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D E C I S I O N
of 21 February 1997

Case Number: T 0605/94 - 3.3.3

Application Number: 90125784.0

Publication Number: 0492003

IPC: C08G 64/30

Language of the proceedings: EN

Title of invention:
Process for the preparation of polycarbonate

Applicant:
DAICEL CHEMICAL INDUSTRIES, LTD.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no) - obvious combination of known features"

Decisions cited:
T 0176/84

Catchword:
-

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Case Number: T 0605/94 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 21 February 1997

Appellant: DAICEL CHEMICAL INDUSTRIES, LTD.
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Decision under appeal: Decision of the Examining Division of the European Patent Office posted 11 March 1994 refusing European patent application No. 90 125 784.0 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: H. H. Fessel
J. A. Stephens-Ofner

Summary of Facts and Submissions

I. European patent application No. 90 125 784.0, filed on 28 December 1990 and published on 1 July 1992 with the publication No. 0 492 003 (Bulletin 92/27) was refused by a decision of the Examining Division 2.1.02.012 of the European Patent Office dated 11 March 1994.

That decision was based on the set of seven claims as originally filed, claim 1 reading as follows:

"A process for producing a polycarbonate by melt-polycondensing a dihydric hydroxy compound and a bisarylcarbonate in the presence of a catalyst characterized in that 4-(4-methyl-1-piperidinyl)-pyridine or a salt thereof is used as catalyst."

Dependent claims 2 to 7 relate to preferred embodiments of the process as defined in claim 1.

II. The reason for that decision was that the subject-matter as claimed did not involve any inventive step with respect to the teaching of following documents:

D1: EP-A-0 382 250, and
D2: EP-A-0 074 837.

In substance the decision relied on the following arguments:

(i) No beneficial effect having been demonstrated by the use of 4-(4-methyl-1-piperidinyl)-pyridine (hereinafter 4-MPP) as a catalyst for the preparation of polycarbonates by melt-polycondensing a dihydroxy phenol and a bisarylcarbonate, the process as defined in

claim 1 of the application had to be regarded as an alternative process to that described in D1, wherein various electron donating amine compounds, in particular 4-dimethylaminopyridine (hereinafter DMAP), were used as catalysts for the same reaction.

(ii) D2 taught that 4-MPP has a catalytic ability in acylation-type and alkylation-type reactions at least comparable to DMAP. It was thus obvious to use 4-MPP for the preparation of polycarbonates.

III. On 25 April 1994 a notice of appeal was lodged against that decision together with payment of the prescribed fee. Together with the statement of grounds of appeal filed on 15 July 1994 the appellant (applicant) submitted an experimental test report showing that under identical conditions 15% of 4-MPP catalyst were distilled off whereas 35% of the comparative catalyst DMAP were eliminated. This was evidence of a threefold advantage of the claimed process, namely (a) commercial advantage, (b) more constant reaction conditions, and (c) more consistent properties of the polycarbonate end product.

IV. During oral proceedings the appellant argued essentially as follows:

(1) In the light of the results of the comparative test report it was no longer justified to define the technical problem underlying the application in suit in alternative terms. If one took the various advantages provided by the use of 4-MPP into account and defined the technical problem accordingly, e.g. in more ambitious terms, it became evident that the skilled person had no reason to consider the combination of D1 and D2.

(ii) Even in the absence of such advantages it was not proper to combine these two citations, because D2 was concerned, firstly, with acylation-type and alkylation-type reactions occurring in the preparation of low molecular weight compounds and, secondly, with the formation of polyurethanes. As it clearly appeared from the International Patent Classification (IPC), class CO8G64/00, polyurethanes could not be equated with polycarbonates.

(iii) In view of this difference a skilled person would not consider a state of the art dealing with one polymer to be relevant to the solution of a technical problem concerning the other polymer, as set out in T 176/84 (OJ EPO 1986, 50).

V. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the application as originally filed.

Reasons for the Decision

1. The appeal is admissible.

2. It has first to be decided whether, firstly, the results of the comparative test report filed together with the statement of grounds of appeal and, secondly, the alleged properties of polycarbonates prepared according to the process as claimed justify a definition in positive terms of the technical problem underlying the application in suit.

2.1 As pointed out by the Board during oral proceedings, the experimental results submitted by the appellant, according to which a lower amount of 4-MPP is distilled out of the system, allow at least two interpretations. If the figures provided concern the melt-polycondensation reaction itself, the lower amount eliminated does indeed reflect a better efficiency, and thus a commercial advantage of the process as claimed; if, by contrast, the figures relate to the end product, this means that the proportion of the catalyst remaining in the polycarbonate is increased, which is acknowledged to have a detrimental effect on its properties (see application as filed, page 6, paragraph 1).

No further information making one interpretation more likely than the other could be provided by the appellant's representative during oral proceedings, so that the comparative test report must be regarded as non-conclusive as far as the commercial advantage is concerned (advantage (a)).

