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D E C I S I O N
of 7 March 2003

Case Number: T 0100/00 - 3.3.3

Application Number: 97200522.7

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Language of the proceedings: EN

Title of invention:

Epihalohydrin-based resins having a reduced halogen content

Applicant:

AKZO NOBEL N.V.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 54, 76(1), 84, 123(2)

EPC R. 88

Keyword:

"Amendments - added subject-matter (no)"

"Novelty (yes) - chemical composition vs. chemical product (compound) - chemical modification vs. purification - concept of "conventionality" of a treatment"

Decisions cited:

T 0012/81, T 0204/83, T 0205/83, T 0206/83, T 0056/87,
T 0450/89, T 0012/90, T 0595/90, T 0990/96

Catchword:

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Case Number: T 0100/00 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 7 March 2003

Appellant: AKZO NOBEL N.V.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 20 July 1999
refusing European patent application
No. 97 200 522.7 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: R. J. Young
Members: P. Kitzmantel
J. C. M. De Preter

Summary of Facts and Submissions

I. This appeal, which was filed on 17 September 1999 lies against the decision of the Examining Division dated 20 July 1999, refusing European patent application No. 97 200 522.7 filed on 19 May 1992 in the name of AKZO NOBEL N.V., and published under No. 0 776 923, this application being a divisional application from European patent application No. 92 910 779.5 (corresponding to PCT/EP92/01134) published under No. 0 589 917 (WO 92/22601) and claiming an EP priority of 19 June 1991.

The appeal fee was paid together with the Notice of Appeal and the Statement of Grounds of Appeal was filed on 29 November 1999.

II. The decision under appeal was based on four sets of each ten claims of a main request and of three auxiliary requests, all filed with a submission dated 29 September 1998.

(i) The independent Claims 1 and 10 of the main request read as follows:

"1. An aqueous solution comprising a water-soluble nitrogen-containing epihalohydrin-based resin having a reduced organic halogen content, characterized in that it has an organic halogen content of below 0.1 % by weight, calculated on solid resin, and total halogen content of below 1 % by weight, calculated on solid resin.

10. The use of the aqueous solution according to any one of claims 1 to 9 as a wet-strength agent for paper."

- (ii) Claim 1 of the first auxiliary request replaced the feature "an organic halogen content of below 0.1 % by weight, calculated on solid resin" of the main request by the feature "an absorbable organic halogen content above 0.0005 % by weight, calculated on solid resin."
- (iii) Claim 1 of the second auxiliary request was identical to Claim 1 of the main request but for the narrower definition "polyaminoamide-epichlorohydrin resin" in lieu of "nitrogen-containing epihalohydrin-based resin".
- (iv) Claim 1 of the third auxiliary request combined the amendments of the first and second auxiliary requests.
- (v) The Claims 10 of all auxiliary requests were identical to Claim 10 of the main request.

III. The decision under appeal refused the application because, in the Examining Division's opinion, the aqueous resin solutions of the Claims 1 of all requests lacked novelty over commercially available aqueous solutions of the same polymer containing higher amounts of halogen-comprising entities. Since the claimed upper limits of the solution's halogen content could not be attributed to a substance parameter of the product, the undesired halogen-comprising entities had to be considered as impurities which were subject to the principle outlined in T 990/96 (OJ EPO 1998, 489) and T 205/83 (OJ EPO 1985, 363), namely that a higher degree of purity obtainable by conventional purification methods could not establish novelty.

Apart from the lack of novelty reference to commercial products, the decision under appeal also referred to the Article 54(2) EPC citations

D1: EP-A-0 349 935,

D2: EP-A-0 282 862,

D3: EP-A-0 332 967, and

D4: EP-A-0 374 938,

as well as to the Article 54(3) EPC citation (for the overlapping contracting states)

D7: EP-A-0 512 423

which all disclosed similar polyaminoamide-epihalohydrin resins to be used as wet-strength agent for paper.

- IV. Together with the Statement of Grounds of Appeal the Appellant submitted four amended sets of each ten claims of a main request and of three auxiliary requests.

