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**Datasheet for the decision  
of 12 November 2009**

**Case Number:** T 1118/07 - 3.3.10

**Application Number:** 97937336.2

**Publication Number:** 0879224

**IPC:** C07C 409/38

**Language of the proceedings:** EN

**Title of invention:**

Novel poly(monoperoxy carbonates)

**Patentee:**

Arkema Inc.

**Opponent:**

Akzo Novbel N.V.

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (yes): non-obvious alternative"

**Decisions cited:**

T 0197/86, T 0606/89, T 0298/93

**Catchword:**

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Case Number: T 1118/07 - 3.3.10

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.10  
of 12 November 2009

**Appellant:** Akzo Nobel N.V.  
(Opponent) Velperweg 76  
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**Representative:** Heinen A.W. (Mrs)  
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**Respondent:** Arkema Inc.  
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**Representative:** Stoner, Gerard Patrick  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
3 April 2007 concerning maintenance of European  
patent No. 0879224 in amended form.

**Composition of the Board:**

**Chairman:** R. Freimuth  
**Members:** P. Gryczka  
D. S. Rogers

## Summary of Facts and Submissions

I. A notice of opposition was filed in which revocation of the European patent No. 879 224 was requested, *inter alia*, on the grounds of lack of novelty and inventive step (Article 100(a) EPC). The objections were based, *inter alia*, on documents

(2) US-A-4 136 105 and

(4) US-A-5 314 970.

In an interlocutory decision issued on 3 April 2007, the Opposition Division found that the European patent could be maintained in amended form on the basis of claims 1 to 15 of the second auxiliary request then pending.

The Opposition Division came to the conclusion that the claimed subject-matter was novel and involved an inventive step when starting from the document (2) as representing the closest prior art.

II. The Opponent (Appellant) lodged an appeal against the above decision. With the statements setting out the grounds for appeal dated 9 July 2007, the Appellant filed a new document

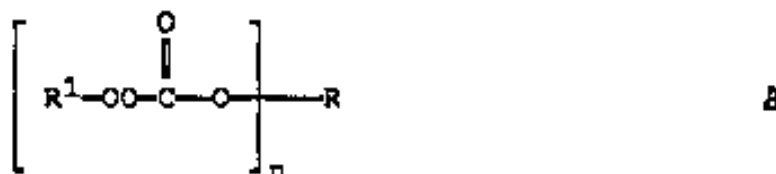
(5) US-A-4 144 262.

III. Under cover of a letter dated 28 August 2009 but received by the EPO on 26 October 2009, the Respondent (Proprietor of the patent in suit) filed two sets of claims as main request and auxiliary request. At the

oral proceedings held in front of the Board on 12 November 2009 he withdrew the main request and the auxiliary request became his sole request.

Claim 1 of the sole request reads as follows:

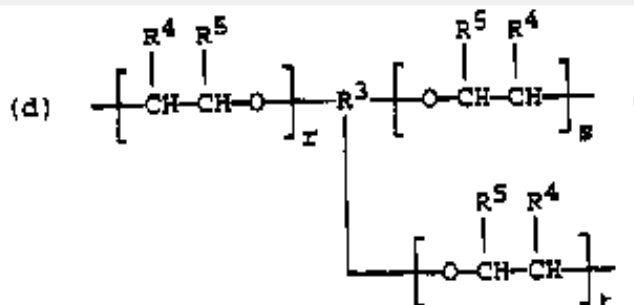
"1. A poly(monoperoxycarbonate) of structure A:

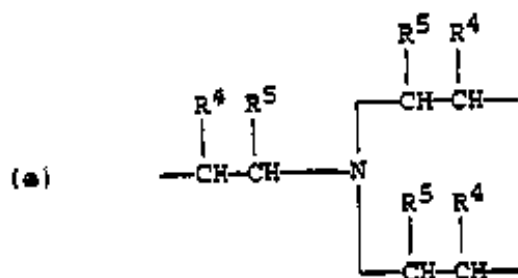


where n is an integer from 3 to 8;

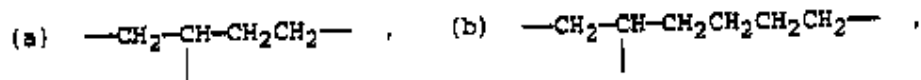
R<sup>1</sup> is selected from t-alkyl radicals of 4 to 12 carbons, 1,1,4-trimethyl-4-(t-butylperoxy)pentyl radical, 1,1,4-trimethyl-4-(t-amylperoxy)pentyl radical, t-cycloalkyl radicals of 6 to 10 carbons, t-aralkyl radicals of 9 to 13 carbons, 3-methyl-1-butyn-3-yl and 3-methyl-1-pentyn-3-yl, and as regards R:

