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# D E C I S I O N
# of 3 May 2006

**Case Number:** W 0026/05 - 3.3.03

**Application Number:** PCT/EP2004/005078

**Publication Number:** WO 2004/0099269

**IPC:** C08F 10/08, C08F 4/642

**Language of the proceedings:** EN

**Title of invention:**
Process for polymerizing 1-butene

**Applicant:**
Basell Polyolefine GmbH

**Opponent:**
-

**Headword:**
-

**Relevant legal provisions:**
PCT Art. 17(3)a
PCT R. 13.1, 13.2, 40.1, 40.2(c)

**Keyword:**
"Unity of invention (yes)"

**Decisions cited:**
G 0001/89, W 0033/92

**Catchword:**
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** W 0026/05 - 3.3.03

**International Application No. PCT/**EP2004/005078

# D E C I S I O N
**of the Technical Board of Appeal 3.3.03**
**of 3 May 2006**

**Applicant:** Basell Polyolefine GmbH
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**Representative:** Colucci, Giuseppe
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**Decision under appeal:** **Protest according to Rule 40.2(c) of the Patent Cooperation Treaty made by the applicants against the invitation (payment of additional fees) of the European Patent Office (International Searching Authority) dated 1 October 2004 .**

**Composition of the Board:**

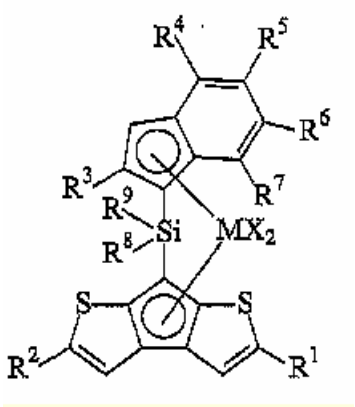
**Chairman:** R. Young
**Members:** C. Idez
T. Bokor

## Summary of Facts and Submissions

I. International application PCT/EP2004/005078 entitled "Process for polymerizing 1-butene" comprising 19 claims was filed on 7 May 2004.

II. Independent Claims 1, 14, 15, 16, 17 and 19 of the application as filed read as follows:

"1. A process for preparing 1-butene polymers, said process comprising polymerizing 1-butene or copolymerizing 1-butene with ethylene, propylene or an alpha-olefin of formula $CH_2$=CHT wherein T is a $C_3$-$C_{10}$ alkyl group, in the presence of a catalyst system obtainable by contacting:
(A) a metallocene compound having the following formula (I)




(I)

wherein: M is an atom of a transition metal selected from those belonging to group 3,4, or to the lanthanide or actinide groups in the Periodic Table of the Elements;

X, equal to or different from each other, is a hydrogen atom, a halogen atoms [sic] or R, OR, OR'O, $OSO_2CF_3$, OCOR, SR, $NR_2$ or $PR_2$ group, wherein R is a linear or branched, saturated or unsaturated $C_1$-$C_{20}$-alkyl, $C_3$-$C_{20}$-cycloalkyl, $C_6$-$C_{20}$-aryl, $C_7$-$C_{20}$-alkylaryl or $C_7$-$C_{20}$-arylalkyl radical, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; and the R' is a $C_1$-$C_{20}$-alkylidene, $C_6$-$C_{20}$-arylidene, $C_7$-$C_{20}$-alkylarylidene, or $C_7$-$C_{20}$-arylalkylidene radical.
$R^1$, $R^2$, $R^5$, $R^6$, $R^7$, $R^8$ and $R^9$, equal to or different from each other, are hydrogen atoms, or linear or branched, saturated or unsaturated $C_l$-$C_{20}$-alkyl, $C_3$-$C_{20}$-cycloalkyl, $C_6$-$C_{20}$-aryl, $C_7$-$C_{20}$-alkylaryl or $C_7$-$C_{20}$-arylalkyl radicals, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; or $R^5$ and $R^6$, and/or $R^8$ and $R^9$ can optionally form a saturated or unsaturated, 5 or 6 membered rings [sic], said ring can bear $C_l$-$C_{20}$ alkyl radicals as substituents;
with the proviso that at least one of $R^6$ or $R^7$ is a linear or branched, saturated or unsaturated $C_l$-$C_{20}$-alkyl radical, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements;
$R^3$ and $R^4$, equal to or different from each other, are linear or branched, saturated or unsaturated $C_l$-$C_{20}$-alkyl, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements;
and (B) an alumoxane and/or a compound capable of forming an alkyl metallocene cation.

