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D E C I S I O N
of 20 April 2006

Case Number: T 1121/03 - 3.3.10

Application Number: 96944758.0

Publication Number: 0874797

IPC: C07C 45/50

Language of the proceedings: EN

Title of invention:
Processes employing indicator ligands

Patentee:
UNION CARBIDE CHEMICALS & PLASTICS TECHNOLOGY CORPORATION

Opponent:
Mitsubishi Chemical Corporation

Headword:
Indicator ligands/UNION CARBIDE

Relevant legal provisions:
EPC Art. 100(b), 123(2), (3)

Keyword:
"Main and auxiliary requests 2, 4 and 6: Sufficiency of disclosure (no) - no technical concept fit for generalisation - undue burden in carrying out the invention throughout the whole area claimed - research programme"
"Auxiliary requests 1, 3, 5 and 7: Amendments (not allowable) - added subject-matter"

Decisions cited:
T 0409/91, T 0435/91

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1121/03 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 20 April 2006

Appellant: (Patent Proprietor)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 31 July 2003 revoking European patent No. 0874797 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: R. Freimuth
Members: J. Mercey
J. Seitz

Summary of Facts and Submissions

I. The Appellant (Proprietor of the Patent) lodged an appeal on 2 October 2003 against the decision of the Opposition Division dated 31 July 2003 revoking European patent No. 874 797, and on 5 December 2003 filed a written statement setting out the grounds of appeal.

II. Notice of Opposition had been filed by the Respondent (Opponent), requesting revocation of the patent in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC) and insufficient disclosure (Article 100(b) EPC).

III. The decision under appeal was based on a main request consisting of the claims as granted, and four auxiliary requests filed during opposition proceedings. The Opposition Division decided that the patent according to all of the then pending requests did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. More particularly, the Opposition Division held that two of the functional features additionally defining the sterically hindered organophosphorus ligand, namely that said ligand (i) had a coordination strength with respect to the metal of said metal-organopolyphosphite ligand complex catalyst less than the organopolyphosphite ligand of said metal-organopolyphosphite ligand complex catalyst, and (ii) when complexed with the metal to form a metal-sterically hindered organophosphorus ligand complex catalyst, provided a reaction rate of at least 25 percent of the reaction rate provided by the

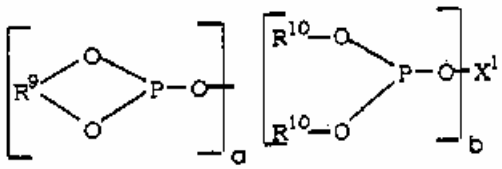
metal-organopolyphosphite ligand complex catalyst, were insufficiently disclosed. No method for measuring either the coordination strength or the reaction rate was disclosed in the patent in suit. With regard to the former parameter, no reliable method for its measurement was available in the prior art, and with regard to the latter, the patent in suit was silent with respect to the conditions under which it should be measured. It was concluded that the person skilled in the art could not carry out the invention without undue experimentation and the application of inventive ingenuity, which amounted to an invitation to conduct a research programme. With letter dated 26 May 2003, the patent proprietor submitted the experimental report D4.

IV. Annexed to the Statement of the Grounds of Appeal, the Appellant submitted a main request and auxiliary requests 1 to 7 superseding any previous request. During the oral proceedings before the Board, held on 20 April 2006, claims 1 to 3 of the eight claims comprised in auxiliary request 7 were replaced by fresh claims 1 to 3. The main request comprised a set of sixteen claims, independent claim 1 reading as follows:

"1. A hydroformylation process which comprises reacting one or more olefinic unsaturated compounds with carbon monoxide and hydrogen in the presence of a metal-organopolyphosphite ligand complex catalyst and optionally free organopolyphosphite ligand, and an amount of a sterically hindered organophosphorus ligand different from the organopolyphosphite ligand of said metal-organopolyphosphite ligand complex catalyst, to produce one or more aldehydes, wherein said sterically hindered organophosphorus ligand (i) has a coordination