(i) when n is 3, R is a triradical selected from structures (d) and (e):

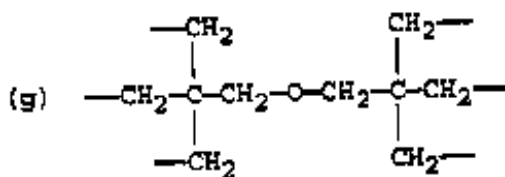


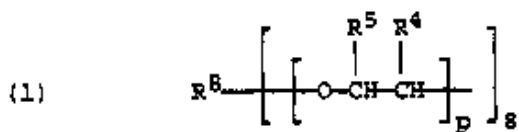
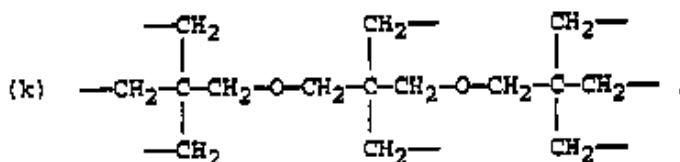
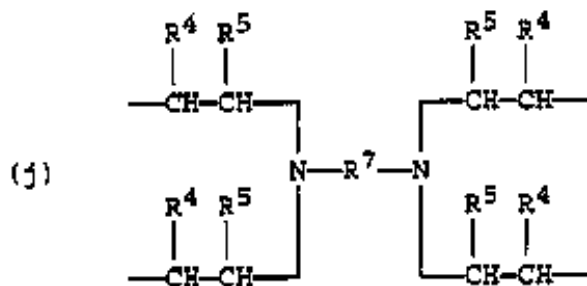
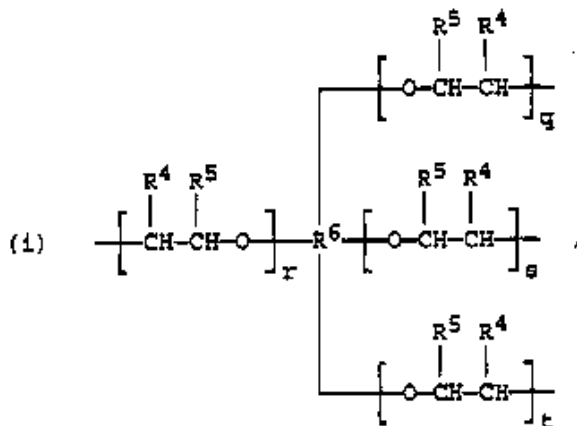


where  $R^3$  is a triradical selected from  $R^2C(CH_2-)_3$ ,  $CHR^2CH(-)CH_2-$  and structures (a) and (b),  $R^2$  is selected from hydrogen and alkyl radicals of 1 to 6 carbons,  $R^4$  and  $R^5$  are the same or different and are selected from hydrogen and alkyl radicals of 1 to 4 carbons,  $r$ ,  $s$  and  $t$  are integers from 0 to 6 and the sum of  $r$ ,  $s$  and  $t$  is from 3 to 18:

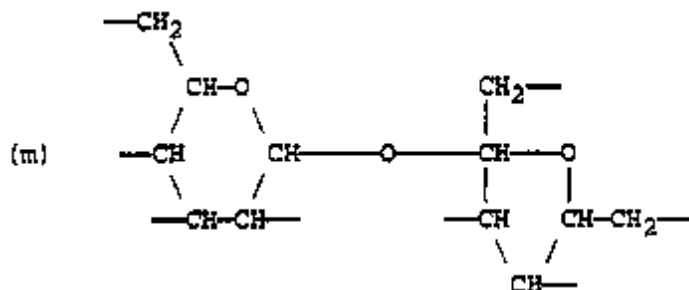
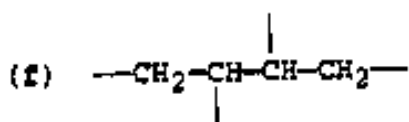


(ii) when  $n$  is 4 to 8,  $R$  is a polyradical selected from structures (g), (i), (j), (k) and (l):





where  $R^6$  is a tetraradical selected from  $C(CH_2-)_4$  and following structure (f),  $R^7$  is a diradical selected from alkylene of 2 to 6 carbons and 1,2-, 1,3- and 1,4-phenylene,  $R^8$  is the sucrose-based octaradical of the following structure (m):



p is an integer from 1 to 3, q is an integer from 0 to 4 and the sum of q, r, s and t is from 2 to 16."

