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Datasheet for the decision
of 16 September 2008

Case Number:	T 0861/06 - 3.3.03
Application Number:	93304520.5
Publication Number:	0574260
IPC:	C08F 20/04
Language of the proceedings:	EN

Title of invention:
Method for production of hydrophilic resin

Patentee:
NIPPON SHOKUBAI CO., LTD.

Opponent:
Stockhausen GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step - problem and solution (yes)"
"Inventive step - ex post facto analysis"

Decisions cited:
T 0982/02, T 1065/02

Catchword:
-

Case Number: T 0861/06 **-** 3.3.03

DECISION
of the Technical Board of Appeal 3.3.03
of 16 September 2008

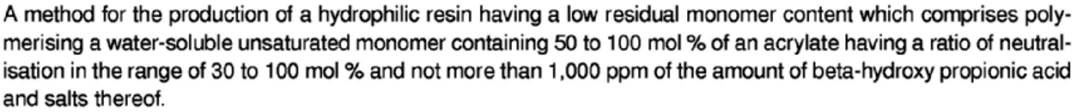
Appellant: (Opponent)	Stockhausen GmbH Bäkerpfad 25 D-47805 Krefeld (DE)
Representative:	Kahlhöfer, Hermann Patentanwälte Kahlhöfer Neumann Herzog Fiesser Postfach 10 33 63 D-40024 Düsseldorf (DE)
Respondent: (Patent Proprietor)	NIPPON SHOKUBAI CO., LTD. 1-1, Koraibashi 4-chome Chuo-ku Osaka-shi Osaka-fu 541 (JP)
Representative:	Luderschmidt, Schüler & Partner Patentanwälte John-F.-Kennedy-Strasse 4 D-65189 Wiesbaden (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office of 16 February 2006 posted 4 April 2006 rejecting the opposition filed against European Patent No. 0574260 pursuant to Article 102(2) EPC 1973.**

Composition of the Board:

Chairman: R. Young
Members: A. Däweritz
H. Preglau

Summary of Facts and Submissions

I. European patent No. 0 574 260, which had been granted in respect of European patent application No. 93 304 520.5, filed on 10 June 1993 and claiming the priorities of 10 June 1992 and 12 October 1992 of two earlier applications in Japan (150425/92 and 272789/92), respectively, had already been the matter of dispute in appeal case T 0982/02. In the decision dated 11 May 2005 terminating that appeal case, the Board set aside the previous decision of the Opposition Division, in which the patent in suit had been revoked for lack of novelty, and remitted the case back to the Opposition Division for further prosecution on the basis of the Main Request submitted with letter of 11 April 2005, which contained 13 claims, including the following independent Claim 1:



A method for the production of a hydrophilic resin having a low residual monomer content which comprises polymerising a water-soluble unsaturated monomer containing 50 to 100 mol % of an acrylate having a ratio of neutralisation in the range of 30 to 100 mol % and not more than 1,000 ppm of the amount of beta-hydroxy propionic acid and salts thereof.

The remaining method claims 2 to 13 were dependent claims.

The claims of this Main Request were identical to the claims as granted, except for Claim 12, which differed from its granted version in that it referred to "ployhydric alcohols" instead of "polyhydric alcohols".

In this decision, references to passages in the patent in suit as granted will be given underlined in squared brackets, those to passages in the application as filed will be shown in underlined italics, eg Claim [1], [0001], [Example [1], *Claim 1*, *page 1, line 1* and *Example 1*, respectively. "EPC" refers to the revised text of the EPC 2000, the previous version is identified as "EPC 1973". Beta- or β-hydroxy propionic acid (also referred to as hydracrylic acid or 3-hydroxy propionic acid), respectively, will be abbreviated herein below to "3-HPA" or "β-HPA", acrylic acid to "AA" and diacrylic acid to "DAA".

II. On 27 July 2005, the Opposition Division continued the opposition proceedings by issuing a summons to oral proceedings. In an annex to the summons, it informed the parties that, since novelty had been acknowledged by the Board in T 0982/02 (above) inventive step would be the issue to be discussed at the oral proceedings.

In a letter dated 15 December 2005, the Proprietor filed "a new set of auxiliary requests 1 to 13".

The oral proceedings before the Opposition Division took place on 16 February 2006. According to the minutes of these oral proceedings, the subject-matter considered at the hearing was confined by the Opposition Division to the question of inventive step and to the documents as previously admitted by the Board to the proceedings (cf. page 1 of the annex to the minutes of that hearing, last paragraph).

III. In the decision under appeal announced at the end of the oral proceedings and issued in writing on 4 April 2006, the Opposition Division referred, as regards the late-filed documents and novelty, to the previous decision T 982/02 (above) under Article 111(2) EPC 1973 and further dealt only with the issue of inventive step. Apart from short comments to the further documents (in the proceedings), as to why they were not deemed pertinent, the Opposition Division based its considerations in its decision on

D1: EP-A-0 372 706,

D2: F.M. Wampler III, "Formation of Diacrylic Acid during Acrylic Acid Storage" Plant/Operations Progress (Vol. 7, No. 3, 183-179), July 1988, and

D4: Beilsteins Handbuch der organischen Chemie, 4th Edition, Vol. 3, 1921, pages 295 to 297, as representing common general knowledge.

(1) The Opposition Division concurred with both parties in considering D1 as the closest piece of prior art and held that the subject-matter claimed was based on an inventive step with regard to this document in combination with D2 and D4.

(2) More particularly, it referred to D1 as disclosing a specific method for the production of an acrylate by neutralisation of AA with a basic substance, to a method for the preparation of an acrylate-containing polymer on the basis of the above acrylate and to the polymer so obtained. However, the Opposition Division found that Dl referred neither to the initial purity of the AA nor to the content of 3-HPA contained therein, whereas the comparison of the results in [Tables 1 and 2] with those in Table 1 of D1 demonstrated that the products in accordance with the claimed method of the patent in suit were significantly better than those according to the examples of D1. The latter products in D1 and those in the comparative examples of the patent in suit, all showing residual monomer contents in the same range, were held to be equally insufficient for the achievement of the required properties of the product.

Consequently, the technical problem to be solved vis-à-vis D1 was seen in the provision of an acrylic acid salt based hydrophilic resin having lower amounts of residual monomer (Grounds for the Decision: page 5, lines 1 and 2).