2.2 Similarly, although the statement of grounds of appeal also mentions more constant reaction conditions (advantage (b)) and more consistent properties of the polycarbonate end product (advantage (c)), no evidence has been provided in support of any of them in spite of explicit inquiry by the Board.

2.3 In the absence of any advantage properly demonstrated of the process as claimed over the process described in D1, the appellant's argument in favour of a definition of the technical problem in ambitious terms must fail. As is well established in the case law of the Boards of Appeal, alleged but unsupported advantages cannot be taken into consideration in respect of the determination of the technical problem underlying an

application. The Board, consequently, concurs with the Examining Division that the process as claimed can only be regarded as an alternative process to that known from D1.

3. The second point to determine is the exact scope of the teaching of D2, in particular the precise field of application of 4-MMP catalyst.

3.1 In the introduction of this citation referred to as "Background of the Invention" it is stated that pyridine homologues and derivatives are well known catalysts in acylation and alkylation reactions as well as in related reactions, in particular carbamoylations, lactonizations and esterifications (page 1, paragraphs 1 and 2). Even if subsequently in the "Description of the Preferred Embodiment" the efficiency of these catalysts is illustrated by means of examples of synthesis of organic compounds of low molecular weight (page 6, paragraph 3 to page 7, paragraph 1; examples), emphasis is also laid on the versatility and power of these catalysts in the preparation of polymers, such as polyurethanes, polyepoxides and polyamides (page 2, paragraph 3 to page 3, line 1).

3.2 Contrary to the appellant's argument, the reactions involved in the preparation of the polymers mentioned in D2 are not different from those occurring in the synthesis of the low molecular weight compounds specifically exemplified. This is evident in view of the reference to carbamoylation reactions and to the preparation of polyurethanes, both based on the same mechanism, which provides a concrete link between synthesis of low molecular weight organic compounds and polymer chemistry. On that basis the skilled person would self-evidently interpret the known suitability for lactonization and esterification reactions as also

extending to the preparation of the corresponding polymers, e.g. polyesters as well as polycarbonates, since the reactions leading to chain formation of these polymers cannot be regarded in essence as different.

3.3 The reference to IPC class C08G64/00 ("Macromelecular compounds obtained by reactions forming a carbonic ester link in the main chain of the macromolecule") is not appropriate, since the fact that this specific IPC class does not mention polyurethanes merely reflects that polycarbonates and polyurethanes are different polymers, which does not speak against the relevance of D2.

As pointed out by the Board during oral proceedings, this relevance does not result from an alleged similarity between these two polymers, which indeed does not exist since they are obtained from different ingredients and consequently by means of different reactions, but from following three step reasoning, namely (i) that pyridine catalysts are generally suitable for acylation reactions, alkylation reactions and in many related reactions, as well as for the preparation of various polymers, (ii) that, more specifically, these catalysts are suitable for carbamoylation reactions and for the preparation of polyurethanes, which in substance are based on the same mechanism, and (iii) that a skilled person would consequently expect these catalysts known to be effective in lactonization and esterification reactions to be also suitable for the preparation of polymers obtained by such reactions, e.g. polyesters and polycarbonates.

3.4 For these reasons the Board, like the Examining Division, concludes that a skilled person would consider D2 for the solution of the above defined technical problem.

4. The third question to be answered is whether the teachings of D1 and D2 are combinable.

4.1 As pointed out by the Examining Division, D1 is specifically concerned with a process for the preparation of polycarbonates in the presence of an electron donating amine compound, in particular DMAP. This has not been disputed by the appellant. Since the technical problem underlying the application in suit can only be defined in alternative terms (see points 2.1 to 2.3 above), a skilled person would implicitly extend to the preparation of polycarbonates the suitability of 4-MPP as catalyst for lactonization and esterification reactions and, therefore, consider D2 as a promising teaching (see points 3.1 to 3.3 above). It follows that the combination of D1 and D2 in the decision under appeal is fully on line with the general principle that only documents pertaining to the same technical field may be combined to decide whether a particular subject-matter involves an inventive step or not.

4.2 In that respect the reference to the decision T 176/84 during oral proceedings is not appropriate. In that decision the Board had reached the conclusion that the claimed subject-matter could not be made obvious by the combination of two particular documents, since the technical field of one of them was not of the neighbouring fields to which a skilled person would refer in search of appropriate solutions to the technical problem (see Reasons for the Decision, points 5.3.1, 5.3.2 and 5.3.4).

4.3 As demonstrated above, the situation in the present case is exactly the opposite in that, at least implicitly, D1 and D2 belong to the same technical field and would thus be considered in combination by the skilled person.

5. To summarize, neither the results of the comparative test report (argument IV.i)), nor the submissions about the significance of the IPC class (argument IV.ii)), nor the reference to the decision T 176/84 (argument IV.iii)) displaces the reasoning set out in the decision under appeal. Accordingly, the Board adopts these reasons entirely and, consequently, dismisses the appeal.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

E. Görgmaier

The Chairman:

C. Gérardin