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D E C I S I O N
of 21 February 2003

Case Number: T 0428/99 - 3.3.3

Application Number: 95905567.4

Publication Number: 0737230

IPC: C08K 5/14

Language of the proceedings: EN

Title of invention:
GELS OR ORGANIC PEROXIDES

Applicant:
Akzo Nobel N.V.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0428/99 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 21 February 2003

Appellant: Akzo Nobel N.V.
Velperweg 76
NL-6824 BM Arnhem (NL)

Representative: Schalkwijk, Pieter Cornelis
Akzo Nobel N.V.
Patent Department
P.O. 9300
NL-6800 SB Arnhem (NL)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 2 December 1998
refusing European patent application
No. 95 905 567.4 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: R. Young
Members: C. Idez
J. De Preter

Summary of Facts and Submissions

- I. European patent application No. 95 905 567.4, based on International application No. PCT/EP94/04249, was filed on 21 December 1994, claiming the priority of 27 December 1993 of an earlier European patent application (93203699.9) and published under No. WO-A-5/18180 on 6 July 1995. The application was refused by a decision of the Examining Division issued in writing on 2 December 1998 for lack of inventive step (Article 56 EPC).
- II. The decision was based on a set of 10 claims, consisting of Claims 1 to 5 as submitted with letter of 10 October 1995 and of Claims 6 to 10 as originally filed.

Claim 1 reads as follows:

"A gel comprising:

- A) a solution of at least one organic peroxide essentially solubilized in a phlegmatizer,
- B) at least one cellulose ester as thickening agent essentially solubilized in solution A, and
- C) at least one thixotropic agent selected from hydrogenated castor oil and fumed silica."

Independent Claim 9 relates to the use of the gel according to any one of Claims 1 to 8 in the hardening of thermoset resins.

The remaining claims are dependent claims which refer to specific elaborations of the subject-matter of the respective antecedent independent claims cited above.

The objection of lack of inventive step was based on the following documents:

- D1: Chemical Abstracts, Vol. 82, No. 20, 19 May 1975, Abstract No. 126 278h, referring to JP-A-74/102 779),
- D2: US-A-3 806 477,
- D3: US-A-3 859 240,
- D4: US-A-3 182 028, and
- D5: NL-A-70/06273.

In its decision the Examining Division held that the closest prior art was represented by peroxide formulations containing a ketone peroxide, a phlegmatizer such as a phthalic ester, and a gel forming colloid (e.g. cellulose acetobutyrate) which were to be used as curing agents for unsaturated polyesters. D1, D2 and D3 were considered as representative of this art.

It considered that the feature distinguishing Claim 1 from the closest prior art was therefore the presence of component (C).

The Examining Division stated that the objective technical problem underlying Claim 1 was to increase the viscosity of the known peroxide compositions to make them more easily meterable from cartridges.

According to the decision, an obvious solution would have been to include a conventional thixotropic agent.

The skilled person would have selected an agent of this kind which would not give rise to undesirable side reactions with the peroxide and which has been used in similar peroxide formulations before. Hence, an obvious choice would have been e.g. hydrogenated castor oil or silica which both were known as possible additives for peroxide compositions (see Examples II and V of D2, Table II and Example III to V of D4, page 3, line 18 and Claim 9 of D5). Furthermore, there was no evidence for any technical prejudice of using thixotropic agents in the peroxide compositions of D1, D2 and D3. Thus, the Examining Division came to the conclusion that Claim 1 did not meet the requirements of Article 56 EPC.

III. On 1 February 1999, a Notice of Appeal against the above decision was lodged by the Appellant (Applicant). The prescribed fee was paid on the same date.

In the Statement of Grounds of Appeal, submitted on 7 April 1999, the Appellant contested the findings of the Examining Division. It argued essentially as follows:

- (i) The technical problem solved by the invention was to provide an organic peroxide containing gel which was storage stable and displayed thixotropic behaviour. The examples demonstrated that this problem had in fact been solved. The technical problem was not, as stated by the Examining Division, to increase the viscosity of the known peroxide compositions to make them easily meterable from cartridges.
- (ii) None of the cited documents referred to the

problem effectively solved by the application.
Hence, inventive step should be recognized.

- (iii) The Examining Division had mosaicked the Appellant's invention on the basis of an incorrect interpretation of the problem and with impermissible hindsight.

IV. Communications were issued on 1 February 2001, 20 September 2001, and 19 June 2002 by the Board, in which in addition to preliminary comments on the teaching of the various documents on file, comparative data in view of the Example IV of D4 which disclosed a gel composition comprising a peroxide, a phlegmatizer, finely dispersed silica and an activator for the gel formation (i.e. cellulose butyl ether), was requested. All these points were addressed by the Appellant in its responses dated respectively 30 May 2001, 8 January 2002 and 3 October 2002. The experimental data filed by the Appellant concerned compositions comprising cellulose esters and compositions comprising cellulose ethers (i.e. methyl cellulose and ethyl cellulose) and the arguments presented by the Appellant in these submissions may be summarized as follows:

- (i) The use of cellulose ethers in combination with silica was suggested in D4.
- (ii) The present application related, however, to gel compositions comprising cellulose esters and silica (referred as formulations A) and to gel compositions comprising cellulose esters and hydrogenated castor oil (referred as formulations B).