(3) Document D2 dealt, according to the decision under appeal, with the formation of DAA during AA storage. Due to the caustic neutralisation of the AA to pH levels necessary for the polymerisation, which could result in the saponification of the ester group of the DAA, species with no vinyl bond could be formed, which would remain as impurities in the resulting polymer. Thus, according to Figure 3 of the document, 3-HPA could be formed. Therefore, as indicated in D2, it was important in certain applications to use AA with a minimal level of DAA. D2 would teach the person skilled in the art to avoid long storage times of AA having high water content at increased temperatures in order to avoid yield losses due to the formation of DAA that could possibly lead to the formation of 3-HPA as an impurity in the resulting polymer.

As D2 did not deal with the problem of residual monomer content in the polymeric product and did not recognise the correlation between 3-HPA and the residual monomer content, the person skilled in the art would ignore D2. Nor would D2 teach to use a freshly distilled AA as starting material for the polymerisation. Rather, "D2 could suggest to use a commercially available ('normal production AA') without storage time which has the lowest content of DAA disclosed in D2 (400 ppm; and consequently even less β-HPA). However, D2 does not teach ... that the 'normal production AA' is suitable in order to reduce the residual monomer content in the polymer since a correlation between 3-HPA and residual monomer content is not given in D2." Rather, it was, in the Opposition Division's view, the Opponent who had suggested ("created") such a link by referring to D4.

(4) However, the Opponent's line of argument was not deemed convincing by the Opposition Division who, consequently, concluded that the claimed subject-matter was inventive over these documents and that Claims 1 to 13 of the Main Request met the requirements of the EPC.

Consequently, the opposition was rejected.

IV. On 2 June 2006, a Notice of Appeal was filed against this decision by the Opponent/Appellant. The prescribed fee was paid on the same date.

(1) In its Statement of Grounds of Appeal received on 11 August 2006 (SGA), the Appellant continued to pursue its request for revocation of the patent in suit in its entirety for the reason of lack of inventive step with regard to a combination of D1 and D2 and common general knowledge. In addition, it filed two further pieces of literature and an internal memorandum

D35: Charles E. Mortimer, "Chemie · Das Basiswissen der Chemie", Georg Thieme Verlag Stuttgart · New York, 5th edition, 1987, cover sheet, preface and pages 526 und 527 (cited as D33),
D36: Data sheet of BASF "Dimerisation in Acrylic Acid - Formation and Effect", 1992 (cited as D34) and
D37: Internal Memorandum of Stockhausen, dated 27 April 1992, "Subject: BASF GAA Dimers" (cited as D35 to demonstrate the availability in due time of BASF's above Data sheet D36).

(2) One of the basic arguments of the Appellant referred to the assertion that it had been common

general knowledge already before the priority date of the patent in suit that 3-HPA might easily split off water upon heating and would thereby form AA. Moreover, it would have been obvious for the person skilled in the art to use freshly distilled AA (having the lowest possible dimer content) for the manufacture of partly neutralised polyacrylates having a low residual monomer content (D35, D36 and D37; SGA, point 2).

(3) With regard to the reasons in the decision under appeal, the Appellant only agreed to the identification of D1 as representing the closest state of the art. It did not, however, accept the comparison of the residual monomer contents in the [examples] and [comparative examples] with those in the examples of D1, because in none of these [comparative examples] would the reaction conditions or the amounts of initiator or crosslinking agent have been even roughly similar to those in D1. The [examples] and [comparative examples] would only show that a monomer solution having a 3-HPA content of not more than 1000 ppm had been obtained when AA had been used, which had been freshly distilled or stored for only a short time (SGA, point 3.5, paragraph 1). Therefore, it disputed that it could be concluded, on the basis of those experimental results, that the monomer solutions used in D1 would have had 3-HPA contents of more than 1000 ppm. The only possible conclusion could have been that D1 did not explicitly disclose the 3-HPA content (SGA, point 3.3).

(4) In the Appellant's opinion, the technical problem to be solved with regard to D1 could be seen in the provision of a hydrophilic resin on the basis of AA having a lower residual monomer content than D1 (as in the decision under appeal) only, if it had been shown

that water-absorbing resins having residual monomer contents lower than those in the preparation examples of D1 would be obtained, when the preparation examples of D1 were repeated with monomer solutions containing not more than 1000 ppm of 3-HPA. However, such a proof had not, according to the Appellant, been provided (SGA: point 3.4).

(5) The key feature for solving the above problem, yet undisputed by the Respondent, namely to use, in the manufacture of the water absorbing resins, freshly distilled AA or AA with the shortest possible storage time (ie AA containing not more than 1000 ppm of 3-HPA) would have been obvious to the person skilled in the art in view of the teaching in D2 in conjunction with the common general knowledge in this art that AA was formed from 3-HPA when heated (SGA: points 3.6 to 3.18). As already mentioned above, the [examples] and [comparative examples] would have shown that, whenever such an AA had been used, the 3-HPA content of the monomer solution would not have exceeded 1000 ppm (section IV(3), above).

(6) When investigating the reasons for any residual monomer content in the desired resin, the person skilled in the art would, in principle, identify two different sources for this content and would, therefore, try to eliminate both sources:

(i) AA monomer contained in the monomer solution, which had not, however, polymerised and

(ii) AA monomer which came into existence only upon heating of the polymer, eg in the course of the drying of the polymer gel or of the additional crosslinking reaction of the polymer surface (SGA, point 3.8)

(7) Document D2, being a review article from a chemical journal and dealing with the formation of AA dimers during the long time storage of AA, would, according to the Appellant, provide the exact cause for the AA monomer formation upon heating of the polymer (source (ii), above). According to its first page, right-hand column, line 3 *et seq.*, the AA dimer formation would badly influence the properties of AA polymers, which showed that the knowledge about the formation of side products during the AA storage was of basic significance for the person skilled in the art. Furthermore, it would be clear from D2, that in the neutralisation of AA, AA dimers contained therein would react to 3-HPA, which would not polymerise and would, therefore, remain as an impurity in the polymeric product (D2, first page, right column, lines 14 to 18 and Figure 3).

(8) The Appellant then disputed the finding in the decision under appeal that the skilled person would not derive from D2 that the above technical problem could be solved by starting either from freshly distilled AA or AA after the lowest possible storage time, ie by using a monomer solution having a 3-HPA content not exceeding 1000 ppm, because D2 would not show a connection between, on the one hand, the formation of 3-HPA in the neutralisation of the AA leading to a 3-HPA content in the AA polymers and, on the other hand, the residual monomer content in the polymer.

However, it would have been common general knowledge in this art, as confirmed by D4 and D35, that 3-HPA would very easily split off water upon heating and would thus form AA.

(9) The skilled person would, therefore, conclude that, in the neutralisation step of the AA, (i) the DAA always contained in AA would form 3-HPA, which was not polymerisable and (ii) would not, therefore, react in the polymerisation, but would, therefore, remain as an impurity in the resulting polymer gel and (iii) would form AA either in the drying step of the polymer gel or in a subsequent surface crosslinking step at the latest.