IV. According to the Appellant, document (4) should be considered as the closest prior art since it was concerned, as was the patent in suit, with efficient initiators for polymerising ethylenically unsaturated monomers and agents for curing polyester resins. In addition, the initiators disclosed therein were structurally more closely related to the claimed initiators than those described in document (2). The patent in suit showed that the initiators according to document (4) performed better than the claimed ones in styrene polymerisation. The problem effectively solved by the invention was thus merely to provide alternative initiators to those known from document (4). The solution consisted in the replacement of the group R in the structure of the initiators said group being introduced in the preparation of the initiator by using a specific polyol. Since the claimed initiators could be prepared with commercially available polyols, known for example from document (5), they were obvious

alternatives to those known from document (2) or (4). In addition, the claimed initiators were not inventive since they contained a peroxide group known by the skilled person to be responsible for initiating polymerisation, the other part of the molecule having no importance in this respect. For these reasons, the claimed subject-matter did not involve an inventive step.

V. According to the Respondent, document (2) addressed the same aim as the patent-in-suit, namely to improve polymerisation efficiency, and represented thus the closest prior art. The skilled person could not expect that the modification of the structure of the initiators known from document (2) would improve their polymerisation performance. The Appellant was right when concluding that the initiators of document (4) also showed improved polymerisation performance, but this knowledge was not part of the state of the art but was only derivable from the patent in suit. In addition there was no reason for the skilled person to modify the initiator disclosed in document (4) by abandoning the polycaprolactone structure so as to arrive at the claimed initiators. Document (5) related to building blocks for optical polymers and was thus not relevant to the claimed subject-matter. There was no "one-way street" situation whereby the skilled person inevitably arrived at the claimed initiators starting from either document (2) or (4). Thus, the claimed subject-matter involved an inventive step.

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



- VII. The Respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 13, labelled "Auxiliary Request", received on 26 October 2009 under cover of a letter dated 28 August 2009.
- VIII. At the end of the oral proceedings the decision of the Board was announced.

### **Reasons for the Decision**

1. The appeal is admissible.

#### *Sole request*

2. *Amendments*

Claim 1 has been amended by deleting radicals within the lists of alternative definitions of the structure of the poly(monoperoxycarbonates) without, however, singling out specific compounds. This amendment which also restricts the scope of protection conferred by the patent as granted fulfils, therefore, the requirements of Article 123(2) and (3) EPC. This was not contested by the Appellant.

3. *Novelty and sufficiency of disclosure*

Novelty and sufficiency of disclosure of the invention were not contested by the Appellant in relation with the subject-matter of the restricted claims. The Board on its side sees no reason to raise such objections on its own.

4. *Inventive step*

4.1 The patent in suit is directed to poly(monoperoxycarbonate) compounds useful as initiators for polymerizing ethylenically unsaturated compounds and curing catalysts for curing unsaturated polyester resins (claim 1, patent specification paragraph [0018]). Documents (2) and (4) relate both to poly(monoperoxycarbonate) compounds. Whereas document (4) concerns primarily the problem of compatibilizing immiscible polymers (column 1, lines 13 and 14, column 3, lines 7 and 8; claims 13 and 14), document (2) addresses, as the patent in suit does, the purpose of improving polymerisation efficiency in terms of polymerisation rate (column 1, lines 39 to 41, 52 to 54; column 2, lines 56 to 59; column 3, lines 1 to 4; column 5, line 41). It is not contested that both documents disclose poly (monoperoxycarbonates), document (2) relating more to alkyl derivatives when n is 3 or 4 (column 2, lines 34 to 41) whereas document (4) concerns polycaprolactone derivatives (claim 1). The parties had contrary views on whether document (2) or (4) disclosed compounds which were structurally the closest to those of the contested patent. However, irrespective of which document is closer to the invention in terms of the structure of the poly(monoperoxycarbonates), the more essential point when determining the closest prior art is the similarity of the purpose of the claimed invention and the prior art (see decisions T 606/89, point 2 of the Reasons; T 298/93, point 2.3 of the Reasons; not published in OJ EPO). In the present case it is not contested that document (2) is in this respect closer

to the invention than document (4), since it aims at achieving the same goal as the patent-in-suit, namely improving polymerisation efficiency in terms of polymerisation rate.

The Board considers therefore that document (2) represents the closest prior art and starting point in the assessment of inventive step.