14. A 1-butene homopolymer having the following characteristics :

- isotactic pentads (mmmm)> 90;

- intrinsic viscosity (I.V.) measured in tetrahydronaphtalene (THN) at 135°C > 1.2;
- melting point (D.S.C.) higher than 100°C; and
- molecular weight distribution Mw/Mn < 4;

15. A 1-butene homopolymer having the following characteristics:

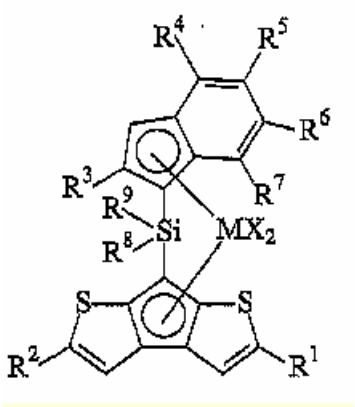
- isotactic pentads (mmmm) > 95;
- intrinsic viscosity (I.V.) measured in tetrahydronaphtalene (THN) at 135°C > 1.5;
- melting point (D.S.C.) higher than 100°C; and
- molecular weight distribution Mw/Mn < 4.

16. A 1-butene/ethylene copolymer having an ethylene content comprised between 0.2 % by mol and 15% by mol obtainable by the process of claim 1 having the following characteristics:

- isotactic pentads (mmmm) > 90
- intrinsic viscosity (I.V.) measured in tetrahydronaphtalene (THN) at 135°C > 1.2 wherein ethylene content in the polymer ($C_2$) (% by mol) and the melting point of the polymer (Tm) meet the following relation:

$Tm < -4.4C_2 + 92.0$.

17. A metallocene compound of formula (II):



(II)

wherein:

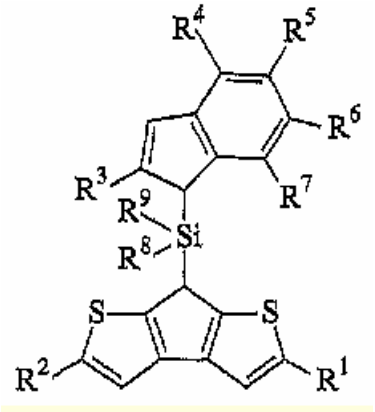
wherein: M is an atom of a transition metal selected from those belonging to group 3,4, or to the lanthanide or actinide groups in the Periodic Table of the Elements;

X, equal to or different from each other, is a hydrogen atom, a halogen atom, a R, OR, OR'O, $OSO_2CF_3$, OCOR, SR, $NR_2$ or $PR_2$ group, wherein R is a linear or branched, saturated or unsaturated $C_1$-$C_{20}$-alkyl, $C_3$-$C_{20}$-cycloalkyl, $C_6$-$C_{20}$-aryl, $C_7$-$C_{20}$-alkylaryl or $C_7$-$C_{20}$-arylalkyl radical, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; and R' is a $C_1$-$C_{20}$-alkylidene, $C_6$-$C_{20}$-arylidene, $C_7$-$C_{20}$-alkylarylidene, or $C_7$-$C_{20}$-arylalkylidene radical;

$R^1$, $R^2$, $R^5$, $R^6$, $R^7$, $R^8$ and $R^9$, equal to or different from each other, are hydrogen atoms, or linear or branched, saturated or unsaturated $C_1$-$C_{20}$-alkyl, $C_3$-$C_{20}$-cycloalkyl, $C_6$-$C_{20}$-aryl, $C_7$-$C_{20}$-alkylaryl or $C_7$-$C_{20}$-arylalkyl radicals, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; or $R^8$ and $R^9$ can optionally form a saturated or unsaturated, 5 or 6 membered ring;

$R^3$ and $R^4$, equal to or different from each other, are linear or branched, saturated or unsaturated $C_1$-$C_{20}$-alkyl radicals, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements;
$R^6$ is a linear or branched, saturated or unsaturated $C_1$-$C_{20}$-alkyl radical, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; or it can optionally form with $R^5$ a saturated or unsaturated, 5 or 6 membered ring, said ring can bear $C_1$-$C_{20}$ alkyl radicals as substituents.

