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File Number: T 749/89 - 3.3.3

Application No.: 82 112 078.9

Publication No.: 0 085 185

Title of invention: Integrated process for the preparation of substantially linear high molecular weight thermoplastic polymers from aryl polyhalide monomers

Classification: C08G 61/12

**D E C I S I O N**  
of 16 December 1992

Applicant: AMOCO CORPORATION

Opponent: BASF Aktiengesellschaft

Headword:

EPC Article 56

Keyword: "Overcoming a technical deterrent - no need to prove the existence of a prejudice"

**Catchwords**

The existence of a prejudice in the art against the use of a certain step is no more than one example of overcoming a deterrent to its adoption. If there is no prejudice, but a patentee asserts credibly that known facts would have deterred a skilled worker from adopting a certain step, the burden is transferred to the opponent to show either that the facts asserted by the patentee are incorrect, or that despite their being correct, there would still have been no significant deterrent. (T 119/82 "Gelation/EXXON" OJ EPO 1984, 217 amplified.)



Case Number : T 749/89 - 3.3.3

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.3  
of 16 December 1992

Appellant :  
(Proprietor of the patent)

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Respondent :  
(Opponent)

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Decision under appeal :

Decision of the Opposition Division of the  
European Patent Office of 27 July 1989, issued on  
20 September 1989, revoking European patent  
No. 0 085 185 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : F. Antony  
Members : R. Lunzer  
J. Stephens-Ofner

## Summary of Facts and Submissions

- I. European patent No. 0 085 185 was granted on 20 May 1987 on the basis of application No. 82 112 078.9 filed on 28 December 1982, having a priority date of 29 December 1981 derived from US Application No. 335 521.

Claim 1 was in the following form:

"1. An integrated process for preparing a substantially linear thermoplastic polymer derived from an aryl polyhalide monomer which comprises:

(i) contacting a phenol compound which is either a halogenated phenol or a dihydric phenol with about stoichiometric amounts of an alkali metal carbonate or hydroxide sufficient to form an alkali metal salt of the phenol compound in a liquid phase of an aprotic solvent and an azeotrope former and for a time and at a temperature sufficient to form the alkali metal salt of the phenol compound;

(ii) contacting the alkali metal salt of the phenol compound with a dihalobenzenoid compound sufficient to form an aryl polyhalide monomer in a liquid phase of an aprotic solvent and an azeotrope former for a time and at a temperature sufficient to form the aryl polyhalide monomer, wherein the dihalobenzenoid compound has an inert electron withdrawing group in one or more of the positions ortho and para to the halogen atoms thereby activating the halogen atoms to a level sufficient to react with said alkali metal salt of the phenol compound;

(iii) removing water from the reaction mass of (i) and (ii) as an azeotrope with said azeotrope former until substantially anhydrous conditions are attained and excess azeotrope former is substantially removed; and

(iv) coupling aryl polyhalide monomers by contacting said monomers with a catalyst mixture in the presence of a reducing metal selected from the group consisting of zinc, magnesium and manganese or mixtures thereof and in a liquid phase of an aprotic solvent under substantially anhydrous conditions for a time and at a temperature sufficient to form a substantially linear thermoplastic polymer, wherein the catalyst mixture comprises an anhydrous nickel compound and at least one ligand selected from the group consisting of a triarylphosphine having from about 6 to about 14 carbon atoms in each aryl moiety and an aromatic bidentate compound containing at least one ring nitrogen atom and from about 5 to about 30 carbon atoms and wherein the ratio of gram atoms of nickel per mole of aryl polyhalide monomer is from about 0.001 to about 0.1, the amount of ligand is from about 1 to about 50 moles per gram atom of nickel and the amount of reducing metal is at least about 1 mole of reducing metal per mole of aryl polyhalide monomer."

II. On 13 February 1988 an opposition was lodged by the Respondent essentially on the grounds of Article 100(a) EPC, alleging lack of inventive step (Article 56 EPC). Article 100(b) was also invoked, but insufficiency of disclosure (Article 83 EPC) was not seriously pursued. The Opponent relied in particular on the following documents:

- (1) DE-B-1 545 106 and
- (2) EP-A-0 025 460.

