

Publication in the Official Journal ~~Yes~~/ No

File Number: T 191/90 - 3.3.3  
Application No.: 82 300 109.4  
Publication No.: 0 060 609  
Title of invention: Novel ethylene/alpha-olefin copolymer  
Classification: C07C 11/02

**D E C I S I O N**  
of 30 October 1991

Proprietor of the patent: MITSUI PETROCHEMICAL INDUSTRIES, LTD.

Opponent: 01) BASF Aktiengesellschaft  
02) Exxon Chemical Patents Inc.

Headword:

EPC Article 123

Keyword: "Change of category of claims - Remittal to the first instance -  
Products obtained by a process identical with products defined by  
parameters"

Headnote



Case Number : T 191/90 - 3.3.3

**DECISION**  
of the Technical Board of Appeal 3.3.3  
of 30 October 1991

**Appellant :**  
(Proprietor of the patent) MITSUI PETROCHEMICAL INDUSTRIES, LTD.  
2-5, Kasumigaseki 3-chome  
Chiyoda-ku  
Tokyo 100 (JP)

**Representative :** Myerscough, Philip Boyd  
J.A. Kemp & Co  
14, South Square  
Gray's Inn  
London WC1R 5EU (GB)

**Respondent 01 :**  
(Opponent 01) BASF Aktiengesellschaft  
-Patentabteilung - C6-  
Carl-Bosch-Strasse 38  
W - 6700 Ludwigshafen (DE)

**Respondent 02 :**  
(Opponent 02) Exxon Chemical Patents Inc.  
1900 East Linden Avenue  
Linden, New Jersey 07036 (US)

**Representatives :** Dew, Melvyn John  
Esso Chemical Ltd.  
Esso Chemical Research Centre  
PO BOX 1  
Abingdon  
Oxfordshire OX13 6BB (GB)

and

von Kameke, Allard  
Beselerstraße 4  
W - 2000 Hamburg 52 (DE)

**Decision under appeal :** Decision of Opposition Division of the European  
Patent Office dated 6 November 1989, issued on  
10 January 1990 revoking European patent  
No. 0 060 609 pursuant to Article 102(1) EPC.

**Composition of the Board :**

**Chairman :** F. Antony  
**Members :** C. Gérardin  
J. Stephens-Ofner

## Summary of Facts and Submissions

- I. The mention of the grant of the patent No. 0 060 609 in respect of European patent application No. 82 300 109.4 filed on 8 January 1982 and claiming the priority of 13 January 1981 from two earlier applications in Japan, was published on 30 April 1986 on the basis of 15 claims.

Claim 1 read as follows:

"A copolymer of ethylene and an alpha-olefin having a low molecular weight and a narrow molecular weight distribution, characterised in that the copolymer has an ethylene content of from 30 to 90 mole %, a number average molecular weight of from 300 to 30,000 and a molecular weight distribution defined by a Q value (the ratio of the weight average molecular weight to the number average molecular weight) of not more than 3 and a Z value (the ratio of the maximum value of the molecular weight to the minimum value of the molecular weight when the molecular weight is measured by gel permeation chromatography) of from 15 to 200."

Claims 2 and 3 were dependent claims directed to preferred copolymers according to Claim 1. Further, Claim 4 was a process claim for producing a copolymer according to Claims 1, 2 or 3, and Claims 5 to 9 were dependent process claims. Last, Claims 10 and 11 concerned a synthetic lubricant oil consisting essentially of a copolymer according to Claims 1, 2 or 3, and Claims 12 to 15 dealt with a fuel oil composition comprising a fuel oil and a copolymer according to Claims 1, 2 or 3.

- II. On 27 January 1987 Opponent 1 filed a Notice of Opposition against the grant of the patent on the ground that the

requirement of novelty under Article 100(a) EPC was not met.

On 29 January 1987 Opponent 2 lodged an opposition to the granted patent and requested revocation thereof on the ground of lack of novelty with regard to the teaching of US-A-3 679 380 (document (2)) or, in the alternative, lack of inventive step under Article 100(a) EPC. Additionally, he objected that the Z value as defined in the patent in suit depended to a large extent on the nature of the GPC apparatus employed and that, consequently, that parameter was not appropriate as a means of identifying the copolymers.

III. By decision of 6 November 1989, issued in writing on 10 January 1990, the Opposition Division revoked the patent on the ground of lack of novelty over the teaching of document (2). The decision stated, firstly, that copolymers having an ethylene content, a number average molecular weight and a statistical molecular weight distribution defined by Q within the terms of Claim 1 of the patent in suit were known from Example 1 of that citation. Secondly, the decision held that the parameter Z could not serve as a distinguishing feature because of the absence of any clear instructions for its determination in the specification in suit, and for the additional reason of the large influence of the sensitivity of the detector on the value of Z.