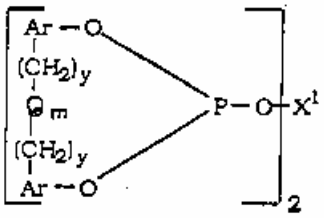
strength with respect to the metal of said metal-organopolyphosphite ligand complex catalyst less than the organopolyphosphite ligand of said metal-organopolyphosphite ligand complex catalyst, (ii) when complexed with the metal to form a metal-sterically hindered organophosphorus ligand complex catalyst, provides a reaction rate of at least 25 percent of the reaction rate provided by the organopolyphosphite ligand of said metal-organopolyphosphite ligand complex catalyst, (iii) has a coordination strength with respect to the metal of said metal-organopolyphosphite ligand complex catalyst greater than carbon monoxide, and (iv) when complexed with the metal to form a metal-sterically hindered organophosphorus ligand complex catalyst, provides a normal:branched aldehyde isomer ratio lower than the normal:branched aldehyde isomer ratio provided by the organopolyphosphite ligand of said metal-organopolyphosphite ligand complex catalyst."

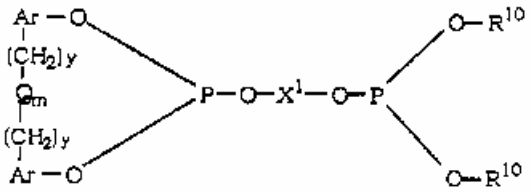
Claim 1 of auxiliary request 2 differed from claim 1 of the main request exclusively in that the metal-organopolyphosphite ligand complex catalyst was additionally defined as comprising "rhodium complexed with an organopolyphosphite ligand represented by the formula:

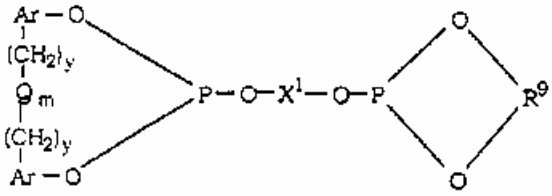


wherein X^1 represents a substituted or unsubstituted n-valent hydrocarbon bridging radical containing from

2 to 40 carbon atoms, each R^9 is the same or different and represents a divalent hydrocarbon radical containing from 4 to 40 carbon atoms, each R^{10} is the same or different and represents a substituted or unsubstituted monovalent hydrocarbon radical containing from 1 to 24 carbon atoms, a and b can be the same or different and each have a value of 0 to 6, with the proviso that the sum of a+b is 2 to 6 and n equals a+b or rhodium complexed with an organopolyphosphite ligand having the formula selected from:





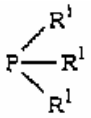


wherein X^1 represents a substituted or unsubstituted divalent hydrocarbon bridging radical containing from 2 to 40 carbon atoms, R^9 is a divalent hydrocarbon radical containing from 4 to 40 carbon atoms, each R^{10}

is the same or different and represents a substituted or unsubstituted monovalent hydrocarbon radical containing from 1 to 24 carbon atoms, each Ar is the same or different and represents a substituted or unsubstituted aryl radical, each y is the same or different and is a value of 0 or 1, Q represents a divalent bridging group selected from $-C(R^5)_2-$, -O-, -S-, $-NR^6-$, $Si(R^7)_2-$ and -CO-, wherein each R^5 is the same or different and represents hydrogen, alkyl radicals having from 1 to 12 carbon atoms, phenyl, tolyl, and anisyl, R^6 represents hydrogen or a methyl radical, each R^7 is the same or different and represents hydrogen or a methyl radical, and m is value of 0 or 1";

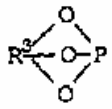
and the sterically hindered organophosphorus ligand was additionally defined as having "the formula selected from:

(a) a triorganophosphine ligand represented by the formula:



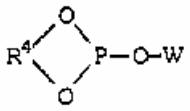
wherein R^1 is the same or different and represents a substituted or unsubstituted monovalent hydrocarbon radical containing from 1 to 24 carbon atoms or greater;