As a consequence, the person skilled in the art would, according to the Appellant, use AA with the lowest possible DAA content in order to reduce at least the influence of DAA on the residual monomer content. In the knowledge of D2, the skilled person would use an AA as referred to therein as "***normal production AA***" as shortly after its production as possible, ie an AA containing less than 400 ppm of DAA.

(10) This opinion was, in the Appellant's view, further supported by D36 containing the following statements as quoted by the Appellant in its SGA (point 3.19): "... ***high concentrations of the Dimer may result in increased residual impurities concentration in the finished product***[3]. ..." and "***... Because of the inherent nature of this product to Dimerize and form gradually increasing concentrations, prudent order placement, delivery and storage systems should be considered***[4].". Furthermore, the Appellant referred to its page 7, point 1, where it had been suggested to develop "***Just-in-Time***" product delivery schedules from the AA supplier. This was, in the Appellant's view, a clear indication for using freshly distilled AA as delivered from the producer as quickly as possible rather than storing it.

(11) The Appellant concluded from these considerations that the claimed subject-matter of Claim 1 did not involve an inventive step with regard to D1 in combination with D2.

V. In a letter dated 2 March 2007, the Respondent/Patent Proprietor disputed the all arguments of the Appellant and filed new sets of claims for 13 auxiliary requests.

(1) The Respondent confirmed that it also considered D1 as the closest piece of prior art, from which the claimed process differed by using "***a distinct acrylate having a distinct purity with regard to its beta-hydroxy propionic acid (β-HPA) content. Particularly, there is no reference in D1 to the use of an acrylate having not more than 1000 ppm of the amount of beta-hydroxy propionic acid (β-HPA) and salts thereof. Moreover, D1 is totally silent with respect to the initial purity of the acrylic acid***" (page 3, lines 3 to 9 of the letter), and thus concurred with the Appellant in this respect (section IV(3), above).

(2) For the rest however, the Respondent disagreed with all the conclusions of the Appellant, which it considered as being based only on unproven presumption and as being of more or less speculative nature. Thus, it did not accept the Appellant's argument that the conclusion concerning inventive step as drawn in the decision under appeal from the comparison of the [examples] and [comparative examples] with the examples in D1 (sections III(2) and IV(3), above) would have been wrong, because of changes in the amounts of initiator and crosslinking agent and in the reaction conditions. Nor did it accept that the person skilled

in the art would have derived from D1 that he should use freshly distilled AA or AA having been stored only for a very short time as the monomer. Rather it pointed out that D1 did not even mention that the AA should be distilled before use, whilst in the [examples] and [comparative examples], the effect of a distillation on the 3-HPA content was evident (paragraph bridging pages 3/4 of the letter). In the Respondent's view, the Appellant's analysis had to be considered as having been made with the benefit of hindsight (page 5, 2nd complete paragraph of the letter).

(3) With reference to [0032], the Respondent pointed out that the claimed subject-matter aimed at the provision of a method for the production of a "hydrophilic resin having excellent physical properties, having only a small residual monomer content and showing virtually no sign of generation or augmentation of residual monomer after polymerisation". The latter property will be referred to herein below as concerning "latent residual monomer" (cf. [0119]).

(4) That this goal had indeed been achieved, was, in the Respondents view, demonstrated by the experimental data in the patent in suit. Thus, whilst [Production 1] in comparison with [Control Production 3] demonstrated the importance of the distillation step (Respondent's letter, page 4, end of paragraph 1), the solution for the underlying technical problem was not simply to use freshly distilled AA or AA, after only a short storage. As demonstrated by [Production 8] and [Control Production 11], in each of which the same AA had been used after distillation, nevertheless, the 3-HPA contents in the resulting AA differed significantly. Whilst in [Production 8] the AA contained only 230 ppm

of the impurity, its content in [Control Production 11] amounted to 2100 ppm. The use of these AA solutions (in [Example 11] and [Control 14], respectively) resulted in significantly different contents of residual monomer and of latent residual monomer in the respective final products (the same letter, page 5, last paragraph as continued on page 6). A similar result was found, when 3-HPA was directly added to the AA in order to increase its content to above 1000 ppm (the same letter, page 4, last paragraph to page 5, line 1).

(5) In addition to its finding that D1 was silent with regard to the purity of the AA monomer (section V(1), above), the Respondent then disputed the Appellant's further arguments based on D2, that it would have been obvious to use freshly distilled AA in the method of D1. Thus, the Respondent pointed out that, according to D2, the freshness or purity of the AA to be used in the production of polymer was different from the concept in the patent in suit. Thus, it referred to AA purities of about 99.8% which had been found acceptable in the state of the art for the production of such polymers (page 6, last paragraph and page 7, paragraph 1) and to the fact that no documents had been cited which had been published before the priority date of the patent in suit and had already suggested that it would be effective to lower the β-HPA content of the monomer to not more than 1000 ppm in order to reduce the residual monomer in AA polymer. Once the person skilled in the art had become aware of the problem of latent residual monomer, it would have been easy to use the route of the patent in suit to solve the relevant problem. However, D1 did not disclose the level of latent residual monomer contained in the AA monomer solution,

so that it was impossible even to presume the β-HPA content in the AA used in the examples of D1, let alone clearly to know its β-HPA content (bottom of page 7).

VI. Further arguments were provided by the Appellant in its letter dated 7 January 2008, including a still further document as referred to in [0021]:

D46 JP-A-03-031 306 (and its English translation D46a).

(1) It started its arguments again from D1, which, as admitted, did not explicitly disclose that the AA used in its examples had had a 3-HPA content of ≤1000 ppm. However, since this compound did not polymerise and would remain in the polymer, the underlying problem should be seen in the reduction of the content of not polymerised impurities in the polymer in comparison with the polymers known from the prior art.

The solution of this problem would have been obvious from D1, because the fact was known that, due to its structure, 3-HPA would not polymerise and would, therefore, remain as an impurity in the product. It would be self-evident to reduce the amount of non-polymerisable impurities in the monomer as much as possible (point 3.1). This would also be true for other natural impurities, such as acetic or propionic acid, which might be present in commercially available AA. The requirement, that the 3-HPA content in the monomer should not exceed 1000 ppm, would mean nothing else.

(2) An additional inventive step objection was based on a combination of the teachings of D1 and the above new document D46/D46a.