- (iii) For the formulations A the closest prior art would be represented by compositions comprising a cellulose ether and silica as presented in D4.
- (iv) There was no indication in D4, that cellulose esters could be combined with silica to give acceptable formulations.
- (v) Cellulose esters could not be considered as a mere substitute for cellulose ethers, since the tests submitted showed that they led to better viscosity characteristics and a better homogeneity of the formulations.
- (vi) Concerning the formulations B castor oil was neither a detergent, nor a colloid, and would be used, if at all, in D4 as an activating agent.
- (vii) Even, if for sake of argument one would argue that D4 disclosed compositions comprising castor oil in combination with cellulose ethers, there was no pointer in D4 to combine castor oil with cellulose esters. Furthermore it had been shown (cf. Examples 16 and H submitted with letter of 30 May 2001), that this combination led to compositions with better viscosity characteristics and homogeneity.
- (viii) Thus, formulations A and formulations B involved an inventive step over D4.

V. The Appellant requested that the decision of the Examining Division be set aside and a patent be granted on the basis of Claims 1 to 10 annexed to the decision.

Reasons for the Decision

1. The appeal is admissible.

2. *Wording of the claims*

2.1 Article 123(2) EPC

Claims 1, 2, 3, 5, 6, 7, 8, 9 and 10 correspond respectively to Claims 1, 2, 5, 6, 7, 8, 9 and 10 as originally filed.

Claim 4 is supported by Claim 4 as originally filed and the passage on page 3, lines 24 to 26 of the application as originally filed.

Consequently, the requirements of Article 123(2) EPC are met by the claims.

2.2 No objection under Articles 84 and 83 EPC has been raised by the Examining Division. The Board is also satisfied that the requirements of Articles 84 and 83 EPC are met.

3. *Novelty*

The subject-matter of Claims 1 to 10 has been considered as novel by the Examining Division over the cited prior art. The Board sees no reason to depart from that view.

4. *Problem and solution*

4.1 The application in suit concerns organic peroxide gel compositions.

- 4.2 Such compositions are known from documents D2, D3, D4, and D6 (GB-A-1 275 172, which is the UK patent application corresponding to D5). In that respect, D4 (mentioned on page 2, lines 14 to 16 of the application in suit) refers to gel compositions comprising a thixotropic agent such as a finely divided silica, and an activating agent in form of an organic polar component having at least one hydroxyl group in order to improve the homogeneity of the gel and its storage stability (cf. D4, column 1, lines 14 to 19; column 2, lines 21 to 34). In particular, it discloses in its Example IV (cf D4, column 6, line 17) a gel composition comprising a finely divided fumed silica (e.g. "Cab-O-Sil") and butyl cellulose as activating agent. Thus, D4 represents, in the Board view, an appropriate starting point for the assessment of inventive step concerning the formulations A (as referred by the Appellant in paragraph IV(ii) above).
- 4.3 Document D6, which is the only document which refers to the use of hydrogenated castor oil as gelling agent for storable peroxide gel compositions (cf. D6, Claim 1, page 2, lines 31 to 36; Example 5) constitutes, in the Board view, an appropriate starting point for assessing inventive step of the formulations B (as referred by the Appellant in paragraph IV(ii) above).
- 4.4 According to the application in suit (cf. page 2, lines 23 to 26), it aims to provide peroxide compositions which are storage stable and which have thixotropic properties.
- 4.5 Thus, starting from D4 (formulations A) or from D6 (formulations B), the technical problem may be seen in the provision of further peroxide gel compositions

being storage stable and exhibiting thixotropic properties.

4.6 The solution proposed according to Claim 1 of the application in suit is to use a composition comprising a combination of cellulose ester solubilized in the peroxide/phlegmatizer solution as a thickening agent with a thixotropic agent selected from fumed silica (formulations A) and hydrogenated castor oil (formulations B).

4.7 In view of Examples 1 to 14 of the application in suit, the Board is satisfied that the claimed measures provide an effective solution of the stated problem.

5. *Obviousness*

It remains to be decided whether this solution was obvious to a person skilled in the art having regard to the cited state of the art.

5.1 Formulations A distinguish from Example IV of D4 by the feature that a cellulose ester solubilized in the peroxide/phlegmatizer composition is used in combination with silica instead of a cellulose ether (i.e. butyl cellulose). The question therefore boils down as to whether it would have been obvious to replace the cellulose ether (butyl cellulose) by a cellulose ester which is essentially solubilized in the peroxide/phlegmatizer solution, in order to obtain a composition having good storage stability and thixotropic properties.