III. By its decision given orally on 27 July 1989, and issued in writing on 20 September 1989, the Opposition Division revoked the patent, finding that the alleged invention, although admittedly novel, was lacking in any inventive step. Claim 1 in suit related to an integrated process which combined the process steps respectively disclosed in

documents (1) and (2). Document (2) was regarded as being the closest prior art, which disclosed step (iv) in the process in accordance with the alleged invention, while document (1) disclosed what were in substance the process steps identified as steps (i) to (iii) in Claim 1 in accordance with the alleged invention. The Opposition Division did not accept the Appellant's argument that the skilled worker would have been discouraged from combining the process steps disclosed in the two documents because it held that the Appellant had failed to prove that there was any prejudice in the industry against making that combination.

IV. An appeal against that decision was lodged on 29 November 1989, the appeal fee was paid on the same day, and the Grounds of Appeal were filed on 19 January 1990. In the Statement of Grounds of Appeal, and during oral proceedings held on 16 December 1992, the Appellant argued that the skilled worker in the art would have been deterred from combining the processes of documents (1) and (2) because it was well known that the process of document (2) was very sensitive to the presence of impurities, while the process of document (1) could be expected to give rise to a product containing substantial amounts of impurities. It was therefore surprising that the two processes could be combined, resulting in a particularly economic integrated process.

V. The Respondent argued in its counterstatement, filed on 2 June 1990, and during the oral proceedings, that the alleged invention was the mere combination of two known processes, and that the skilled worker seeking a starting material for carrying out the process of document (2) would see at once in the disclosure of document (1) a potential starting material. There was no good reason to fear the presence of impurities, because the reader of

document (1) would have understood that it involved a condensation reaction of a kind which was inherently unlikely to give rise to undesirable impurities.

- VI. The Appellant requested that the decision under appeal be set aside, and the patent maintained as granted. The Respondent requested that the appeal should be dismissed.

### Reasons for the Decision

1. The appeal is admissible.
2. Reference to new document

At the start of the oral proceedings the Board refused to admit a further document referred to by the Appellant in its Grounds of Appeal. It was excluded by the Board in the exercise of its discretion under Article 114(2)EPC, since the Board did not consider that the new document was relevant for the purposes of supporting the Appeal.

3. Novelty

Novelty is not in issue, and the Board is satisfied that no valid objection of lack of novelty can be maintained on the basis of the cited prior art.

4. Closest prior art

Document (2), which is regarded as the closest prior art, is referred to in the patent in suit at page 2, lines 25 to 35. It discloses the coupling of pure and substantially anhydrous aryl and heteroaryl polyhalide monomers in an aprotic solvent under anhydrous conditions using a catalyst mixture of a nickel compound and a ligand in the

presence of a reducing metal. That disclosure corresponds with the process steps identified in feature (iv) of Claim 1 in suit, and the contrary was not asserted by the Appellant.

5. Problem

Seen against the disclosure of document (2), the problem with which the patent in suit is concerned is to find a more economic alternative to the process there disclosed.

6. Solution and its effectiveness

The solution proposed in accordance with the alleged invention is an integrated process comprising the process in accordance with document (1), which discloses essentially steps (i) to (iii) of the process of Claim 1 in suit, subject to the qualification that document (1) is concerned with the production of polymeric materials, whereas in accordance with the alleged invention, monomers are required for subsequent processing; and the process of document (2) as step (iv). It is accepted by the Board, that the skilled reader of document (1), who wanted to produce monomers rather than polymers, would know as a matter of general knowledge that this would be attainable by a suitable adjustment of the proportions of the reactants. That the process in accordance with document (1) is capable, in principle, of providing a suitable starting material for step (iv) was not in issue, and the Board is satisfied that there is inherent economy in carrying out the integrated process in accordance with the alleged invention, as contrasted with separating and purifying the product of the process of document (1), before subjecting it to the catalytic treatment disclosed in document (2).