The technical problem vis-à-vis D1 already mentioned in the previous section would be solved according to D1 by starting with a freshly distilled AA and neutralising it at 20 to 40°C (as in all examples in D1). In these conditions, the 3-HPA content in the monomer component would never exceed the claimed limit of 1000 ppm.

This solution would be obvious from the knowledge of D46 also for technical reasons. D46 would refer to the interconnections between residual monomer in partly neutralised polyacrylates and the heavy metal content of the AA used for those polymers. In order to further reduce the residual monomer content in those polymers, D46 would suggest to use freshly distilled AA not containing heavy metals any more. Therefore it would have been obvious to start in the examples of D1 from a freshly distilled AA, free of heavy metals. In view of the fact that the polymerisation had been carried out in example 5 of D1 in a twin-arm type jacketed kneader of stainless steel, which meant that the AA or the monomer solution came into contact with a surface from which eg iron could be dissolved, it would have been obvious to the person skilled in the art to reduce the drag-in of heavy metal by removing any heavy metal from the AA monomer by distillation.

VII. In its letter dated 15 August 2008, the Respondent replaced all its previously submitted requests and, accordingly, filed new clean copies of the Main Request and of the first to eleventh Auxiliary Requests (which will be referred herein below as Auxiliary Requests 1 to 11). Besides arguments in which the Appellant's above submissions were disputed, a table in the letter showed a concordance between the Respondent's previous and its new requests filed therewith. Moreover, the amendments in each of the above Auxiliary Requests 4 to 10 were identified in the table. However, since none of these auxiliary requests played a role in the further proceedings, it is unnecessary to refer here to their particulars and details. The claims of the Main Request were identical to the version as identified in section I, above.

(1) The Respondent requested that D46/D46a not be admitted, because it could have been cited at a much earlier stage of the proceedings. Moreover, according to the Respondent, it was completely silent about the control of the level of organic compound impurities and could not, therefore, provide any hint to the reduction of such a content. Rather, it only dealt with the control of the level of heavy metals. Moreover, it additionally suggested the reduction of the heavy metal content by means of ion exchange resin, activated carbon or the like. Moreover, once removed, this impurity would not form again during storage.

In the patent in suit, however, factors such as time and temperature between the distillation and the neutralisation of the AA, and the neutralisation conditions, played a role for maintaining the 3-HPA content of the monomer within the claimed range of the patent in suit (cf. [0060]). None of these conditions was, however, disclosed in D46. Nor had D46 anything to do with the concept of the latent residual monomer or the problem of increasing residual monomer content upon surface crosslinking or drying of the polymer at high temperatures. Therefore, the new document should not be admitted into the proceedings.

(2) With regard to the question of inventive step, the Respondent reiterated its previously presented arguments, in particular, with regard to the difference between "residual monomer content" and "latent residual monomer content" and pointed out that none of the cited pieces of prior art disclosed to use a freshly distilled AA. Nor would any one of those documents indicate that 3-HPA might affect the increase of (latent) residual monomer, in general, let alone, that the factors mentioned above, ie the time between the manufacture and the polymerisation of the monomer, might do so. Moreover, in its conclusion part, D2 would allow a purity of AA of 99.5% which was referred to as "a common specification limit" which would, as the Respondent stated, amount to 3100 ppm of 3-HPA (points 4.1.5 and 4.5.5, in particular, page 16 of the letter).

The Respondent also commented on the disclosure of D4 and of D35, which, in its opinion, only dealt with the behaviour of 3-HPA itself, but did not consider any behaviour of 3-HPA in a polymer or in relation to the residual monomer content and latent residual monomer content thereof (page 20 of the letter).

(3) The Respondent concluded again that the arguments brought forward by the Appellant were based on inadmissible hindsight and argued that D2 would be ignored by the person skilled in the art, because it was an instruction for manufacturers of AA and not related to an absorbent polymer, and that D2 was silent about any relation between β-HPA and the latent residual monomer. Nor would the common general knowledge present any motivation to reduce the latent residual monomer (item 5.1 of the letter).

VIII. Oral proceedings were held on 16 September 2008. In the discussion, both parties reiterated, in essence, their previous arguments as submitted in writing. Therefore, only those points as presented during the hearing, which have been of particular importance for this decision, are summarised herein below.

(1) At the beginning of the hearing, the Appellant, on the one hand, requested that the case be referred back to the Opposition Division, if the auxiliary requests mentioned in section VII, above, which it considered as being late-filed, were admitted into the proceedings.

On the other hand, the Respondent maintained all its latest requests on file and argued that these requests would not differ significantly from the previous requests in substance. However, D46/D46a cited by the Appellant (section VII(1), above) should not be admitted, because it would be irrelevant and late-filed. It was agreed to postpone any decision on these matters until they became relevant to the debate.

Hence, from the numerous documents cited in the course of the opposition and appeal proceedings, only D1, D2, D4, D35, D36 and D46/D46a played a role at the hearing.

(2) Then the Appellant was given the floor to present its case. It indicated that the claimed subject-matter would not involve an inventive step with respect to the combinations of the closest state of the art as represented by D1, in particular its Example 5 with the teachings of D2 or D36 or D46/D46a, respectively, as seen in the light of the common general knowledge of the person skilled in the art. In the Appellant's view, Example 5 of D1 comprised all features of Claim 1 of the Main Request except for the 3-HPA content.

(3) The objective problem to be solved with respect to D1 was seen by the Appellant in the provision of a method for the production of a hydrophilic resin having only a small residual monomer content, as set forth in [0032].

(4) In view of the fact that Claim 1 did not define any conditions of the heat treatment as repeatedly addressed by the Respondent in its counter-arguments and with regard to the broad range of temperatures for the drying in [0082] (70 to 300°C), the Appellant did not see any distinguishing feature between the drying in D1 and in the patent in suit and, hence, the result would be the same in D1 and in the patent in suit.

(5) From D36, the person skilled in the art would, moreover, know that the DAA content would affect the purity of the polymer (D36, page 6, right column, paragraphs 4 and 5). Therefore, the polymer manufacturer would control the DAA content (ibid., left column) and he would, as set out in [0061], use fresh AA, irrespective of whether he was aware of the importance of this feature for the residual monomer content. It would only be decisive that he had arrived at a pure polymer in a controlled reaction (having regard to the extremely high reactivity of pure AA, containing no inhibitor after distillation). The person skilled in the art would always, as the first point, take the purity of its starting compounds into account, as well as all information dealing therewith. In support of this argument, the Appellant referred to T 1065/02 of 20 April 2004 (not published in the OJ EPO).

In the Appellant's opinion, the claimed subject-matter would, therefore, be derived in an obvious manner from D1 and D36.