(b) a monoorganophosphite represented by the formula:



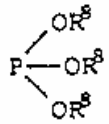
wherein R^3 represents a substituted or unsubstituted trivalent hydrocarbon radical containing from 4 to 40 carbon atoms or greater;

(c) a diorganophosphite represented by the formula:



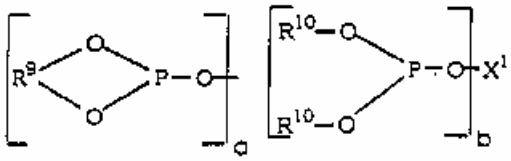
wherein R^4 represents a substituted or unsubstituted divalent hydrocarbon radical containing from 4 to 40 carbon atoms or greater and W represents a substituted or unsubstituted monovalent hydrocarbon radical containing from 1 to 18 carbon atoms or greater;

(d) a triorganophosphite represented by the formula:



wherein each R^8 is the same or different and represents a substituted or unsubstituted monovalent hydrocarbon radical; and

(e) an oxide of an organopolyphosphite represented by the formula:



wherein X^1 represents a substituted or unsubstituted n-valent hydrocarbon bridging radical containing from 2 to 40 carbon atoms, each R^9 is the same or different and represents a divalent hydrocarbon radical containing from 4 to 40 carbon atoms, each R^{10} is the same or different and represents a substituted or unsubstituted monovalent hydrocarbon radical containing from 1 to 24 carbon atoms, a and b can be the same or different and each have a value of 0 to 6, with the

proviso that the sum of a+b is 2 to 6 and n equals a+b."

Claim 1 of the auxiliary requests 4 and 6 differed from claim 1 of auxiliary request 2 exclusively in that the sterically hindered organophosphorus ligand was restricted to the above formulae (c), (d) or (e) only in the case of auxiliary request 4, and to formula (e) only in the case of auxiliary request 6.

Claim 1 of each of the auxiliary requests 1, 3, 5 and 7 differed from claim 1 of the main request and of the auxiliary requests 2, 4 and 6 respectively, exclusively in that the feature "under the same reaction conditions" was incorporated at the end of features (ii) and (iv) thereof.

V. The Appellant submitted that the feature "under the same reaction conditions" found support in the application as filed, since it was implicitly disclosed therein, more particularly in Examples 4 and 5, such that this amendment complied with the requirements of Article 123(2) EPC.

The Appellant further submitted that the invention, which was defined in claim 1 according to any request *inter alia* by the feature (ii), i.e. that the metal sterically hindered organophosphorus ligand complex catalyst provided a reaction rate of at least 25% of the reaction rate provided by the metal-organopolyphosphite ligand complex catalyst, was sufficiently disclosed. Based on common general knowledge and simple preliminary experiments such as those described in Examples 1 to 5 of the patent in

suit, the skilled person could measure the reaction rate and conclude whether the sterically hindered ligand met feature (ii) or not. The Appellant submitted during oral proceedings before the Board that the reaction rate was dependent on the nature of the catalyst metal and on operation time, and during the written procedure that the reaction rate was dependent on temperature, and on the concentration of the reactants, of the rhodium metal, and of the ligands. The Appellant further submitted that the limits of the suitable sterically hindered ligand were defined once the organopolyphosphite ligand was chosen.

VI. The Respondent submitted that claim 1 of auxiliary requests 1, 3, 5 and 7 offended against the requirements of Article 123(2) EPC, since the supplementation of the functional features (ii) and (iv) with the feature "under the same reaction conditions" was not clearly and unambiguously derivable from the application as filed.

The Respondent submitted that the invention was insufficiently disclosed with respect to feature (ii). The patent in suit was silent as to how the reaction rate should be determined. Since reaction rates were dependent on reaction conditions such as the nature of the catalyst metal, operation time, temperature, and reagent concentrations, different reaction conditions would result in different reaction rates, and hence in different reaction rate ratios. As a result, the skilled person was invited to conduct a research programme in order to figure out which sterically hindered ligand may be used with which organopolyphosphite ligand.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or, subsidiarily, on the basis of any of the auxiliary requests 1 to 6, all requests submitted on 5 December 2003, or on auxiliary request 7, claims 1 to 3 thereof filed during the oral proceedings on 20 April 2006 and claims 4 to 8 filed on 5 December 2003.