19 A ligand of formula (III):




(III)

wherein $R^1$, $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, $R^7$, $R^8$ and $R^9$ have the meaning described in claim 12.

Claims 2 to 13, and 18 were dependent claims.

III. On 1 October 2004 the European Patent Office (EPO), acting as International Searching Authority (ISA), in compliance with Article 17(3)a) PCT and Rule 40.1 PCT issued an "Invitation to pay Additional Fees"

(hereinafter "Invitation") stating that the application contravened the requirements of unity of invention according to Rule 13 PCT and inviting the Applicant to pay, within a time limit of 30 days, 4 additional search fees.

IV. This "Invitation" resulted from the EPO/ISA's conclusion that the general concept underlying the claimed subject-matter, was a ligand suitable as a component in olefin polymerization processes according to claim 19, formula III (feature 1). However, this concept was well known from document D1 (L. Resconi et al "New Catalysts Design for the Simultaneous Control over Polypropylene Molecular Mass and Stereoregularity", Polymeric Materials: Science & Engineering 2002, Vol.87, pages 76-77) (cf. D1, Compound 4 in Chart 2, Paragraph "Results and Discussion"; Table 1).

According to the "Invitation" the problem arising from the production and the use of these compositions could be solved in 5 ways, which were linked by "feature 1" mentioned above as same or corresponding feature. In the light of D1, there was, however, no single general inventive concept (Rule 13.1 PCT) and no demonstrated same or corresponding special technical feature (Rule 13.2 PCT) linking the following groups of claims:

Group 1: the subject matter of claims 1–13;
Group 2: the subject matter of claims 14–15;
Group 3: the subject matter of claim 16;
Group 4: the subject matter of claims 17–18; and
Group 5: the subject matter of claim 19.

V. On 18 October 2004 the Applicant paid under protest these four additional search fees and simultaneously requested reimbursement of these fees.

In its letter dated 18 October 2004 announcing the afore-mentioned payment the Applicant argued essentially as follows:

(a) Annex B of the Administrative Instructions under the Patent Cooperation Treaty (as in force from February 2004) provided instructions for the interpretation of the principles of Rule 13.2 PCT and set out that unity of invention was met for the case that there was "in addition to an independent claim for a given product, an independent claim for a process specially adapted for the manufacture of the said product, and an independent claim for an apparatus or means specifically designed for carrying out the said process" (cf. page 60, point (e), item (iii)).

(b) Claims 1-13 were directed to a process for preparing 1-butene polymers (group 1). Claims 14-15 (group 2) were directed to a 1-butene homopolymer directly obtainable with the process of claims 1-13 (see the examples). Claim 16 (group 3) was directed to a 1-butene/ethylene copolymer directly obtainable with the process of claims 1-13 (see the examples). Claims 17-18 (group 4) were directed to the metallocene used for carrying out said process (means specifically designed). Claim 19 (group 5) was directed to the intermediate for the obtainment of said metallocene compound.

(c) According to item (g) of Annex B of the Administrative Instructions Under the Patent Cooperation Treaty (page 61) unity of invention has to be considered to be present if:
(A) the intermediate and final products have the same essential structural element, in that:
(1) the basic chemical structures of the intermediate of the final products are the same, or
(2) the chemical structures of the two products are technically closely interrelated, the intermediate incorporating an essential structural element into the final product, and
(B) the intermediate and final products are technically interrelated, this meaning that the final product is manufactured directly from the intermediate or is separated from it by a small number of intermediates all containing the same structural element.

(d) Consequently, unity of invention existed between Claims 1 to 19.

(d) According to the Examiner, Claims 1-19 should however lack of unity for the reason that the general concept underlying the claims of the present application was a ligand suitable as a component in the olefin polymerization process. According to the Examiner said ligand was known from Dl.

(e) The general inventive concept underlying the claims of the present invention was not (as suggested by the Examiner) the ligand of claim 19, but the use of a particular metallocene compound in a particular polymerization process.

(f) Since Dl did not disclose this use, this general inventive concept was not anticipated and Claims 1-19 fulfilled the requirements of unity of invention.