(6) The Respondent disputed these arguments and pointed out that whilst D1 concerned only the neutralisation of AA, the patent in suit would further require the control of 3-HPA in the polymerisation mixture. Furthermore, D1 would be silent about any possible increase of residual monomer content upon heat treatment of the polymer.

As regards D36, the Respondent argued that apart from the suggested prudent order placement the storage system (storage tank design) should, according to this document, receive attention.

With regard to the different aspects of the relevant technical problem to be solved with regard to the closest state of the art, ie D1, the Respondent pointed out that, in D1, only the standard residual monomer content had been considered, which was related to the AA, whereas the latent residual monomer content, not contemplated in any one of the cited documents, depended on the presence of 3-HPA.

(7) The Appellant then reiterated its previous objection of lack of inventive step on the basis of D1, D2 and general common general knowledge as evidenced by D4 and D35. According to D2, Page 183 and Fig. 3, DAA would form during the neutralisation of the monomer before polymerisation 3-HPA, which would remain as impurity in the hydrophilic AA polymer produced therefrom. The person skilled in the art would, however, have known from D35 that 3-HPA, contained in the polymer, would, upon heating (eg as in Example 5 of D1:

at 180°C for 40 min), split off water and would thus yield AA contained as additional newly formed residual monomer in the polymer. This would also be confirmed by D4, pages 295 and 296, where reference was made to the decomposition of DAA or its salts at about 200 to 250°C, or to sodium hydracrylate splitting off water at from 180 to 200°C. Therefrom, the Appellant concluded that AA would form in the drying step at 180°C as carried out in the examples of D1.

In view of what it considered to be common general knowledge (see above), the Appellant further disputed in this context the view taken by the Opposition Division in No. 3.2 of the decision under appeal, that a correlation between 3-HPA and residual monomer content would not have been given in D2.

(8) The Respondent, however, took the view that for the decomposition of DAA in salt form much higher temperatures would be necessary than those used in the drying step of the examples in D1.

(9) A further objection of lack of inventive step was then presented by the Appellant on the basis of D1 and D46/D46a (section VI, above). The relevance of this latter document was, however, again disputed by the Respondent who, therefore, requested that D46/D46a not be admitted in the proceedings.

(10) In the following discussion dealing with the question of relevance of the document, the Appellant relied in particular on the fact that D46 referred to the distillation of AA directly before to the polymerisation which was then to follow as quickly as possible because of the high reactivity of the AA free of inhibitor. By contrast, the Respondent repeated its

arguments submitted in writing and its request that D46/D46a not be admitted (section VII(1), above).

(11) After deliberation, the Board informed the parties that the late-filed document D46/D46a was not introduced in the proceedings.

(12) As neither party wished to comment further on inventive step, the debate was closed with respect to the Main Request and the oral proceedings were interrupted for the final deliberation by the Board on this request, which might optionally result in the final decision on the case.

IX. The requests of the parties at this moment were as follows:

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

The Respondent requested that the appeal be dismissed or, in the alternative, that the patent be maintained in accordance with the Main Request or, in the alternative, with one of the Auxiliary Requests 1 to 11 in their numerical order, all submitted with the letter dated 15 August 2008.

Reasons for the Decision

1. The appeal is admissible.

Main Request of the Respondent

2. The Main Request before the Board is identical to the request on which decision T 982/02 on novelty was based. Therefore, this decision can and does focus on the

single ground for opposition put forward by the Appellant in its SGA (sections IV(1) to IV(11), above), ie its objection of lack of inventive step.

3. *Problem and solution*

3.1 The patent in suit concerns a method for the production of a hydrophilic resin essentially based on acrylate monomer and having a low residual monomer content.

3.2 A method for the manufacture of such a hydrophilic resin was already known from D1 (page 2, lines 1 to 4), which has been considered as the closest piece of prior art by both parties and in the decision under appeal. The Board has no reason to take a different view in this respect.

3.2.1 More particularly, D1 relates in a first aspect to a specific method for the preparation of a monomer component of partially neutralised acrylate monomer suitable for the manufacture of the desired polymer having reduced residual monomer content. According to this method of D1, which may also be used in the patent in suit ([0063]), AA is being neutralised by means of a basic substance in four sequential steps (steps (A) to (D)), in each of which the neutralisation ratio of the AA must be controlled and maintained within particular limits for a definite time. More specifically, whilst in step (A), in which AA and the basic substance are supplied simultaneously, this ratio is kept at from 75 to 100 mol%, an excess of the basic substance is added in step (B). Thereafter in step (C), the neutralisation ratio of the reaction mixture is maintained within the range of step (B) (100.1 to 110 mol%) for a certain time (1 to 120 min) thereby allowing the reaction system to age and finally, in step (D), the neutralisation ratio of the AA is adjusted to the desired value within a range of from 20 to 100 mol% by supplying additional AA to the mixture. During the steps (A) and (C), the temperature of the reaction system is preferably maintained in the range of 20 to 50°C in order to prevent the formation of impurities based on radical polymerisation reaction (D1, Claim 1 and page 4, lines 17 to 36).

The polymerisation method which represents the second aspect of D1 is characterised by the use of a monomer component prepared according to the above first aspect.

In a still further aspect, D1 relates to a polymer obtained by means of the above polymerisation method. According to the description, the polymer has "a reduced residual monomer content" (D1, page 2, line 3, cf. also page 3, lines 4 to 7).

3.2.2 According to the second aspect of D1, mentioned above, the method for the production of an acrylate-containing polymer includes the possibility of preparing polymers having a crosslinked structure by means of at least one of three crosslinking methods, each of which comprises having a specific crosslinking agent incorporated in advance in the monomer component, or by means of a fourth method which comprises polymerising the monomer component in the presence of a hydrophilic compound enabling the monomer, during this polymerisation, to form a crosslinked structure by graft bonding (page 5, line 11 to page 6, line 2, in particular lines 14/15, 37/38 50/51 and 32 to 34, respectively).

More particularly, the polymerisation to the desired polymer product is accomplished by dissolving the monomer component, a polymerisation initiator and optionally a crosslinking agent in water, deaerating the obtained solution and subsequently subjecting the solution to polymerisation (page 6, lines 3 to 11). In general, the polymer is obtained as a hydrated gel, which is then preferably comminuted into a form fit for drying and is finally dried. The acrylate-containing polymer obtained in this way has a notably decreased residual monomer content of not more than 0.3 wt.% (ie ≤3000 ppm), if it is in a water-soluble form, or not more than 0.05 wt.% (ie ≤500 ppm), if it is in a water-swellable form (page 6, lines 18 to 40, in particular lines 36 to 40).