The Respondent requested that the appeal be dismissed.

VIII. At the end of the oral proceedings, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments (Article 123(2) and (3) EPC)*

The amendments made to claim 1 as granted, namely that the process is restricted to a hydroformylation process, that features (iii) and (iv) are mandatory, that the reactants are defined as olefinic unsaturated compounds, carbon monoxide and hydrogen, that the products are defined as aldehydes and the product isomer ratio as an aldehyde isomer ratio, have a proper basis in the original application. Such a process is disclosed on page 9, lines 3 to 26 of the application as filed.

Therefore all the amendments to claim 1 as granted comply with the requirements of Article 123(2) EPC.

These amendments to claim 1 as granted bring about a restriction of the scope of the claims, and therefore of the protection conferred thereby, which is in keeping with the requirements of Article 123(3) EPC.

3. *Insufficiency of disclosure of the invention (Article 100(b) EPC)*

The main issue to be decided in this appeal is whether or not the decision under appeal was right to find that the patent in suit did not disclose the claimed invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. The Appellant objected in particular to the finding of the Opposition Division that the subject-matter of claim 1 as a whole could not be carried out by a person skilled in the art because the sterically hindered organophosphorus ligand was defined by means of inadequate functional features.

3.1 It is the established jurisprudence of the Boards of Appeal that the requirements of sufficiency of disclosure are only met if the invention as defined in the independent claim can be performed by a person skilled in the art in the whole area claimed without undue burden, using common general knowledge and having regard to further information given in the patent in suit (see decisions T 409/91, OJ 1994, 653, point 3.5 of the reasons; T 435/91, OJ EPO 1995, 188, point 2.2.1 of the reasons). That principle applies to any invention irrespective of the way in which it is

defined, be it by way of a functional feature or not. The peculiarity of the functional definition of a technical feature resides in the fact that it is defined by means of its effect. That mode of definition comprises an indefinite and abstract host of possible alternatives, which is acceptable as long as all alternatives are available and achieve the desired result. Therefore, it has to be established whether or not the patent in suit discloses a technical concept fit for generalisation which makes available to the person skilled in the art the host of variants encompassed by the functional definition of a technical feature in that claim.

3.2 In the present case, the patent in suit aims at providing an indication when the organopolyphosphite ligand in a hydroformylation reaction has become depleted and at overcoming the problem of the metal of the metal-organopolyphosphite complex catalyst becoming intractable (patent specification, page 3, lines 3 to 7). The means provided to achieve this aim are indicated in claim 1 which is directed to a hydroformylation process which is carried out in the presence of both a metal-organopolyphosphite ligand complex catalyst and a sterically hindered organophosphorus ligand (also referred to hereinafter and in the patent in suit as the "indicator ligand") different from the organopolyphosphite ligand (also referred to hereinafter as the "primary ligand") of said metal-organopolyphosphite ligand complex catalyst, said indicator ligand being further defined in terms of four functional features (i) to (iv). The second of these features is that when complexed with the metal to form a metal-indicator ligand complex catalyst, it

provides a reaction rate of at least 25 percent of the reaction rate provided by the metal-primary ligand complex catalyst. This feature is a functional feature, since, together with features (i), (iii) and (iv), it reflects one of the aims of the patent, namely that the indicator ligand should provide an indication of the depletion of the primary ligand. In order to do this the indicator ligand should, when complexed with the metal, provide reaction characteristics which are observably different from those provided by the metal-primary ligand catalyst, a minimum reaction rate compared to that of the metal-primary ligand catalyst being one of the requirements of the indicator ligand necessary to achieve this aim.