These requests correspond to those before the Examining Division but for the fact that the former first auxiliary request now became the second auxiliary request and *vice versa*. Moreover, in the wording of all Claims 1 the passage "characterized in that it" is replaced by "characterized in that the solution".

- V. The Appellant's arguments brought forward in the Statement of Grounds and in its reply of 15 January 2003 to the Rapporteur's communication dated 5 March 2002 can be summarized as follows:

(i) Differently from the facts underlying T 205/83, in the present case the characterizing features of the claims were indeed substance parameters of the aqueous resin solution.

(ii) This could be concluded from the information contained in

"Paper Chemistry", ed. by J.C. Roberts, 1991, Wet Strength Chemistry, pages 76 to 95 (hereinafter D8, no evidence for its publication before the present priority date of 19 June 1991),

according to which the halogen content of the claimed solutions was mainly derived from resin moieties of the type aminochlorohydrin and/or hydroxyazetidinium chloride (the latter moiety being the intramolecular rearrangement product of the former) resulting from the reaction between epichlorohydrin and polyaminoamide.

The contribution to the total chlorine content of chlorine containing impurities like MCP (= 1-chloro-2,3-propanediol) and DCP (= 1,3-dichloro-2,3-propanediol) was negligible.

(iii) In view of this situation, the inventive ion-exchanger treatment of commercial solutions was not a purification but a modification method. It led to the claimed low halogen contents of the solution which were much lower than those disclosed in any of the citations, including the Article 54(3) EPC document D7.

This ion exchange treatment was the subject-matter of the parent application (of the present divisional application) which had been granted without opposition.

VI. Observations under Article 115 EPC were filed by the European Patent Attorneys Hoffmann & Eitle with submissions dated 2 August 2000 (also comprising a copy of previous submission dated 30 April 1999) and 6 June 2002.

In these observations the following objections have been raised:

- (i) The application in suit contravened Article 76(1) EPC because the parent application did not disclose aqueous solutions having the claimed halogen contents but only the resins themselves.
- (ii) The desire for a minimisation, for environmental reasons, of the halogen content of nitrogen-containing epihalohydrin-based resins was known from
 - (ii-1) the West German effluent control legislation (21.800),
 - (ii-2) the paper "Reducing Organic Chloride Contaminants in Polyaminoamide-epichlorohydrin Wet-strength Resins" presented during the Papermakers Conference held between 8 to 10 April 1991 in Seattle and reported in the December 1991 issue of the Tappi Journal (hereinafter D9, published after the present priority date of 19 June 1991).

- (ii-3) US-A-4 975 499 (hereinafter D10),
column 1, lines 54 to 65,
- (ii-4) EP-A-0 374 938 (= D4), page 2, lines 4
to 14.
- (iii) The technical explanation of the Appellant
concerning the nature of the halogen-containing
moieties of the claimed polyaminoamide-
epichlorohydrin resins found no basis in the
application.
- (iv) The same applied to the Appellant's argument
that the invention related to a method of
modification rather than purification.
- (v) The conclusion that a special degree of purity
could not establish novelty applied equally to
resins and to solutions of this resin (cf.
T 205/83, T 990/96 and T 728/98 (OJ EPO
2001, 319)).
- (vi) The fact that the resins of the application in
suit were designated epihalohydrin-based resins
was at variance with the Appellant's allegation
that the halogen atoms had been stripped away.
- (vii) The observer also repeated the argument of the
Examining Division's communication of 3 December
1997, namely that, contrary to the Examination
Guidelines, part C, chapter III, paragraph 4.7,
by claiming all solutions of the existing
technical problem (i.e. reducing the halogen

content) but offering only one means to achieve that aim, the claims covered not only the actual technical contribution to the art but monopolised a technical area extending well beyond it.