3.2.3 In each of Examples 1 to 4 of D1, AA was neutralised with sodium hydroxide solution, as described in section 3.2.1, above, whilst keeping the mixture in step (A) within a temperature range of 20 to 40°C. In step (B), the temperature was then adjusted to a range of from 30 to 50°C and maintained in step (C) for a given time of between 1 and 100 min, respectively. In the fourth step of that method, further AA was added to provide aqueous solutions of acrylate of from 35 to 40 wt.% and neutralisation ratios of from 30 to 100 mol%.

According to Examples 5 to 7 and Table 1 of D1, the products of Examples 1 to 3 were copolymerised with a crosslinking agent (in Example 6, with N,N'-methylene bisacrylamide (MBA) or, in Examples 5 and 7, with trimethylol triacrylate (TMTA), respectively) in a twin-arm type jacketed kneader within 60 min at a temperature of up to 83°C to give a minutely granulated hydrated gel polymer, which was then dried with hot air at 180°C for 40 min. The dry polymer thus obtained was further mechanically comminuted and then tested for absorption ratio, water-soluble content and residual monomer content.

Example 8 (as also shown in Table 1) essentially differed from the above polymerisation examples of D1 by the additional presence of methacrylic acid in the monomer mixture further comprising the AA component of Example 4 and MBA.

The residual monomer contents of the polymers thus obtained were determined by dispersing a sample of the polymer in distilled water, stirring for 2 h, passing the stirred dispersion through a specific filter paper and analysing the filtrate by liquid chromatography.

The values found for the polymers of Examples 5 to 8 were 400, 400, 410 and 390 ppm, respectively.

Comparative polymers prepared from acrylate compositions in Control examples, in which the neutralisation of AA to the acrylate composition had not been carried out in accordance with the method claimed in D1, showed residual monomer contents within a range of from 650 to 760 ppm.

In Example 9 of D1, another polymer was manufactured in accordance with the requirements of its claimed process, however, in a different apparatus. The residual monomer content of this polymer obtained was 2600 ppm, determined by the bromine addition method.

3.2.4 Nowhere in the description of the preparation of the partially neutralised acrylate component in D1 is mention made of the initial purity of the AA or of a distillation step (cf. the Respondent's remark as referred to in section V(2), above). Nor does D1 contain any hint to any side products, which could be formed at any stage of the preparation of the monomer component or of the polymerisation of the monomer component, ie side products other than residual monomer.

3.2.5 In the Appellant's opinion, the person skilled in the art would in any case use "fresh" AA (cf. section IV(5), above) in the polymerisation. This point was already discussed with regard to the question of novelty, where the present Appellant, who had been the Respondent in the first appeal T 0982/02 (above), had argued that it would have been common general knowledge and conventional to use the AA "as soon as possible" after its purification. The Board had not, at that time, been in a position to concur with the then Respondent's arguments concerning D1 even in conjunction with common general knowledge. Nor does it now see any reasons for taking a different view concerning the question of what could be derived from the disclosure of D1 (cf. T 0982/02, above, Nos. 3.3 to 3.3.9 of the reasons).

3.3 The Respondent (section V(5), above) saw the technical problem to be solved with regard to the closest state of the art, ie D1, not only in a reduction of the residual monomer content (first aspect), as formulated in the decision under appeal (section III(2), above) and as suggested in the Appellant's SGA (section IV(4), above), but also in a reduction of the latent residual monomer content [0119] (***page 32, line 33 to page 33, line 5***). This second aspect has already been addressed in [0001] in terms of "... a hydrophilic resin which ... shows virtually no increase in the residual monomer content under varying conditions of use" and in the original application text (***page 1, lines 7 to 11***).

3.4 By contrast, in D1, reference is made only to "residual monomer content". The question of a latent residual monomer content has never been considered therein. Nor is the drying step as carried out in D1 (180°C for 40 or 180°C for 60 min; page 9, line 18 and page 12, line 48, respectively) comparable with the method of determination of the latent residual monomer content as described in [0123] (180°C for 3 hours in addition to the drying step).

3.5 For the assessment of inventive step, the question, therefore, arises of whether both aspects of the above technical problem have been solved (section 3.3, above).

3.5.1 In the examples carried out in accordance with the claimed method of the patent in suit, acrylate monomer compositions were used which had been prepared in examples, referred to as "Production" examples ([P]), on the basis of commercially available AA. After having been refined by distillation and only stored at moderate temperatures for a limited time (≤24 h), the AA was at least partially neutralised either by using the neutralisation method of D1 (see eg [P 1]: "The refined acrylic acid was stored at 30°C for 3 hours and then neutralized by the following procedure of Example 1 cited in EP-A-0372706.", [0127]) or, in the alternative, by a method as used in control examples of D1 (see eg [P 8]: " The refined acrylic acid was stored at a temperature of 30°C for 3 hours and then neutralized by the following procedure of Control 2 of EP-A-0372706.", [0134]).

3.5.2 In "Control Production" ([CP]) examples of the patent in suit, this procedure was modified either by storing the refined AA for a prolonged period in different temperature conditions (thus mention is made of eg 48 hours at 40°C in [CP 6] or 20 days at 25°C in [CP 1] or at 30°C, respectively, in [CP 10], just to give some examples), before the neutralisation was carried out, or by subjecting the commercial available AA to the neutralisation without previous refinement by distillation (as eg in [CP 2]) or by carrying out the neutralisation at elevated temperatures (as eg in [CP 11]). These differences in the pre-treatment of the acrylate components resulted in significant increases in the 3-HPA content (as reported in each CP) of each water-soluble acrylate composition used thereafter for the manufacture of polymers. In a number of comparative polymerisation examples ("Controls"), the water-soluble acrylate compositions were stored for a prolonged time between the neutralisation step and the initiation of the polymerisation (cf. eg [Controls 1 to 6]). With regard to the differences in the two relevant properties of the hydrophilic polymers thus obtained, reference can be made to the arguments and data provided by the Respondent in section V(4), above, and to the respective experimental data shown in [Tables 1 and 2] on [pages 22 and 23]. Whilst, in the [comparative examples], the latent residual monomer contents ranged from 140 to 1200 ppm, the corresponding values in the [examples] ranged from "max.5" to 40 ppm. The residual monomer contents in the [comparative examples] and in the [examples] ranged from 300 to 1560 and 35 to 300 ppm, respectively. More particularly, when comparing data of experiments directly comparable with one another, eg. of [Example 11] (on the basis of [P 8]) and of [Control 14] (on the basis of [CP 11]) (cf. section V(4), above), wherein the only difference lay in the neutralisation temperature of the AA, the advantages in the two residual monomer contents becomes even more evident (residual monomer contents/latent residual monomer contents in [Example 11] = 140/30 ppm; in [Control 14] = 420/240 ppm).