3.3 The definition of the indicator ligand in claim 1 contains in fact two parts: the result to be achieved and, in addition, the indication of a structural requirement to be met in order to obtain the result, i.e. a steric hindrance of the organophosphorus ligand. However, that structural definition comprises a practically unlimited number of individual ligands since, apart from the indication that the organophosphorus ligands should be sterically hindered, their structure remains completely undefined and, thus, embraces any conceivable structural variation. Therefore, the structural definition of the indicator ligand in claim 1 covers any chemical compound once it comprises a sterically hindered organophosphorus compound.

However, that not **all** sterically hindered organophosphorus ligands would necessarily satisfy at the same time the functional features (i) to (iv) is

conceded in the patent in suit, which indicates that "**certain**" sterically hindered organophosphorus ligands have been found to be suitable ligands to use as indicators of organopolyphosphite ligand depletion (patent specification, page 3, lines 3 to 4; page 7, lines 51 to 52 and line 57; and page 8, line 26; emphasis added), "**provided that** the chosen sterically hindered organophosphorus ligand meets the criteria set forth herein" (patent specification, page 8, lines 57 to 58 and page 9, lines 30 to 31; emphasis added). The Appellant conceded in the written statement setting out the grounds of appeal dated 5 December 2003 (page 6, lines 4 to 12; page 7, lines 9 to 14; and page 7, last line to page 8, line 8) that the skilled person needs to **select** an indicator ligand from among the sterically hindered organophosphorous ligands that meets the criteria (i) to (iv). Further evidence that specific sterically hindered organophosphorous ligands, e.g. dioxides, are not suitable as indicator ligands, was provided by experiment D of experimental report D4. More particularly, such dioxides did not give any appreciable hydroformylation activity and thus did not meet feature (ii). Therefore, the above structural definition of the indicator ligand comprises a host of possible chemical compounds which may or may not lead to the required minimum indicator:primary ligand reaction rate ratio.

In order to pick from that host those chemical compounds which satisfy *inter alia* the above functional feature (ii) for being a suitable indicator ligand, the person skilled in the art is thereby confronted with the uncontested fact that the resulting reaction rate ratio is affected by a number of operational variables

unrelated to the structure of the indicator ligand. The Appellant conceded that these variables may be related to the reaction system used, e.g. the nature of the metal of the complex catalyst, and/or to the reaction conditions, e.g. operation time, reagent concentration and temperature.

3.3.1 Firstly, the reaction rate ratio as defined in feature (ii) of claim 1 is affected by the nature of the reaction **system** in the two reactions used to determine the respective reaction rates. Thus the nature of the metal of the metal-ligand complex catalyst has a substantial impact on the catalyst activity. The Appellant conceded during oral proceedings before the Board that even if the same metal were used in the two reactions to be compared, the reaction rate ratio using one metal and one pair of primary/indicator ligands would not necessarily be the same as the reaction rate ratio using another metal and the same pair of primary/indicator ligands.

3.3.2 Secondly, the reaction rate ratio as defined in feature (ii) of claim 1 is affected by the length of **time** the two reactions have been in operation when the respective measurements are made. This finding is supported by the results of Examples 2 and 4 given in Tables 2 and 4 of the specification of the patent in suit, which provide evidence of the fact that depending on the number of days in operation, the reaction rate ratio of the same reaction using the same indicator ligand may or may not satisfy feature (ii). Hence, the reaction rate ratio of 26% derived from the reaction rates after 0.5 and 4.0 days in operation in Table 2 are above the required threshold of 25%, i.e. satisfies

the feature (ii), whereas all other reaction rate ratios derivable from said Table are below that threshold. The same conclusion applies to the reaction rate ratio of 24% derived from the reaction rates after 1.8 and 2.9 days in operation in Table 4, which does not satisfy feature (ii)), whereas all other reaction rate ratios derivable from said Table do. During oral proceedings before the Board, the Appellant, by arguing that in order for a reaction rate ratio to be meaningful the respective measurements should be made once steady state has been achieved, conceded thereby that operation time does indeed affect the reaction rate ratio.

