 (see above).

- 3.2 Example 1 of the patent demonstrates the method as defined in operative claim 1. Following addition of the components of the polymerisation system, mixing was continued until polymerisation initiated, as indicated by opacification of the system. At this point stirring was stopped. Polymerisation was allowed to continue until the inner temperature of the reaction vessel reached 60°C (with heat removal - retention period). At the time at which the inner temperature of the vessel surpassed 60°C (at which time the polymerisation system had assumed the form of a gel), stirring was started to crush the gel into particles, and the polymerisation was further continued until the inner temperature reached maximum of 75°C. For the following 20 minutes the gel was disintegrated and retained at a polymerisation temperature above 65°C to complete the polymerisation, yielding a cross-linked polymer in the form of a particulate hydrogel.

Control 1 repeated the procedure of example 1 however with omission of the interjection of the retention period from the start of the polymerisation, i.e. stirring was continuous.

Example 2 and control 2 essentially correspond to example 1 and control 1, but employ a lower content of crosslinker (0.06 mol% based on monomer as opposed to 0.1 mol% in example 1/control 1).

The results of examples 1 and 2 and controls 1 and 2 are reported in the following table:

	Absorption capacity g/g	Content of soluble component (Wt%)
Example 1	45	1.6
Control 1	32	3.4
Example 2	51	4.2
Control 2	35	5.6

This evidence establishes that the technical problem as set out in the patent in suit is in fact solved by the measures of claim 1.

4. *The closest state of the art*

By common consent D9 represents the closest state of the art.

D9 relates, like the patent in suit to a method of production of a particulate hydrogel polymer and an absorbent resin.

On page 2 commencing at line 37 it is taught, as in the patent in suit (see above), that although the absorption capacity can be increased by lowering the crosslink density this also results in a higher concentration of water soluble component which is

exuded on contact with water, urine or body fluid. The water soluble substance which is extracted does not merely lower the absorption ratio of the resin but also aggravates the deterioration of the absorbent resin. Accordingly, the problem set out in D9 at page 2, line 47 and 48 is to provide a method for producing an absorbent resin having a high absorption capacity and a low concentration of water soluble substance (the exudation of which aggravates deterioration of the resin - see section 3.1 above), i.e. the same problem as set out in the patent in suit.

This problem is solved according to claim 1 of D9 by a method in which a shear force is repeatedly exerted on the hydrogel polymer.

According to the discussion at page 5 commencing at line 8 the shear force may be applied at an optional time to the hydrogel having at least several % of polymerisation degree, preferably 10 to 100%, more preferably 20 to 100% polymerisation degree. It is cautioned against applying the shear force on the monomer component at a low degree of polymerisation, as this can result in reduction in molecular weight (page 5 lines 12-16).

Concrete examples of the manner of effecting the production are disclosed at page 5, lines 21-27:

- Exertion of the shear force on the hydrogel polymer after completion of the polymerisation;
- Exertion of the shear force during the process of the polymerisation;
- Continuation of the polymerisation and simultaneous exertion of the shear force.

The polymerisation examples of D9 employ a process in which stirring was carried out continuously.

Accordingly the aims of D9 are aligned with those of the patent in suit. The technical means for attaining this are similar in that the stirring conditions are to be controlled. D9 however allows a range of stirring regimes (see above). In contrast thereto the patent in suit specifies a single set of stirring conditions, which conditions are not disclosed in D9, i.e. from the point of gelation and prior to attainment of the maximum temperature (see claim 1 recited in section I above and the discussion of the examples of the patent in suit in section 3.2 above).

5. *The objective technical problem compared to D9, its solution*
- 5.1 The control examples of the patent in suit, referred to in section 3.2 above, employ stirring throughout the polymerisation and thus correspond to the method of D9 as shown in the examples thereof.
- 5.2 Accordingly the technical problem set out in the patent in suit can be adopted as the objective technical problem.
- 5.3 The evidence of the examples and controls of the patent in suit is that by adopting the specified stirring regime as set out in operative claim 1 a product is obtained having higher absorption and lower content of soluble component than obtained when operating according to the conditions set out in D9.

5.4 Consequently it is plausible that the objective technical problem is effectively solved by the application of the claimed measures.

6. *Obviousness*

It must now be decided if this solution to the objective technical problem is obvious.

6.1 The essence of the teaching of D9 is that stirring must be continuous throughout the polymerisation process. Insofar as an interruption of the stirring is contemplated in D9, it is not indicated that the interruption should be as defined in the operative claims (see analysis of D9 in section 4 above). Accordingly taken on its own, D9 does not contain any teaching which would guide the skilled person to operate as specified in operative claim 1 for any reason, let alone in order to solve the objective technical problem set out in section 5 above.

6.2 It has been submitted that the combination of D9 with D10 would render the claimed subject matter obvious (see sections III.(b), V.(b) and XII.(b) above). D10 also relates to the provision of absorbent resins, and as set out at page 2, lines 46-49 like the patent in suit and D9, is concerned with optimising the balance between absorption capacity and water-soluble component content. According to claim 1 and page 3, lines 9-17 of D10 this problem is solved by a process in which the polymerisation is carried out without agitation, while controlling the temperature of the polymerisation solution. In a second step the thus obtained resin is

- crushed and subjected to crosslinking (page 3, lines 18-22).
- 6.3 The solutions proposed in D9 and D10 are therefore mutually incompatible - while D9 permits and requires stirring during the polymerisation thus obtaining a finely divided polymer in a single step, D10 excludes stirring during this phase, and instead employs crushing of the obtained polymer to provide the finely divided product.
- 6.4 The appellant submitted at the oral proceedings (see section XII.(b) above) that since D10 did not contain any teaching about stirring during the hydrogel state, such a step was not excluded. D10 is indeed silent about the hydrogel state and thus neither explicitly permits nor explicitly prohibits stirring at this stage. There is thus a total absence of any explicit teaching about this. However as the core of the invention of D10 is to allow complete polymerisation up to solidification (claim 1, Processes 1 and 2 at page 3, lines 9-22) the clear, unambiguous teaching is that there is to be no stirring until such a solid state is attained, i.e. that stirring in the hydrogel state is excluded.
- 6.5 Even if - despite the evident incompatibilities between D9 and D10 - the skilled person would nevertheless consider the teachings in combination, this would not render it obvious, as required by operative claim 1, to employ a static state from the onset of polymerisation until complete gelation for any reason, let alone in order to solve the objective technical

problem and thus obtain improved absorption with and without load with a low content of soluble component.

6.6 The subject matter of claim 1 of the main request is therefore not obvious and hence meets the requirements of Art. 56 EPC.

6.7 No objections were raised in the appeal against the subject matter of claim 18 in respect of Art. 56 EPC. Nor has the Board any objections of its own.

6.8 The patent in suit therefore meets the requirements of Art. 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

R. Young