- 4.2 Document (2) discloses poly(monoperoxy carbonate) compounds in which the group corresponding to the group  $R_1$  of the claimed compounds is a t-octyl group, and in which, when  $n$  is 3,  $R$  is  $-HC(CH_2-)_2$  or  $R_3C(CH_2-)_3$ ,  $R_3$  being alkyl of 1 to 5 carbon atoms or, when  $n$  is 4,  $R$  is  $C(CH_2-)_4$  (column 2, lines 16 to 53). These compounds are useful as initiators for polymerizing ethylenically unsaturated compounds and as catalysts for curing unsaturated polyester resins (column 2, lines 56 to 61).
- 4.3 Having regard to this prior art, the Respondent submitted that the technical problem underlying the patent in suit was to provide initiators showing an enhanced polymerisation efficiency.
- 4.4 As the solution to this problem the patent in suit proposes the compounds according to claim 1 which are characterized by the fact that the group  $R$  has the structures (i) or (ii) as defined in the claim (see point III above).
- 4.5 The Appellant and the Respondent were divided as to whether or not the evidence presented, namely the comparison of the initiators A-4 and I-5 in example 15 of the patent specification, convincingly showed that

the technical problem defined herein above was successfully solved by the claimed compounds.

- 4.5.1 According to the established case law of the Boards of Appeal, for a comparative test to demonstrate an inventive step based on an improved effect over a claimed area, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention (see T 197/86, point 6.1.3, OJ EPO, 1989, 371).

However, the "comparative" initiator A-4 does not contain the t-octyl group present in all the compounds disclosed in document (2) and, thus, does not reflect the closest prior art (see patent specification page 31, line 53). In addition, compound A-4 is a bis-peroxyde whereas the initiator I-5 representing the invention is a tris-peroxyde (see patent specification, example 5 at page 21), whereas the invention and the closest prior art document (2) encompass both tris-peroxydes. Therefore, the sole comparison on which the Respondent relies cannot show that the alleged improvement of the polymerisation efficiency has its origin in the distinguishing feature of the invention, namely the structure of the group R, with the consequence that this comparison cannot support the alleged improvement.

- 4.6 According to the jurisprudence of the Boards of Appeal, alleged but unsupported advantages cannot be taken into consideration for the determination of the problem underlying the claimed invention (see e.g. decision T 20/81, OJ EPO 1982, 217, point 3, last sentence). Since in the present case the alleged advantage, i.e.

improved polymerisation efficiency, lacks the required experimental support, the technical problem as defined above (see point 4.3) needs to be redefined in a less ambitious way, and in view of the teaching of document (2) can merely be seen in providing an alternative polymerisation initiator.

4.7 It remains to be decided whether or not the proposed solution to that objective technical problem is obvious in view of the state of the art, in other terms, whether it was obvious to the skilled person in view of the prior art to replace the R group in the initiators disclosed in document (2) by groups of formula (i) or (ii) as defined in claim 1 of the patent in suit in order to provide alternative initiators.

4.7.1 Document (2) discloses only initiators in which the R group is derived from branched alkylene groups (see column 2, lines 2 to 41) and can thus not give any hint to the skilled person looking for alternative initiators to replace these groups by branched polyether or polyamine groups as required by claim 1 in suit. The same applies to document (4) which discloses only polycaprolactone derivatives, i.e. compounds in which the R group corresponding to the group R of the claimed compounds, is an ester derivative but not a branched polyether or polyamine (see document (4), claim 1, structure of groups A and B). Document (5) which concerns a different technical area than the patent in suit, namely monomers for optical polymers (column 1, lines 1 and 2), discloses those polyols which could be useful for preparing the claimed initiators (column 3, line 58 to column 4, line 10) but makes no reference at all to polymerisation initiators.

This document thus does not give any hint to alternative polymerisation initiators.

For these reasons, document (2) on its own or in combination with documents (4) or (5) does not point to the claimed solution for solving the technical problem defined herein above.

4.7.2 The Appellant argued that since the claimed initiators could be prepared with commercially available polyols they were obvious alternatives to those known from document (2) or (4). However, as explained above in relation with the disclosure of document (5), the simple fact that polyols which could be useful for preparing the claimed compounds were known and commercially available does not, *per se*, render the claimed solution obvious to the skilled person since the Appellant did not rely on any document where these polyols were described as being used for the preparation of polymerisation initiators. This argumentation must thus be rejected.

The Appellant also argued that the claimed initiators were obvious alternatives to those known in the art since they contained a peroxide group known by the skilled person to be responsible for initiating polymerisation, the other part of the molecule having no importance in this respect. This argumentation must however be rejected since it is not supported by any evidence, i.e. documents. On the contrary, documents (2) and (4) by disclosing initiators with specific R groups rather convey the teaching that not only the peroxy group but also the rest of the molecule plays a role in polymerisation initiators.

4.8 Therefore, the poly(monoperoxycarbonate) compounds according to claim 1 and, for the same reasons, those of dependant claims 2 to 7 as well as the process for preparing the claimed compounds according to claims 8 to 13 involve an inventive step.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent with the following claims and description to be adapted: claims 1 to 13, labelled "Auxiliary Request", received on 26 October 2009 under cover of a letter dated 28 August 2009.

The Registrar:

The Chairman:

C. Rodríguez Rodríguez

R. Freimuth