(g) The claims should hence be grouped in the following manner:
Claim 19 directed to the ligands;
Claims 17-18 directed to metallocene compounds containing the ligands;
Claims 1-13 directed to 1-butene polymerization process using the metallocene compounds; and
Claims 14-16 polymer products obtained with this process.

(h) The subject-matter of Claim 18 was not anticipated by Dl, since that document did not disclose a metallocene compound in which the substituent $R^6$ was a $C_1$-$C_{10}$ alkyl radical. Even if one would consider that Dl anticipated the subject-matter of Claims 17-19, the remaining set of claims would maintain the unity of invention being linked by the above general inventive concept.

(i) According to the decision G 1/89 (OJ EPO, 1991, 155; Reasons point 8.2), while the ISA might consider the request of additional fees, this should be done only in clear cases. In particular, in view of the fact that such consideration under the PCT was being made without the applicant having had an opportunity to comment, the ISA should exercise restraint in the assessment of novelty and inventive step and in border-line cases preferably refrain from considering an application as not complying with the requirement of unity of

invention on the ground of lack of novelty or inventive step.

VI. On 7 March 2005 the Review Panel of EPO/ISA issued a "Notification regarding Review of Justification for Invitation to pay Additional Search Fees" (hereinafter "Review Notification"), in which the Applicant was invited to pay a protest fee within a time limit of one month.

In paragraph 1 of the "Review Notification", the Applicant was told that after review of the protest the four additional search fees should not be reimbursed.

The position of the Review Panel (cf. paragraph 2.3.3) of the Review Notification) can be summarized as follows:

(i) According to Section 10.16 on page 78 of the PCT Guidelines (as in force from 25.03.2004) "a single general inventive concept must link the claims in the various categories..."

(ii) There was no expression in product Claims 14 to 15 linking them to process Claims 1 to 13.

(iii) The use of a particular metallocene in a polymerisation process, as stated by the Applicant, could not form the basis of the general inventive concept because this use was not common to all claims, since it did not form a subset of product Claims 14 to 19.

(iv) Only the ligand of Claim 19 could fulfil this criteria because this ligand represented a subset of the metallocene structure of Claim 18, which in turn was common to process Claims 1 to 13 and the polymer products of Claims 14 to 16 which might have been produced by said process.

(v) Since D1 anticipated Claim 19, this inventive concept was known from D1.

(vi) In the light of D1, there was hence no single general inventive concept (Rule 13.1 PCT) and no demonstrated same or corresponding special technical feature (Rule 13.2 PCT) linking the following groups of claims:

Group 1: the subject matter of Claims 1-13;
Group 2: the subject matter of Claims 14-15;
Group 3: the subject matter of Claim 16;
Group 4: the subject matter of Claims 17-18; and
Group 5: the subject-matter of claims 19.

The Review Panel thus concluded that the Applicant's protest was not justified and that no reimbursement of search fees was required.

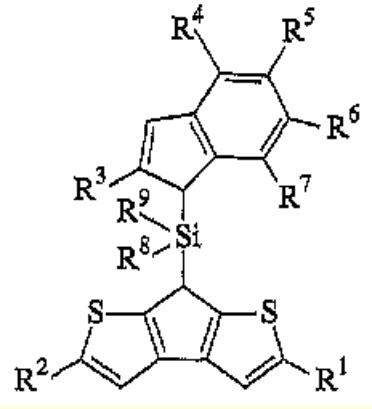
VII. On 24 March 2005 the Applicant paid the protest fee requested in the "Review Notification". In its letter dated 24 March 2005 announcing the afore-mentioned payment the Applicant submitted the following additional comments:

(i) According to the Examiner, Claims 1-19 of the present application should lack of unity a posteriori

for the reason that DI should destroy the novelty of claim 19.

(ii) This kind of objection should be raised only in clear cases.

(ii) Claim 19 as filed related to a ligand of formula (III):




wherein $R^1$, $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, $R^7$, $R^8$ and $R^9$ have the meaning described in Claim 12.

(iii) Claim 12, which referred to a process according to Claims 1 to 12 [sic] did not contain the meaning of the groups cited in Claim 19.

(iv) This should render claim 19 unclear and therefore the objection of lack of unity a posteriori should have been avoided according to G 1/89.