IV. The Patentee (Appellant) thereafter filed a Notice of Appeal against that decision on 15 March 1990 and paid the prescribed fee at the same time. Together with the Statement of Grounds of Appeal filed on 18 May 1990 the Appellant filed two new sets of claims to be considered as main request and first auxiliary request, wherein several ranges in Claims 1, 2 and 12 had been amended in such a way that reliance was no longer placed upon the Z value to

provide a clear distinction over the prior art. As far as the arguments presented in that submission were concerned, they boiled down to the assertion that the skilled man would have had no major difficulty, at the latest at the publication date of the patent in suit, in determining the Z value with a reasonable degree of precision.

- V. During oral proceeding held on 30 October 1991 Respondent 2 (Opponent 2) argued that the changes made with respect to several ranges given in the claims did not overcome the difficulties in identifying the copolymers according to Claim 1, since these copolymers were still characterised by the parameter Z. These objections applied not only to the two sets of claims previously filed, but equally to two further sets of claims submitted as second and third auxiliary requests at the onset of the oral proceedings.

After an extensive discussion about the determination of Z and the accuracy of the method, the Board informed the parties present that claims containing the parameter Z would not be allowed.

- VI. This led the Appellant not to maintain his previous requests and to file the following set of process claims as fourth auxiliary request:

"1. A process for preparing a copolymer of ethylene and an alpha-olefin having an ethylene content of from 30 to 90 mole %, a number average molecular weight of from 300 to 30,000 and a molecular weight distribution defined by a Q value (the ratio of the weight average molecular weight to the number average molecular weight) of not more than 3, which process comprises copolymerizing ethylene with the alpha-olefin in the liquid phase in the presence of a polymerization catalyst composed of a soluble vanadium

compound and an organoaluminum compound in the co-presence of hydrogen, characterized in that

(a) the copolymerization is carried out in a continuous manner,

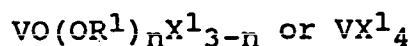
(b) the concentration of the vanadium compound in the polymerization system is maintained at 0.3 to 30 millimoles/liter, and

(c) the vanadium compound is supplied to the polymerization system as a solution in a polymerization medium in a concentration which is 1 to 5 times the concentration of the vanadium compound in the liquid phase.

2. A process according to Claim 1 wherein the copolymer has an ethylene content of from 35 to 85 mole %, a number average molecular weight of from 500 to 25,000 and a Q value of not more than 2.8.

3. A process according to Claim 1 or 2 wherein the alpha-olefin has 3 to 14 carbon atoms.

4. A process according to Claim 1, 2 or 3 wherein the soluble vanadium compound is of the formula



wherein  $R^1$  represents an aliphatic hydrocarbon group having 1 to 20 carbon atoms,  $X^1$  represents a halogen atom, and  $n$  is a number of from 0 to 3, and the organoaluminum compound is of the formula



wherein  $R^2$  represents an aliphatic hydrocarbon group having 1 to 6 carbon atoms,  $X^2$  represents a halogen atom, and  $m$  is a number of from 1 to 3.

5. A process according to any one of Claims 1 to 4 wherein the concentration of the vanadium compound in the liquid phase is maintained at 0.5 to 20 millimoles and the organoaluminum compound is used in such an amount that the Al/V atomic ratio in the liquid phase is from 2/1 to 50/1.

6. A process according to any one of Claims 1 to 5 wherein the average residence time of the reaction mixture in the polymerization system is from 5 to 300 minutes, and the copolymerization is carried out at a temperature of from 0 to 100°C and at a pressure of from 0 to 50 kg/cm<sup>2</sup> gauge (0 to 4.9 MPa gauge).

7. A process according to any one of Claims 1 to 6 wherein ethylene and the alpha-olefin are fed into the polymerization system so that the ethylene/alpha-olefin mole ratio is from 1:10 to 10:1.

8. A process according to any of Claims 1 to 7 wherein hydrogen is used in an amount of 1/100 to 100/1 moles per mole of the sum of the ethylene and alpha-olefin fed to the polymerization system.

9. A process according to any one of the preceding claims wherein the copolymer has an ethylene content of from 70 to 90 mole % and a number average molecular weight of from 1,000 to 20,000.

10. A process according to Claim 9 wherein the copolymer has an ethylene content of 75 to 85 mole % and a number average molecular weight of 2,000 to 20,000.

11. A process according to Claim 10 wherein the copolymer has an ethylene content of 77 to 83 mole % and a number average molecular weight of from 3,000 to 10,000.

12. A process according to any one of Claims 1 to 8 wherein the copolymer has an ethylene content of 40 to 60 mole % and a number average molecular weight of from 300 to 2,000."