- (viii) Document D3 was novelty destroying because it disclosed a water-soluble nitrogen-containing epihalohydrin-based resin having an organic halogen content of 0,01 to 0.5% by weight.
- (ix) Since the resins of the claimed type were added to the wet end of a paper machine, usually in an amount of about 0.5% by weight of the dry pulp, it was evident that the products of Examples 15 and 16 of D7 containing less than 0.07% by weight of organically bound chlorine would result in an aqueous solution being formed there in accordance with the claimed invention.
- (x) Furthermore, the EP-A-0 510 987 (hereinafter D11) disclosed polyaminoamide-epichlorohydrin resins from which undesired halogen was enzymatically eliminated. These resins were devoid of organic halogen and comprised low levels of inorganic and total halogen.
- (xi) Claim 1 of both the first and third auxiliary requests, insofar as they referred to absorbable organic halogen contents above 0.0005% by weight, contravened Article 123(2) EPC.
- (xii) Claim 1 lacked clarity (Article 84 EPC), since the word "reduced" therein had no reference.

- VII. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the sets of claims of the main request or of the first, second or third auxiliary requests (in this order).

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*
 - 2.1 Change of "resin" to "aqueous solution of resin"
(Article 76(1) EPC, Rule 88 EPC)
 - 2.1.1 The Claims 1 of all requests relate to an **aqueous solution of an epihalohydrin-based resin** whereas the product Claims 5 to 12 of the parent application EP-A-0 589 917 relate to a **water-soluble epihalohydrin-based resin**.
 - 2.1.2 It is, however, evident from the original description that the term "water-soluble epihalohydrin-based resin" is in fact a shorthand version for "aqueous resin solution" (all references below are to the originally filed description).
 - 2.1.3 This conclusion results from the following analysis of the description:
 - (i) Page 5, line 31 to page 6, line 15, especially page 6, lines 9 to 15 on the one hand discloses that a **solution** of epihalohydrin-based resin is passed through the exchanger resin bed and on the other hand refers to the typical dwell time for the epihalohydrin **resin** to be in contact with the ion exchanger bed.

- (ii) On page 10 a method of preparation of the epihalohydrin-based resin is described. According to the first paragraph the end-product before the ion-exchanger treatment is a solution, but in the second paragraph it is set out that resins are subjected to this treatment which are thereafter neutralized with acid. It is evident that the resin solution, not the solid resin, is neutralized.
- (iii) On page 11, line 8 to page 12, line 19 and in Example 3 on page 14, line 24 to page 15 line 10 reference is made to the method of preparation according to the US-A-3 891 589. While these references in the application fail to disclose that the reaction is carried out in (aqueous) solution, this fact is revealed by the US-patent itself (cf. Example 1).
- (iv) Examples 1 and 2 (pages 13, 14) both describe the ion-exchanger treatment of aqueous resin solutions and it is apparent from Table II on page 14 that the resulting product is a solution having a certain solids content.
- (v) The above evidence is completed by the definitions of the various halogen contents in % by weight calculated on solid resin, a reference which would be superfluous if the term "resin" was synonymous to "solid" resin.

2.1.4 The replacement in all requests of the original definition of the parent application "a water-soluble, nitrogen-containing, epihalohydrin-based resin" (cf. Claim 5) by the definition "an aqueous solution comprising a water-soluble nitrogen-containing epihalohydrin-based resin" therefore amounts to a

correction under Rule 88 EPC which is allowable because it was immediately apparent to the skilled person (i) that an error had occurred and (ii) how it should be corrected. It follows that this correction does not contravene the provisions of, respectively, Articles 76(1) and 123(2) EPC (cf. Opinion G 3/89 (OJ EPO 1993, 117)).

2.2 Further amendments (Articles 76(1) and 123(2) EPC)

In the Board's judgment, all further amendments which are contained in the four sets of claims of the Appellant's requests are fairly based on the parent application which therefore comply with the requirements of Articles 76(1) and 123(2) EPC.

3. *Clarity*

No objection arises under Article 84 EPC, especially not with respect to Claim 1 (all requests). For the person skilled in the art the term "epichlorohydrin-based resin" clearly designates a resin whose preparation involved epichlorohydrin as a starting monomer. Similarly, the word "reduced" in the passage "reduced organic halogen content" has undoubtedly the (relative) meaning "a halogen content reduced with regard to conventional prior art resins".