5.2 Document D4 defines the activating agent used to improve the homogeneity and the storage properties of

the gel in a very broad manner as a polar organic compound having at least one hydroxyl group.

- 5.3 While it is true that this broad definition would also encompass cellulose esters, D4 does not explicitly mention these components as activating agents.
- 5.4 Furthermore, the comparative data submitted by the Appellant with its letter of 3 October 2002 (Examples I and J) show that cellulose ethers other than butyl cellulose either lead to inhomogeneous compositions (i.e. methyl cellulose in Example I) or to a non gelled composition (i.e. ethyl cellulose in Example J) and, that they, although falling under the broad definition of the activating agent given in D4, will not perform as such.
- 5.5 This implies that only specific organic compounds bearing at least one hydroxyl group would effectively work as activating agents for silica. As indicated above, D4 is totally silent on the use of cellulose esters as activating agent, let alone in combination with silica. Thus, D4 itself cannot lead to the solution of the technical problem proposed in the application in suit.
- 5.6 Documents D2 and D3 (which is a divisional application of D2) both relate to peroxide paste compositions comprising a gel forming colloid such as cellulose esters, cellulose ethers or silica aerogels, and a synthetic organic polymer which is insoluble in the paste (cf. D2, column 2, lines 4 to 40; claim 1; Examples II and V; cf D3, column 2, lines 5 to 30; Example II, Claim 1). The aim of documents D2 and D3 is to provide homogeneous and storage stable paste

compositions containing ketone peroxides enabling a faster jellification and hardening of unsaturated polyester putties than the materials known and available for this purpose (cf. in particular D2, column 1, line 64 to column 2, line 9; Example V of D2). To this end, they instruct the skilled person to combine the gelling agent (e.g. colloidal silica) with a synthetic organic polymer **insoluble** in the paste. Furthermore, they do not contain any teaching to combine silica with cellulose esters for any purpose, let alone as an activator for forming a stable peroxide gel composition. They cannot, therefore, lead the skilled person to the relevant solution of the technical problem.

5.7 While D1 discloses a composition comprising 10 parts of solution of a peroxide in a phlegmatizer and 10 parts of a cellulose acetobutyrate, it appears that this composition also contains a very high amount (i.e. 80 parts) of organic solvents (e.g. ethyl acetate, toluene) and that it is used for impregnating a substrate. Firstly, it is highly questionable, in view of its very high amount of solvent and its intended use, as to whether this composition could be in form of a gel and could exhibit thixotropic properties. Secondly, D1 is absolutely not concerned by the storage stability of the peroxide composition. Thus, the skilled person could not derive from D1 in which way to modify the teaching of D4 in order to solve the technical problem.

5.8 Document D6 merely relates to the use of fatty esters such as hydrogenated castor oils as gelling agents for peroxide compositions (cf. D6, Claim 1, page 2, lines 31 to 36; Example 5). It can therefore provide no

hint to the solution of the technical problem represented by the formulations A according to the application in suit.

5.9 The formulations B differ from D6 by the feature that a cellulose ester solubilized in the peroxide/phlegmatizer solution is used in combination with the hydrogenated castor oil.

5.10 Document D6 itself contains no indication to combine the hydrogenated castor oil with a cellulose ester in order to obtain storage stable compositions, let alone, as shown by the comparison between Example 1 and Comparative Example D made in the application in suit, that this would result in an improved storage stability of the gel compositions.

5.11 Documents D2 and D3 would not give any hint to the solution proposed by the application in suit, since, as indicated above, they teach to combine the gelling agent with a polymer insoluble in the paste. Nor would the skilled person regard the teaching of D4 as relevant to the solution of the technical problem, since on the one hand, as submitted by the Appellant, the hydrogenated castor oil cannot be considered as a colloid nor as a detergent as required by D4 for the gelling agent, and since, on the other hand, as indicated above, D4 is totally silent on the use of cellulose esters as activating agent for the gelling compound. Document D1 is, for the reasons given in paragraph 5.7 above, of no relevance for the solution of the technical problem.

5.12 Consequently, the solution (i.e. formulations A and formulations B) of the stated problem does not arise in

an obvious way from the cited prior art. It thus follows from the above that the subject matter of Claim 1 involves an inventive step in the sense of Article 56 EPC.

By the same token, the subject-matter of Claims 2 to 8 which are directly or indirectly dependent upon Claim 1, involves an inventive step. This conclusion is also valid for the subject-matter of Claims 9 and 10, which require as an essential feature the application of the composition according to any of Claims 1 to 8.

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 with the order to grant a patent on the basis of Claims 1 to 10 annexed to the decision under appeal, after any consequential amendment of the description (i.e. in particular acknowledgment of the relevant disclosure of D4 and D5 to the state of the art).

The Registrar:

The Chairman:

E. Görgmaier

R. Young