3.3.3 Thirdly, the reaction rate ratio as defined in feature (ii) of claim 1 is affected by the **concentration** of the reagents in the two reactions used to determine the respective reaction rates. This finding is supported by the results of Example 6 given in Table 6 of the specification of the patent in suit, which provide evidence that in the same reaction the reaction rate varies with the ligand concentration. For example, the reaction rate (denoted as "catalyst activity" in Table 6) varied from 1.2 to 1.8 depending on whether 0.25 or 0.50 equivalents of the same Ligand A were present. The Appellant, in the letter dated 5 December 2003 (cf. page 8), conceded that the reaction rate was dependent on the concentration of the ligands, as well as of the reactants and of the catalyst metal.

3.3.4 Fourthly, the reaction rate ratio as defined in feature (ii) of claim 1 is affected by the **temperature** in the two reactions when the respective measurements are made. It is common general knowledge that reaction rate is

dependent on temperature, and this fact was not disputed by the Appellant.

3.4 It follows from the above that there is no necessary correlation between the structural definition of the indicator ligand and the further functional requirement (ii) in claim 1 that, when complexed with the catalyst metal, it should provide a reaction rate of at least 25% of that provided by the metal-primary ligand complex. Therefore, the reaction rate ratio defined in claim 1 necessarily varies unsystematically and unpredictably without any conclusive interdependency between the structure of the primary ligand and the structure of the indicator ligand. Neither the common general knowledge nor the patent in suit provides any technical guidance according to which a person skilled in the art could identify the suitable individual indicator ligands without undue effort. In the patent in suit, no further information is provided regarding feature (ii) over and above the literal wording of this feature given in claim 1. The person skilled in the art trying to identify indicator ligands meeting the functional definition (ii) set out in claim 1, does not have at his disposal any information leading necessarily and directly towards success through the evaluation of initial failures. Thus, the functional definition of the indicator ligand given in claim 1 is no more than an invitation to perform a research programme in order to find the suitable indicator ligands (cf. decision T 435/91, *loc. cit.*, point 2.2.1, last paragraph of the reasons).

For these reasons, in the Board's judgement, the invention as defined in independent claim 1 cannot be

performed by a person skilled in the art within the whole area claimed without undue burden, which pursuant to Article 100(b) EPC prejudices the maintenance of the patent.

3.5 The Board accepts that the person skilled in the art is acquainted with methods for determining a reaction rate which is a conventional parameter in the technical field of chemistry. Thus, it is possible for a person skilled in the art to determine two separate reaction rates and calculate therefrom a reaction rate ratio.

However, the Appellant's conclusion that given the ability of a person skilled in the art to determine a reaction rate ratio, the claimed invention cannot be objected to on the basis of Article 100(b) EPC is not valid. The decisive fact in the present case is that the person skilled in the art, whilst being able to measure two separate reaction rates, cannot carry out the invention without undue burden within the whole area claimed, since the functional definition of the indicator ligand in claim 1 merely invites him to perform a research programme due to the lack of any technical guidance comprised in the patent in suit (cf. points 3.1 to 3.4 above).

4. In these circumstances, the Appellant's main request must fail as the patent in suit does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art pursuant to Article 100(b) EPC.

Auxiliary requests 1, 3, 5 and 7

5. *Amendments (Article 123(2) EPC)*

5.1 Claim 1 according to auxiliary request 1 differs from that of the main request in that the feature "under the same reaction conditions" is comprised in features (ii) and (iv) thereof. Features (ii) and (iv) comprise two of the four selection rules for determining which sterically hindered organophosphorus ligand should be used with which metal-organopolyphosphite ligand complex catalyst.

5.2 It is established jurisprudence of the Boards of Appeal that an amendment extends beyond the content of the application as filed, if the amended subject-matter is not directly and unambiguously derivable from the application as filed.

5.3 In the application as filed, no further information is provided regarding features (ii) and (iv) over and above the literal wording of these two features given in claim 1, let alone any indication of the reaction conditions under which these two features should be measured.