Main request

4. *Novelty*

4.1 Article 54(1)(2) EPC stipulates that an invention shall be considered to be new if it does not form part of the state of the art, i.e. has not been made available to the public before the date of filing of the European patent application.

The words "made available", in the terms of the jurisprudence of the EPO, mean that the prior publication contains a **clear and unmistakable disclosure** of the subject matter of the later invention including implicit features (e.g. T 204/83 OJ EPO 1985, 310, Reasons 3; T 56/87 OJ EPO 1990, 188, Reasons 3; T 450/89 of 15 October 1991; Reasons 3.11). A further requirement is that the disclosure must be enabling (T 206/83 OJ EPO 1987, 5).

- 4.2 In the Board's judgement, these principles must also apply in the present case where the novelty of a **composition** (i.e. aqueous resin solution) is at issue which differs from compositions of the state of the art by the absence of residual starting material (epihalohydrin) and of by-products of the reaction that caused the formation of the resin component as well as by (minor) compositional changes of said component, its salt form inclusive.
- 4.3 The afore-mentioned situation is different from that underlying T 205/83 (Reasons 3.2.3) where it was concluded that a known **product** (there: vinyl ester/crotonic acid copolymer) cannot achieve novelty by the absence of by-products (monomeric contamination) because the subject-matter whose novelty was denied according to this decision concerned the **product itself** (i.e. the copolymer) not a composition comprising the copolymer.
- 4.4 It appears that T 990/96 which denied the novelty of a low molecular chemical compound having a proportion of erythro to threo isomer of 99.5 to 0.5 or higher went a step further because there, at least with regard to the

part of the claim which did not relate to the 100% erythro isomer, the claimed subject-matter must be considered as a composition comprising erythro as well as threo isomers.

4.5 In the present case the claimed composition comprises an aqueous solution of a nitrogen-containing epihalohydrin-based resin having an organic halogen content of below 0.1% by weight and a total halogen content of below 1% by weight, both calculated on solid resin.

4.6 The person skilled in the art is aware that this composition is derived from a composition having a higher organic and a higher total halogen content which essentially originate from

- (i) low molecular weight organic compounds (e.g. dichloropropanol DCP, monochloro propane diol MCP),
- (ii) epihalohydrin (unreacted residue),
- (iii) resin molecules comprising aminohalohydrin branches (i.e. covalently bound halogen), and
- (iv) resin molecules comprising azetidinium halogenide branches (i.e. ionically bound halogen).

(cf. original application: page 2, line 21 to page 3, line 8; page 13, Example 1, Table I; D8: pages 82 to 83, Figure 6.6; D9: page 135, middle column, second paragraph; page 136, first paragraph of the section "Results" (the disclosure of D8 and D9 is considered to belong to the common general knowledge of the skilled person)).

- 4.7 The results in Table I of the present application demonstrate that, in the case of the use as starting material of the commercial state-of-the-art resin EtadurinNXH (ex Akzo Chemicals) not only the organic chlorine content is reduced by 98 to 99% but also the total chlorine content by more than 90% from 11.7 to less than 1% by weight, calculated on solid resin, the latter reduction being much bigger than that accounted for by the reduction of the organic chlorine.
- 4.8 According to the Applicant's analysis of the prior art (pages 7 to 9 of submission dated 29 September 1998) none of the citations discloses a resin solution complying with the halogen content requirements of the claimed resin solutions. The Board accepts this analysis which was not contested by the Examining Division, nor by the observing party. The results of this analysis are as follows:
- 4.8.1 The resin solutions according to Examples 6 to 8 in Table I of D1 have a total chlorine content of 13.3, 12.7 and 12.5% by weight, respectively, calculated on solid resin. The lowest content of organic chlorine appears to be 1% by weight, calculated on solid resin (Example 8).
- 4.8.2 The lowest organic halogen content disclosed in D2 is 0.73% by weight, calculated on solid resin (Example 3); the corresponding total halogen content is about 15% by weight, calculated on solid resin.
- 4.8.3 According to D3 the lowest halogen contents disclosed are an organic halogen content of 0.73% by weight, calculated on solid resin (Example 3) and a total halogen content of 9.2% by weight, calculated on solid resin.