7. Inventiveness

- 7.1 The issue of inventiveness turns on whether a skilled person, having as his starting point the disclosure of document (2), confronted with the problem of finding a more economic alternative thereto, and having also at hand the disclosure of document (1), which discloses a route to suitable starting monomers, would have thought of combining the two steps into an integrated process, without introducing the further step of isolation and purification of such monomers. In the view of the Board, the answer to that question would have to be affirmative, unless there were some sufficient disincentive which would dissuade the skilled worker from making that combination.
- 7.2 It is well established in the caselaw of the Boards of Appeal (see e.g. T 119/82 "Gelation/EXXON" OJ EPO 1984, 217) that inventiveness can sometimes be established by demonstrating that a known prejudice, i.e. a widely held but incorrect opinion of technical fact, needed to be overcome. In such cases, the burden is on the patentee (or applicant for a patent) to demonstrate, such as by reference to suitable technical literature, that the alleged prejudice really existed.
- 7.3 The existence of a known prejudice in the art is no more than one example of a factual situation which might deter the skilled worker from adopting a particular step. No less common is the situation, such as is asserted by the Appellant in the present case, that there are good technical reasons why the skilled worker would have been deterred from adopting a given step. In such cases, if in an opposition the patentee advances credible argument to demonstrate why the skilled worker would have been deterred, the burden is transferred to the opponent, either to show that the facts alleged are incorrect, or



that although the facts asserted are correct, there are good reasons why the skilled worker would nonetheless not have been significantly deterred.

- 7.4 In the present case, the Opposition Division held (Decision, page 7, paragraph 10) that the Appellant had failed to demonstrate the existence of a prejudice by failing to cite a body of literature in support of the existence of such a prejudice. However, what was asserted here was not the existence of a known "prejudice in the industry", the kind of situation covered by the case law mentioned above, but instead the existence of a plausible technical deterrent.
- 7.5 On pages 5 to 7 of its statement dated 15 November 1988 filed in response to the opposition, the Appellant asserted that it was well known in the industry that catalyst systems of the kind described in document (2) were extremely sensitive to being contaminated or poisoned by any impurities contained in the starting materials. Consequently, the Appellant argued that the skilled worker would not think of using the products of the process of document (1) without an intervening purification step. That argument was still further elaborated by the Appellant at page 4 of its letter dated 23 June 1989, where seven detailed reasons were given to support the Appellant's contention that considerations of the nature of the reactions involved would dissuade the skilled worker from combining the two processes, for fear that impurities from steps (i) to (iii) could poison the catalyst in step (iv).
- 7.6 The Respondent did not contest the known sensitivity of the catalyst, but argued at the oral proceedings that the skilled worker had good reason not to fear the presence of deleterious impurities remaining associated with the

monomer produced in steps (i) to (iii). The skilled reader of document (1) would have seen that it involved a condensation reaction, of the kind which was unlikely to give rise to any side reactions, and resultant impurities.

- 7.7 Whereas the Appellant in its written submissions gave detailed support for its contention that there were sound technical reasons why a skilled worker would have been deterred from combining the processes of documents (1) and (2), there was no written refutation by the Respondent, although that deficiency was made up to some extent by arguments advanced during the oral proceedings. Although the Board finds some of the above mentioned seven reasons advanced by the Appellant less than convincing, nevertheless the Board accepts the fact that the skilled worker might reasonably have expected, taking into account the probabilities imposed by the law of mass action, that some of the phenolate which is formed in step (i), would not have reacted completely, even in the presence of an excess of the dihalobenzoid compound in step (ii). He would thus reasonably have expected that, in the absence of a separation and purification step, there would be some residual free phenolate left in the reaction products in step (iii), which could poison the catalyst in step (iv).
- 7.8 In the Board's view that expectation would have been sufficient to have deterred the skilled worker from combining the processes of documents (1) and (2), without any intervening separation and purification step, and it needed an inventive step to overcome that deterrent.
8. The subject-matter of Claim 1 of the patent in issue thus involves an inventive step as required by Article 56 EPC, and the claim is therefore patentable. The dependent

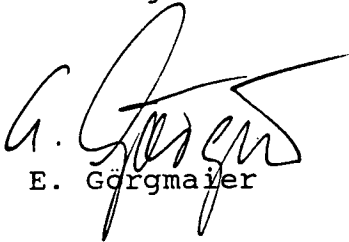
Claims 2 to 25 relate to modifications of the integrated process falling wholly within the scope of Claim 1, and on that ground alone they are entitled to be upheld.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent as granted.

The Registrar:

  
E. Gorgmaier

The Chairman:

  
F. Antony