(v) According to the Examiner's view only the ligand of Claim 19 was anticipated by Dl, but Dl described the synthesis of metallocene compounds starting from the ligands.

(vi) It was hence not clear why the metallocene compound of Claim 17 was considered new with respect to Dl while the ligand of Claim 19 was not.

(vii) The claims should be grouped in the following manner:

Claim 19 directed to the ligands;
Claims 17-18 directed to metallocene compounds containing the ligands;
Claims 1-13 directed to 1-butene polymerization process using the metallocene compounds; and
Claims 14-16 polymer products obtained with this process.

(viii) Even if Dl might anticipate claim 19 according to the Examiner view, the remaining set of claims would maintain the unity of invention being linked by the general inventive concept stated in the letter of 18 October 2004.

(ix) This was in line with Annex B of the Administrative Instructions Under the Patent Cooperation Treaty, page 60, point (e) (combinations of categories of claims that met the unity of invention allowed according to Rule 13.2 PCT).

VIII. The Applicant requested the reimbursement of the additional search fees and of the protest fee which had been paid.

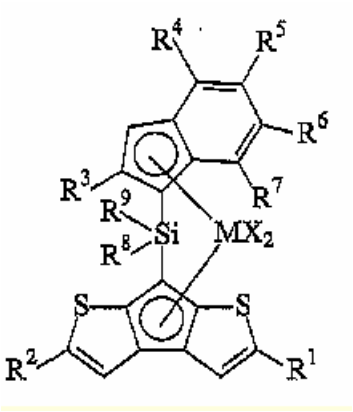
## Reasons for the Decision

1. The protest is admissible.

2. As can be deduced from the description, the aim of the present application is the preparation of isotactic 1-butene polymers having a high molecular weight with high yield (page 1, lines 3-4; page 1, line 28 to page 2, line 3).

3. This problem is solved, according to the application, by using in a polymerization process for 1-butene polymers a catalyst system obtainable by contacting

(A) a specific metallocene compound having the following formula (I)




(I)

wherein: M is an atom of a transition metal selected from those belonging to group 3,4, or to the lanthanide or actinide groups in the Periodic Table of the Elements;
X, equal to or different from each other, is a hydrogen atom, a halogen atoms [sic] or R, OR, OR'O, $OSO_2CF_3$,

OCOR, SR, $NR_2$ or $PR_2$ group, wherein R is a linear or branched, saturated or unsaturated $C_1$-$C_{20}$-alkyl, $C_3$-$C_{20}$-cycloalkyl, $C_6$-$C_{20}$-aryl, $C_7$-$C_{20}$-alkylaryl or $C_7$-$C_{20}$-arylalkyl radical, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; and the R' is a $C_1$-$C_{20}$-alkylidene, $C_6$-$C_{20}$-arylidene, $C_7$-$C_{20}$-alkylarylidene, or $C_7$-$C_{20}$-arylalkylidene radical;
$R^1$, $R^2$, $R^5$, $R^6$, $R^7$, $R^8$ and $R^9$, equal to or different from each other, are hydrogen atoms, or linear or branched, saturated or unsaturated $C_l$-$C_{20}$-alkyl, $C_3$-$C_{20}$-cycloalkyl, $C_6$-$C_{20}$-aryl, $C_7$-$C_{20}$-alkylaryl or $C_7$-$C_{20}$-arylalkyl radicals, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; or $R^5$ and $R^6$, and/or $R^8$ and $R^9$ can optionally form a saturated or unsaturated, 5 or 6 membered rings [sic], said ring can bear $C_l$-$C_{20}$ alkyl radicals as substituents;
with the proviso that at least one of $R^6$ or $R^7$ is a linear or branched, saturated or unsaturated $C_l$-$C_{20}$-alkyl radical, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements; $R^3$ and $R^4$, equal to or different from each other, are linear or branched, saturated or unsaturated $C_l$-$C_{20}$-alkyl, optionally containing heteroatoms belonging to groups 13-17 of the Periodic Table of the Elements;
(B) an alumoxane and/or a compound capable of forming an alkyl metallocene cation; and optionally
(C) an organo aluminum compound (page 2, line 4 to page 3, line 25).