- 4.8.4 The worked Examples of D4 disclose resin solutions having a dichlorohydrin content of 0.11 to 1.68% by weight, calculated on solid resin; the total halogen content of the solutions according to Examples 3 and 6 being about 11% by weight and 13.4% by weight, respectively, both calculated on solid resin.
- 4.8.5 The resin solutions according to Examples 14 to 16 of D7 (page 12, Table I) exhibit organic halogen contents of $\leq 0.07\%$ by weight, calculated on solid resin, i.e. amounts being within the range of present Claim 1, but their content of total halogen is 9.1, 9.1 and 9.5% by weight, respectively, calculated on solid resin.
- 4.8.6 It is the common object of each of the afore-mentioned citations to provide resin solutions having a low **organic** halogen content (D1: page 5, lines 48 to 51; D2: paragraph bridging pages 2 and 3; D3: page 2, lines 44 to 46; D4: page 2, lines 11 to 14; D7: page 2, lines 47 to 53). None of these citations mentions the desirability of a low **total** halogen content. The same applies to documents D10 and D11 cited by the observing party (D10: column 1, lines 54 to 65; D11: page 4, lines 22 to 24) as well as to the "West German effluent control legislation (21.800)" to which the observing party referred in its submission dated 30 April 1999 (page 1, last paragraph) in order to establish the necessity of low amounts of absorbable **organic** halogens (AOX).
- 4.9 It results from the above considerations that the known prior art concerned with resin solutions of the kind envisaged by the application in suit

- (i) is devoid of a disclosure of resin solutions having the low organic and total halogen contents required by present Claim 1,
- (ii) did not recognize the desirability of this double requirement, and
- (iii) failed to disclose any means suitable to this end.

4.10 It results that the claimed subject-matter is not comprised by the state of the art and **is beyond the boundaries of its disclosure**. This situation is to be distinguished from that of "selection inventions" where the issue of novelty depends on whether or not the respective subject-matter which is **within the boundaries** of a prior art disclosure is or is not comprised by the state of the art.

4.11 The decision under appeal found that the claimed subject-matter nevertheless lacked novelty because the surplus over the state of the art was a matter of "purity" which could be achieved by "conventional" techniques.

4.12 Even if, arguably, this reasoning could be accepted with regard to the elimination of low molecular weight organic by-products, it is clearly not applicable to the compositional changes occurring as a consequence of the replacement of halogen, be it bound to the resin molecules covalently or, particularly, ionically, by whatever other moiety. Since these changes result in the formation of modified solutions which are not disclosed in the state of the art, the condition for the acknowledgement of novelty according to T 205/83 (Reasons 3.2.3), namely the existence of new substance parameters, is fulfilled.

While there cannot be any doubt that the replacement of covalently bound halogen atoms by different entities leads to a new substance parameter, the same holds also true for the replacement of the halogenide counterions of the azetidinium groups by other ions because thereby different salts are created. In the terminology of T 12/81 (OJ EPO 1982, 296, Reasons 14.2) and T 12/90 of 23 August 1990 (Reasons 2.6, not published in the OJ EPO) this replacement thus introduces a "new element".

- 4.13 The reliance in this reasoning on changes occurring as consequence of a treatment (of a starting material) which is not part of Claim 1 (i.e. ion-exchanger treatment) is justified because it is inevitable that the removal of halogen entities which were part of the resin molecules of the starting material must be accompanied by the entry of replacement entities (leaving aside a theoretically possible molecular rearrangement which would anyway amount to a structural change).

The Examining Division's finding of lack of novelty also relied on procedural characteristics (purification treatment) not reflected by the wording of Claim 1.