5.4 The Appellant argued that when determining whether a particular sterically hindered organophosphorus ligand/metal-organopolyphosphite ligand complex catalyst pair fulfilled the requirements of features (ii) and (iv), it was implicit that the two measurements required in each case be determined under the same reaction conditions, since otherwise these two features would be nonsensical. More particularly, it

argued that Examples 4 and 5 in the application as filed provided a basis for the amendment made to feature (ii), since in these examples reaction rates of a metal-sterically hindered organophosphorus ligand complex and a metal-organopolyphosphite ligand complex were compared under the same reaction conditions.

5.5 The Board, however, holds that Examples 4 and 5 cannot under any circumstances provide a basis for the amendments to features (ii) and (iv), since these two examples are not concerned with the selection rules addressed in functional features (ii) and (iv), but instead illustrate the claimed process using the sterically hindered organophosphorus ligand/metal-organopolyphosphite ligand complex catalyst pair already selected beforehand according to these rules.

5.6 Since, thus, the amendments to features (ii) and (iv) of claim 1 are not unambiguously derivable from the application as filed, claim 1 of auxiliary request 1 is amended in such a way that subject-matter extending beyond the application as filed is added, contrary to the requirements of Article 123(2) EPC, with the consequence that auxiliary request 1 is not allowable.

5.7 The same amendments, namely the insertion of the aforesaid feature into features (ii) and (iv), have been made to claim 1 of each of the auxiliary requests 3, 5 and 7, thereby offending against the provisions of Article 123(2) EPC. Therefore, by the same token, these requests are also not allowable.

Auxiliary requests 2, 4 and 6

6. *Amendments (Article 123(2) and (3) EPC)*

Independent claim 1 of each of the auxiliary requests 2, 4 and 6 differs from claim 1 of the main request exclusively in that the metal-organopolyphosphite ligand complex catalyst is additionally defined as rhodium complexed with an organopolyphosphite ligand represented by specific formulae, and in that the sterically hindered organophosphorus ligand is additionally defined by specific formulae (cf. point IV above). These amendments find support in original dependent claims 11, 13 and 14. Therefore all the amendments comply with the requirements of Article 123(2) EPC.

These amendments to claim 1 as granted bring about a restriction of the scope of the claims, and therefore of the protection conferred thereby, which is in keeping with the requirements of Article 123(3) EPC.

7. *Insufficiency of disclosure of the invention (Article 100(b) EPC)*

The definition of the indicator ligand in claim 1 according to each of the auxiliary requests 2, 4 and 6 differs from that according to the main request exclusively in that the structural definition of the indicator ligand, i.e. the steric hindrance of the organophosphorus ligand, has been condensed in chemical formulae, while retaining the functional definition of the indicator ligand (ii) that it should, when complexed with the metal, provide a reaction rate of at

least 25% of that provided by the metal-primary ligand complex. The structural definition still comprises a countless number of individual compounds not all of them being suitable indicator ligands as set out in point 3 above. More particularly, not all oxides of organopolyphosphites as represented by the structural formula (e) (see point IV above) for the sterically hindered ligand given in claim 1 of auxiliary request 6, said oxides also being included in claim 1 of auxiliary requests 2 and 4, are suitable indicator ligands as indicated in point 3.3 above. With respect to the functional feature (ii), the patent in suit provides no guidance according to which a skilled person could identify suitable indicator ligands without starting a research programme. Therefore, the objections raised against claim 1 of the main request, which are based on the functional feature (ii) retained in claim 1 of the auxiliary requests 2, 4 and 6, still apply to that claim of these auxiliary requests, resulting necessarily in the same conclusion that the invention as defined in independent claim 1 of these requests cannot be performed by a person skilled in the art within the whole area claimed without undue burden.

8. In these circumstances, the Appellant's auxiliary requests 2, 4 and 6 must also fail for lack of sufficient disclosure pursuant to Article 100(b) EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Moser R. Freimuth