3.5.3 In view (i) of these data in the patent in suit, (ii) of the fact that no counter-evidence has been provided by the Opponent/Appellant, who had asserted that no improvement of the residual monomer contents had been demonstrated vis-à-vis D1 (sections IV(3) and IV(4), last sentence, both as above), and (iii) of the Respondent's arguments in sections V(2) to V(4), above, the Appellant's argument cannot prevail, that no proof would have been provided for the provision of a hydrophilic resin on the basis of AA having a lower residual monomer content in comparison with D1. The burden of proof for the correctness of its assertion and arguments concerning D1 has, however, been on the Appellant who, as the Opponent, had raised this objection, but has not discharged this burden.

3.6 Consequently, the Board is satisfied that both aspects of the suggested technical problem (section 3.3, above) have been solved by means of the claimed method, as shown by the examples and comparison examples in the patent in suit. It is therefore acknowledged as the relevant technical problem to be solved with regard to the closest piece of prior art, ie D1.

4. *Inventive step*

It remains to be decided whether the claimed solution of the above problem (sections 3.3 and 3.6, above) derives in an obvious way from the cited documents.

4.1 As conceded by the Appellant, D1 does not refer to a 3-HPA content of the AA used in the manufacture of its hydrophilic polymer product. Nor, furthermore, does it address at all the question of purity of the monomer or of side products or the problem concerning a latent residual monomer content, ie a monomer content which might form under varying conditions of use of the polymer (cf. [0119]). Rather, the determination of the residual monomer content in D1 as described on from page 9, line 55 to page 10, line 1 and on page 12, lines 50 to 52, respectively, makes it clear to the Board that this content refers only to the remainder of the monomer which had not reacted in the polymerisation process. The conditions used in D1 (drying by means of hot air at 180°C, as described in Examples 5 and 9 and as executed in the other examples of D1) is not comparable with the heat treatment in the determination of the latent residual monomer content as referred to in [0123] (sections 3.2.1 to 3.2.4 and 3.4, above).

The drying of a hydrogel serves only to remove water in vapour form from the polymer containing gel by means of heat transfer (in this case: my means of hot air to increase the partial pressure of the water in the gel above the pressure of the surroundings). The time needed therefor essentially depends on the water content, the particle size and the temperature of the drying medium used. Normally, the drying is done at elevated temperature for efficiency reasons, but in conditions which ensure that the thermal stress on the polymer is kept as low as possible in order to prevent its degradation; cf. [page 9, lines 43 to 47].

D1 contains no information that the drying was carried out therein in a different way or that it had been extended further. Thus, in Example 5 of D1, the drying took 40 min and, in its Example 9, it took 60 min, each by means of hot air at 180°C (section 3.4, above). These latter conditions correspond directly to those in the drying step of [Example 11]. In comparison with these drying conditions, the conditions for determining the latent residual monomer content were, however, far more stringent, see [0123], according to which the already dried polymer was heated to 180°C for 3 hours.

It follows from these facts and findings, that D1 itself does not relate to the same technical problem, in particular its second aspect as defined in section 3.3, above. Nor can it, therefore, contribute to the solution of this problem.

Consequently, the solution found in the patent in suit is not obvious in view of D1.

4.2 The Appellant's arguments were, however, additionally based on combinations of D1 and D2 and D1 and D36, respectively, and on common general knowledge.

In the appeal proceedings, a further objection of lack of inventive step was raised with regard to the combination of D1 and D46/D46a, which has not, however, been taken into consideration, because the late-file document D46/D46a was not introduced in the proceedings under Article 114(2) EPC (sections VIII(9) to VIII(11), above).

4.2.1 Article D2 refers to the formation of DAA during AA storage. Since AA was widely used as a monomer in polymer industry for the manufacture of polymers for various applications, the author stressed the importance for the producers of these polymers to receive AA of good quality. However, according to common industry knowledge, AA would spontaneously dimerize to DAA (β-acryloxypropionic acid) during storage in a reaction, which could not be prevented. The presence of significant amounts of DAA in the AA could, however, lead to copolymers with longer pendant groups containing ester bonds, as shown in Figure 2 of D2. This could be detrimental to polymer properties in certain applications. Furthermore, from the economic standpoint, the formation of DAA meant the loss of a significant amount of the AA monomer and, hence, could mean yield losses of up to 50% of the DAA level in the AA feed. On the other hand, caustic neutralisation of the AA to pH levels necessary for polymerisation could, according to D2, saponify the ester group in the DAA. This could produce species with no vinyl bond for polymerisation that would remain impurities. According to Figure 3, the possible reaction products of DAA cleavage would be 3-HPA and acrylate anion. As a consequence, the use of AA with a minimal level of DAA was considered by the author as being important in certain applications.

In the experimental part of the article, the formation of DAA during the storage of AA at 15, 25, 35 and 45°C, respectively, and at different water contents of the samples (0.08, 0.25, 0.54, 1.42 and 2.9%, respectively) was investigated for up to 65 days, thereby starting with samples initially containing less than 0.040% of DAA and 0.018 to 0.022% of an inhibitor to prevent polymerisation (all the % values were indicated as relating to % on a mass basis).

The investigations showed that the rate of DAA formation increased with both increasing water content and temperature, the latter having the greater effect. From these results, the author concluded "that acrylic acid of 99.7% purity and containing 0.08% water can be stored for one month at 25°C before the purity decreases to 99.5% (a common specification limit). The same material shipped in drums in an unventilated trailer or in railcars at 35-45°C during the summertime could decrease to 99.5% purity in 5 days due to diacrylic acid formation."

4.2.2 "Dimerization in Acrylic Acid - Formation and Effect" is also the subject-matter of D36. This data sheet also corroborates that dimer formation begins immediately once the AA has been produced, that this reaction is a spontaneous reaction, which can neither be prevented nor reversed, and that it can only be minimised by controlling temperature and water content.

With regard to the effects of DAA on AA based products, D36 indicates that high concentration of the dimer as an inherent impurity of AA may result in increased residual impurities concentration in the finished product. Thus, products used for water absorption may exhibit reduced absorption capacity as a result of polymer mitigation.

The actual impact of the DAA content on the manufacturing process of such products can, according to D36, only be determined by the manufacturer.

The conclusion of all the considerations in D36 was the recommendation of prudent order placement, delivery, and storage systems. Thus, as one measure besides the control of storage conditions (such as storage tank design and moisture control), "Inventory turn-over should be maximized: therefore, judicious order placement, and just-in-time delivery schedules from the supplier should be developed".

