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Datasheet for the decision
of 4 August 2015

Case Number:	T 1886/10 - 3.3.03
Application Number:	03006867.0
Publication Number:	1348721
IPC:	C08F10/00, C08F10/02, C08F2/34, C08F6/02
Language of the proceedings:	EN

Title of invention:
Olefinic polymer and process for producing the same

Patent Proprietor:
Mitsui Chemicals, Inc.

Opponents:
Basell Polyolefine GmbH
Borealis Polymers OY
Univation Technologies, LLC

Headword:

Relevant legal provisions:
EPC Art. 54, 56, 83

Keyword:
Sufficiency of disclosure - (yes)
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

Catchword:

Case Number: T 1886/10 - 3.3.03

DECISION
of Technical Board of Appeal 3.3.03
of 4 August 2015

Appellant: (Patent Proprietor)	Mitsui Chemicals, Inc. 5-2, Higashi-Shimbashi 1-Chome Minato-ku Tokyo (JP)
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Respondent: (Opponent 1)	Basell Polyolefine GmbH Brühler Strasse 60 50389 Wesseling (DE)
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Respondent: (Opponent 2)	Borealis Polymers OY P.O.Box 330 06101 Porvoo (FI)
Representative:	Campbell, Neil Boyd Dehns St Bride's House 10 Salisbury Square London EC4Y 8JD (GB)
Respondent: (Opponent 3)	Univation Technologies, LLC 5555 San Felipe, Suite 1950 Houston, Texas 77056 (US)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 19 July 2010 revoking European patent No. 1348721 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairwoman B. ter Laan
Members: M. C. Gordon
C. Brandt

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division revoking European patent number 1 348 721 (granted on European patent application number 03 006 867.0).

II. The patent was granted with a set of 5 claims, claim 1 reading as follows:

"A process for producing an olefinic polymer by (co)polymerizing one or two or more olefins selected from ethylene and α-olefins having 3-20 carbon atoms in the presence of a metallocene type catalyst in a gas phase using a fluidized-bed reactor, the process comprising:

a polymerization step of (co)polymerizing olefins with allowing a saturated aliphatic hydrocarbon to exist in a concentration of 2 to 30 mol % in said fluidized bed reactor; and

a ligand removing step of bringing the resulting (co)polymer into contact with a ligand-remover and then heating said (co)polymer which has been brought into contact with the ligand-remover."

Claims 2-5 were dependent claims.

III. Three oppositions against the patent were filed, invoking the grounds pursuant to Art. 100(a) EPC (novelty and inventive step; all opponents), Art. 100(b) EPC (Opponents II and III) and Art. 100(c) EPC (only Opponent III).

Inter alia the following documents were cited in support of the oppositions:
D3: US-A-5 405 922

D10: EP-A-808 850
D11: EP-A-634 421
D20: Litteer, D.L. "Recent advances in metallocene LLDPE technology", Popular Plastics and Packaging, December 1998 pp 67-72.
D24: EP-A-1 209 179.

IV. The decision of the opposition division was based on a main request and a first and second auxiliary request, all filed with letter of the patent proprietor dated 9 April 2010.

Claim 1 of the main request differed from claim 1 as granted in that the final part of the claim, relating to the ligand removing step, read as follows, additions compared to the ganted claim being indicated in **bold:**

"... a ligand removing step of bringing the resulting (co)polymer into contact with a ligand-remover and then heating **and melting** said (co)polymer which has been brought into contact with the ligand remover **using a single screw or twin-screw extruder to pelletize the (co)polymer**."

The wording of the auxiliary requests is not relevant for the present appeal.

V. According to the appealed decision, the requirements of Art. 83 EPC were met. Objections that

- the claims omitted a pellet steaming step, despite such a step being an essential feature of all examples and

- the claims were too broad so that the invention could not be operated over the whole range claimed were not supported by any evidence and/or were considered to be objections of lack of clarity (Art. 84 EPC).

The requirements of Art. 54 EPC were satisfied. In the polymerisation process of D11 the presence of water was limited to such a low amount that no removal of the catalyst ligands would occur. According to the minutes of the oral proceedings the patent proprietor had conceded that D11 disclosed the claimed concentration of saturated aliphatic compound in the reactor.

Regarding inventive step the closest prior art was D10 which taught all features of claim 1 except for the reaction taking place in a fluidised bed in the presence of 2-30 wt% of saturated aliphatic hydrocarbon.

D10 however taught that the ligand removing process thereof could be used for all polyethylenes prepared using a catalyst having cyclopentadienyl ligands to provide odour free polymers suitable for use in the field of foods. Thus the skilled person was taught by D10 that a polymer made e.g. by the process of D24 could be rendered suitable for food use by the process of D10.

The first and second auxiliary requests were held not to meet the requirements of Art. 123(2) EPC. The underlying reasoning is not of relevance for the present appeal.

Consequently the patent was revoked.