With regard to the impact on the understanding of a product claim of process characteristics which are not features of that claim, reference is made to decision T 595/90 (OJ EPO 1994, 695, Reasons 5, last paragraph) where it was held that a product which can be envisaged as such with all characteristics determining its identity together with its properties in use, i.e. an otherwise obvious entity, may become nevertheless non-obvious and claimable as such if there is no known way or applicable (analogy) method in the art to make

it and the claimed methods for its preparation are therefore the first to achieve this in an inventive manner. The implication is that the known analogy methods would not have been enabling for obtaining the product.

While this decision relates to obviousness (not to novelty) it emphasises the substantive coherence of a product and a process by which it may for the first time be prepared in a new and inventive manner, a situation bearing resemblance to the present case because the parent application of the present divisional application which is directed to an ion-exchanger treatment leading to the resin solutions of present Claim 1 resulted in the grant of a European patent (cf. paragraph 1 of the Examining Division's communication of 3 December 1997 in conjunction with Claims 9 and 10 of the original application).

4.14 The Board therefore decides in view of the argument elaborated in point 4.12 above that the subject-matter of present Claim 1 is not anticipated by the cited prior art.

4.15 In addition to the afore-mentioned reasoning, the Board makes the following comments with regard to the "purity" arguments of the decision under appeal:

- (i) The application of the rationale of T 990/96 that "a document disclosing a low molecular chemical compound and its manufacture makes available this compound to the public in the sense of Article 54 EPC in all grades of purity as desired by a person skilled in the art" presumes that the claimed degree of purity could be achieved by "conventional" purification processes (Reasons 8).

(ii) However, the qualification "conventional" can only mean "conventional in view of the concrete technical context concerned". A purification technique may be conventional in one technical area but non-conventional in others. It appears that the mere fact that ion-exchanger treatments are among the many purification methods exhibited in chemical textbooks in various contexts does not necessarily make them "conventional" for the post-treatment of aqueous solutions of nitrogen-containing epihalohydrin-based resins, even if ion-exchanger materials are "conventionally" available (Reasons 7.3 of decision under appeal). The fact that lawn mowers are commercially available does not make them suitable, and thus "conventional", for crop harvesting.

(iii) In the present case up to the present invention the ion-exchanger treatment, which - as the name suggests - is especially designed for the removal of undesired ions, had not been disclosed or suggested for the post-treatment of aqueous solutions of nitrogen-containing epihalohydrin-based resins.

Moreover, the known state of the art which is relevant here has not even recognized the desirability of the removal of inorganic (ionic) halogen.

This is e.g. apparent from D1, D2, D3, D4 and D7 all of which disclose a base treatment of the epihalohydrin reaction product (converting thereby organic halogen into inorganic) without expressing any concern about the inorganic (ionic) halogen content which remains in the

solution (D1: Claim 7; page 9, Table 2 and lines 19 to 25; D2: Claim 1; page 4, lines 46 to 54; page 5, lines 19 to 21; D3: page 4, lines 25 to 30; D7: Claim 1).

(iv) In the Board's judgment, it cannot be concluded in such a situation that an ion-exchanger post-treatment of aqueous solutions of nitrogen-containing epihalohydrin-based resins amounts to the application of a conventional method. It is quite a different question whether the use of an ion-exchanger post-treatment was obvious in the context of the present invention.

5. Claim 1 of the main request therefore complies with the requirement of Article 54 EPC. The same applies *a fortiori* to Claims 2 to 9 which are dependent on Claim 1 and to Claim 10 which relates to the use of the claimed aqueous solutions as a wetting agent for paper.
6. There is therefore no need to consider the auxiliary requests.
7. Since the decision under appeal only relied on the afore-discussed lack of novelty conclusion, it remains to be examined whether the other requirements of the EPC are also fulfilled. For this purpose the case is, in accordance with Article 111(1) EPC, remitted to the first instance.

Order

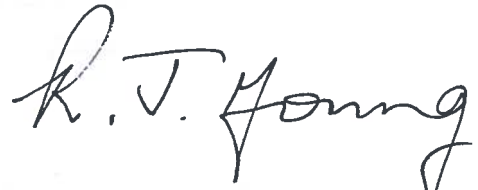
For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division for further prosecution.

The Registrar:


E. Gorgmaier

The Chairman:


R. Young