However, despite this recommendation, D36 still contains the clear and unambiguous statement on its page 3, that "Once acrylic acid is produced, Dimer formation begins immediately. It is a spontaneous reaction which can neither be prevented nor reversed."

Moreover, AA is not instantaneously polymerised after having been manufactured (an argument to this end has never been provided), but it is at least partly neutralised, before the polymerisation is initiated (cf. D1 and sections 3.2.1 to 3.2.3, above). However, as demonstrated in the [examples] and [comparative examples], the way in which AA is made ready for polymerisation has also a decisive influence on the polymer product (cf. sections 3.2.5, 3.5.1 and 3.5.2, above). This was already considered in T 0982/02 (above; No. 3.2.2 of the reasons). Contrary to the normal behaviour of chemical compounds, AA forms a dynamic system inevitably changing its composition until its consumption in the polymerisation. Therefore, the situation here significantly differs from the situation in the case dealt with in T 1065/02 (above), which can rather be compared with those cases already discussed in the first appeal (cf. Nos. 3.5 to 3.5.11 of the reasons in T 0982/02, above).

4.2.3 The only clear and direct teaching which can be derived from D2 or D36 concerns the formation of DAA upon storage of AA. Whilst D36 is completely silent about any formation or presence of 3-HPA in AA, the formulation used on page 183 of D2, right column, only indicates that a saponification of the ester group of

DAA may, in the author's opinion, theoretically occur and that 3-HPA might then be a possible result of such a reaction, as presumed in Figure 3 of D2 as a possible reaction product. However, no indication can be found in D2 that this reaction had, in fact, happened or that the above statement was based on actual experience.

Nor is it derivable from D2 that pendant side groups in AA/DAA copolymer (according to Fig. 2 of D2, a conceivable side product of the polymerisation), if formed, would be saponified with an elimination of 3-HPA in the conditions of the polymerisation mixture or of the post-treatment of the polymer. Nor is there a hint in either document that 3-HPA, if at all present in the monomer component and subsequently also in the polymer produced therefrom, might have a noticeable influence or even any influence on the latent residual monomer content, a feature neither considered nor even mentioned in any one of the cited documents.

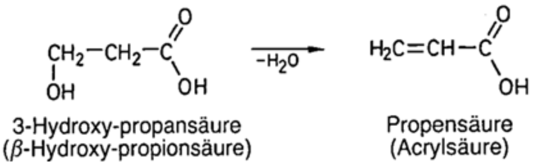
The only clear and directly obtainable information that can be derived from both of these documents is that DAA formation starts as soon as AA has been produced, that the DAA content in the AA provided increases with an increasing the water content of the AA, and with the duration and the temperature during the AA storage and that this impurity may result in copolymers having poorer properties in certain applications. Moreover, in D2, the person skilled in the art is taught "that acrylic acid of 99.7% purity and containing 0.08% water can be stored for one month at 25°C before the purity decreases to 99.5% (a common specification limit)" (cf. the Conclusions in D2, section 4.2.1, above, last paragraph).

4.2.4 In view of these findings, the Board does not see that either D2 or D36 as such would provide an incentive for the manufacturer of hydrophilic AA polymer to solve the two aspects of the relevant problem (section 3.3, above) by modification of the teaching of D1. It would rather appear to the Board that the person skilled in the art would not even consider D2 or D36 when faced with the above technical problem. The suggestion to combine D1 with either D2 or D36 would rather appear to be based on an ex-post facto analysis.

4.3 However, according to the Appellant's arguments, the person skilled in the art would additionally have relied on common general knowledge when combining the above teachings of D1 and D2 or D36. In order to demonstrate what it deemed to have been common general knowledge at the relevant date of the patent in suit, the Appellant additionally referred to a handbook (D4) and to a textbook (D35).

4.3.1 In the passage of D4, referred to by the Appellant, data concerning the chemical behaviour of 3-HPA are given. On its page 296, paragraph 2, the free hydracrylic acid was characterised as being a strongly acidic syrup, decomposing if distilled alone or if boiled with sulphuric acid (equal amounts of sulphuric acid and water). According to this passage, salts of AA and of DAA were formed upon heating of salts of 3-HPA to 200 to 250°C. In paragraph 3 of the same page, its sodium salt, $NaC_3H_5O_3$, was characterised as having a melting point of 143°C and as being in the form of indistinct crystals, which lost "1 H_2O" upon heating to 180°C or faster at 250°C and which was thereby converted to the sodium salts of acrylic and diacrylic acid. This passage was followed by a statement that the structures of the conversion products of 3-HPA were unknown ("***Umwandlungsprodukte der Hydracrylsäure, deren Strukturformel unbekannt ist***") and by four further paragraphs referring to DAA, "Paradipimalsäure $C_6H_{10}O_5$", "Paradipinsäure $C_6H_{10}O_4$" and "Paracrylsäure $(C_3H_4O_2)_8$".

4.3.2 According to D35, page 526, β-hydroxycarboxylic acids intramolecularly split off water upon heating thereby forming α,β-unsaturated carboxylic acids, and on page 527, the following chemical equation is shown:



Whilst D4, in fact, provides some information about the chemical behaviour of 3-HPA or its sodium salt in isolation under certain thermal conditions, D35 is completely silent about the conditions in which the reported water elimination would indeed take place.

4.3.3 Neither D4 nor D35 discloses, however, in clear and unambiguous terms that 3-HPA would be formed in the preparation of the AA monomer composition or during the subsequent polymerisation thereof in conditions as described in D1, let alone that it would, indeed, be formed from DAA. Rather, in D4, page 296, line 1, mention is made of a reaction to prepare (the sodium salt of) 3-HPA by heating sodium acrylate with aqueous sodium hydroxide to 100°C. Such conditions are, however, never involved in D1, nor in the claimed method. In the Board's view, this clear teaching even casts doubts on the presumption of the author of D2 that 3-HPA would form in the neutralisation of AA carried out before the polymerisation.

4.3.4 Consequently, the Board does not see any reason on the basis of D4 or D35 which could reverse its conclusion as set forth in section 4.2.4, above.

5. In view of the above facts and findings, the Board has come to the conclusion that the subject-matter as claimed in the patent in suit, in particular in Claim 1 of the Main Request, is based on an inventive step. By the same token, this finding is also valid for the remaining dependent claims of this request.

6. Consequently, there is no need further to consider any one of the Respondent's Auxiliary Requests, nor to consider the Appellant's request for remittal (section VIII(1), above).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:	The Chairman:
E. Görgmaier	R. Young