- VII. Although Respondent 2 conceded that the wording of these claims might be formally acceptable on the basis of the original specification, he maintained that the copolymers obtained by the process did not necessarily correspond to the products as defined in the product claims as granted and that, consequently, there were considerable doubts as to whether the requirements of Article 123(3) EPC were met.
- VIII. The Appellant requested that the decision under appeal be set aside and that the case be remitted to the Opposition Division for further prosecution of the oppositions on the basis of the set of claims submitted during oral proceedings as the fourth auxiliary request.

Respondent 1 (Opponent 1), duly summoned to the oral proceedings, had informed the EPO on 10 October 1991 that he would not attend them, but that his request to dismiss the appeal was maintained.

Respondent 2 equally requested that the appeal be dismissed.

#### Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.



2. The current wording of the claims does not give rise to any objections under Article 123(2) EPC.

Claim 1 is essentially a combination of Claim 4 as granted and filed originally with the features of ethylene content, number average molecular weight and molecular weight distribution mentioned in Claim 1 as granted and filed originally. As will appear hereinbelow, the class of polymers defined by the original product claim comprising a reference to the Z value, on the one hand, and the class of polymers obtained by the present process claim, thus incorporating specific process features, on the other hand, are identical, so that the subject-matter covered by Claim 1 does not extend beyond the content of the application as filed. Claims 2 and 3, which have been drafted as dependent process claims, correspond to Claims 2 and 3 as granted and filed originally, with the exception that the characterisation of the copolymer by means of the Z value has been deleted in Claim 2. Claims 4 to 8 correspond to Claims 5 to 9 as granted and filed originally, with their numbers and appendancies adjusted. Claims 9 to 11 are further dependent process claims which incorporate all the features of Claims 12 to 14 as granted and filed originally, the numbers and appendancies thereof having been adjusted. Lastly, Claim 12 is a dependent process claim directed to the preparation of copolymers having an ethylene content of 40 to 60 mole % and a number average molecular weight of from 300 to 2,000, which corresponds in both cases to the preferred ranges mentioned on page 5, lines 27 to 29 and lines 43 to 45 of the patent as granted, and respectively page 11, lines 7 to 11 and page 12, lines 3 to 7 of the application as originally filed.

As noted above, Respondent 2 did not dispute the fact that the wording as such of the claims is adequately supported

by the description of the patent specification as well as that of the original application.

3. The issue raised by Respondent 2 under Article 123(3) EPC boils down to the objection that the protection conferred to the process would, by virtue of Article 64(2) EPC, extend to the products directly obtained thereby and that there was no reason why these products would necessarily be limited to the copolymers as defined in the granted version of Claim 1.

However, as was expressly submitted by the Appellant during oral proceedings, there is in fact no ambiguity at all, since the nature of the products is inherent to the process; in other words, the scope of the copolymers as originally claimed and that of the copolymers resulting from the process as now claimed are identical. This is supported by Examples 1 to 16 in the patent specification, which illustrate the preparation of ethylene copolymers following the method specified in Claim 1; the experimental data mentioned in Table 1, page 9 and in Table 2, page 12 provide evidence that all the copolymers which meet the original requirements concerning the ethylene content, the number average molecular weight and the Q value, also satisfy the original condition regarding the Z value, to the extent that the latter can be relied on. The Board, therefore, accepts the above submission.

The data given in Comparative Example 10 in Table 2 do not contradict the above finding. It is true that a Z value of 10 is not within the original range of from 15 to 200 for that parameter; however, this is only a comparative experiment intended to demonstrate the influence of purification on the various parameters of the product obtained in Comparative Example 5, wherein a batchwise method - thus outside the scope of Claim 1 - was used to

synthetise the copolymer. Nor do the experimental data of Comparative Example 3 in Table 1 support the Respondent's objection, since the ethylene content of 10 mole % is outside the claimed range of 30 to 90 mole %.

4. For these reasons, the Board regards the submission referred to in the second paragraph of point 3 above as a technical information put in the file, from which it follows that the requirements of Article 123(3) EPC are met.
  
5. Since the only ground for the decision under appeal was lack of novelty of the then claimed product because the Z value was not suitable as a distinguishing feature, the patentability of the process now claimed has not yet been examined and decided (cf. Reasons for the Decision under appeal, point 5). To enable this to be done, the case, therefore, needs to be remitted to the first instance for further prosecution of the oppositions.

#### Order

For these reasons, it is decided that:

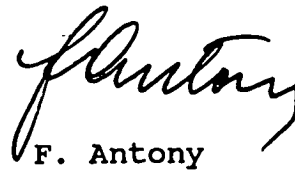
1. The decision under appeal is set aside.
  
2. The case is remitted to the Opposition Division for further prosecution on the basis of the amended claims

submitted in the course of oral proceedings as the fourth auxiliary request.

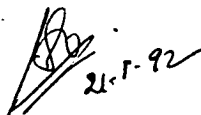
The Registrar:

  
E. Gorgmaier

The Chairman:

  
F. Antony

CG  
20.1.92

  
21.1.92

00111