4. While, as indicated above in Section II, the present application comprises 6 independent claims, the claims

should have been grouped, in the Board's view, in the following manner:

Group 1: Claims 1 to 13, which refer to a process for preparing 1-butene polymers using a catalyst system comprising the specific metallocene compound;

Group 2: Claims 14 to 16 which relate to 1-butene polymers obtainable by a polymerization process using the catalyst system comprising the specific metallocene compound;

Group 3: Claims 17 to 18 which refer to the specific metallocene compound; and

Group 4: Claim 19 which refers to a ligand which is an intermediate in the manufacture of the specific metallocene compound.

5. In that context, it is, in the Board's view, evident that the subject-matter of Group 1 is conceptually linked to that of Group 3 by the specific metallocene component used in the catalyst system defined in Claim 1 for polymerizing 1-butene polymers, and that the same conclusion applies to the subject-matter of Groups 1 and 4,

(i) since the intermediate incorporates an essential structural element (i.e. Formula (III)) into the metallocene component used in the catalyst system, and

(ii) since the metallocene component is manufactured directly from the intermediate.

6. In the Board's view, the same conclusion further applies to the subject-matter of Groups 1 and 2.

6.1 While Claim 16 is expressly related to the process of Claim 1, it is true, as indicated by the Review Panel in its Review Notification that there was no expression in Claims 14 to 15 linking them to the process according to Claim 1. The Board however notes that Rule 13.1 PCT does not require that the link between the subject-matter of independent claims must be expressly stated in their wording. All that is required is that there should be a single general inventive concept.

6.2 In the Board's judgment, in determining whether or not this requirement is met, a formalistic approach should be avoided (cf. also decision W 33/92 of 12 August 1992, not published in OJ EPO, Reasons point 3).

6.3 Consequently, although in the present case, the wording of the three independent Claims 1, 14 and 15 might at first glance give the impression that they related to three different inventions, it is evident in view of lines 6-16 on page 8 of the description and of Examples 1, 2, 3 (cf. Table 1) that the homopolymers according to Claims 14 and 15 are obtainable by a process according to Claim 1.

7. Thus, in contrast to the view expressed by the Review Panel in the "Review Notification", the Board comes to the conclusion that it is not the ligand according to Claim 19, but the use of a specific metallocene component as part of a catalyst system in the polymerization of 1-butene polymers, which would

qualify as common unifying "special technical feature" within the meaning of Rule 13.2. PCT, provided this common concept is novel and has an inventive character.

8. Under Rule 40.2(c) PCT the Board only has to examine whether, considering the reasons given by the ISA and the submissions made in support of the protest, retaining additional fees was justified. This means that the Board cannot therefore investigate ex officio whether an objection of lack of unity would have been justified for reasons other than those given.

9. While it has been considered by the Review Panel in the "Review Notification" that document D1 anticipated the subject-matter of Claim 19, the Board notes that it has not been argued by the Review Panel, either that D1 was a novelty destroying document for the subject-matter of Claim 1 or that it challenged the inventive step of the subject-matter of that claim.

10. Thus, the Board can only conclude that the Review Panel had no objection concerning the novelty and the inventive character of the use of the specific metallocene component in the polymerization of 1-butene polymers.

11. In this connection, even if, in view of the unclear definition of the groups $R^1$ to $R^9$ in Claim 19, it might have been considered that some intermediates falling under the formula (III) according to Claim 19 of the present application, could have been known, as submitted by the Review Panel, from document D1, this should have had for its consequence the subsequent raising of an objection of lack of novelty in the

course of the examination proceedings, on which the Applicant would have the opportunity to comment, but in no case the charging of additional search fees.

12. Thus, under these circumstances, the Board can only come to the conclusion that the reasons given in the "Invitation" do not warrant the proposed lack of unity objection and that the subject-matter of Claims 1 to 13 (Group 1), and 14 to 16 (Group 2), of Claims 17 to 18 (Group 3), of Claim 19 (Group 4) must be considered as so linked as to form a single general inventive concept within the meaning of Rule 13.1 PCT.

13. It thus follows from the above that the Applicant's protest against the payment of four additional search fees is justified.

## Order

## For these reasons it is decided that:

The refund of the four additional search fees and the protest fee is ordered.

The Registrar: The Chairman:

C. Eickhoff R. Young