VI. With the statement of grounds of appeal the patent proprietor - now the appellant - maintained as the sole request the set of claims according to the main request as considered by the opposition division.

VII. The opponents responded to the appeal, maintaining objections pursuant to Art. 54, 56 and 83 EPC.

VIII. On 10 March 2015 the Board issued a summons to oral proceedings and on 19 May 2015 issued a communication setting out its preliminary position on the case.

IX. Opponent III made a further submission with letter of 2 July 2015.

X. Oral proceedings were held before the Board on 4 August 2015.

XI. The arguments of the appellant can be summarised as follows:

a) Art. 83 EPC
The arguments advanced by the respondents appeared to relate to the scope of the claims, i.e. either Art. 56 or Art. 84 EPC and were not supported by any evidence.

b) Art. 54 EPC
The appellant departed from the statement recorded in the minutes of the oral proceedings before the opposition division that D11 disclosed the amount of saturated aliphatic hydrocarbon as required by the operative claims. On the contrary, the explicit disclosure of the examples of D11 was of a value outside the claimed range. Furthermore D11 did not disclose either explicitly or implicitly

(directly and unambiguously) a step of pelletisation.

c) Art. 56 EPC
The closest prior art was D10. The problem to be solved was to provide a modified process yielding polyolefins with lower odour.
The claimed subject-matter differed from the process of D10 by the features that:
- the polymerisation was carried out in a gas phase fluidised bed reactor
- in the presence of 2-30 mol% of saturated aliphatic hydrocarbon.

The examples and comparative examples of the patent had been designed to ensure that, as far as possible, polyolefins having consistent properties were obtained, which explained the deviations in the reaction conditions and gas composition employed. The comparative examples were representative of the teaching of D10, deviations in the powder steaming time notwithstanding.

None of the secondary documents invoked by the respondents, for example D3, D20 and D24, addressed odour, even if they did disclose unrelated advantageous effects of the incorporation of a saturated aliphatic hydrocarbon in the reactor. The combination of any of those documents with D10 could only arise by hindsight and was not obvious. Arguments based on a "bonus effect" were not valid.

The pellet steaming step was not essential to the invention and had never been disclosed as such. The powder steaming step was more effective regarding the reduction of odour due to the better contact between the steam and the polymer when in powder form. The optional step of pellet steaming merely provided a final optimisation or "polishing" of the product. This was shown by the examples of D10. Consequently pellet steaming was not essential to the technical effect demonstrated.

Therefore, the claimed subject-matter involved an inventive step.

XII. The arguments of the respondents can be summarised as follows.

a) Art. 83 EPC
All the examples of the patent employed a pellet steaming step. No such feature was present in the claim. There was no evidence that the process could be carried out without pellet steaming.
The definitions of the ligand remover and of the ligand removal steps were very broad. It was not credible, nor was there any evidence, that the process would be operable over the entire scope thereof.

b) Art. 54 EPC
The process of D11 employed an aliphatic saturated hydrocarbon in the reactor in an amount within the claimed range, as the appellant had acknowledged. Methanol - a ligand remover - was present in the reactor meaning that the ligand removal step was disclosed. It was inherent to D11 that the obtained polymer was subjected to pelletisation, such a step being conventionally carried out.

c) Art. 56 EPC

D10 was the closest prior art, as it addressed the same problem as the patent in suit and also related to polymers having a narrow molecular weight distribution (MWD) prepared using high activity catalysts. The distinguishing features were the details of the manufacturing process, as indicated by the appellant, although those should be seen as a single distinguishing feature only. The catalysts employed in D10 and the patent were the same. The examples of the patent did not correspond to the claim due to the absence of the pellet steaming step.

The examples could not show any effect with respect to D10 because:

- it was not known how the polymers in D10 had been produced;
- the polymers of the patent had different densities to those of D10;
- D10 disclosed the initial content of residual ligand, whereas the patent included no such information;
- the conditions of the ligand removal steps differed.

Under these circumstances the onus was on the patent proprietor to provide appropriate evidence.

No improvement compared to D10 had been shown or could even be shown since the odour of the polymers of D10 was already stated to be optimal. Consequently the problem to be solved was merely to provide an alternative process.

To solve this problem the skilled person would as a matter of course consult documents relating to metallocene based processes. A number of such documents existed relating to polymers of narrow molecular weight distribution (MWD) prepared with high activity catalysts corresponding to those of D10. The process of D24 was identical to the first part of the operative claim. In view of the many reported advantages of the D24 process it would be obvious to employ it in order to modify the process of D10.

D20 also taught to employ a saturated hydrocarbon in the fluidised bed reactor operating in the condensed mode and taught further that the resulting product had a reduced content of amorphous low molecular weight fractions (which could contribute to odour).

D3 disclosed a condensed mode process in a fluidised bed and reported that the process had high catalyst activity, i.e. high efficiency and provided a product with a narrow molecular weight distribution.

Even accepting that there was an effect over D10 in respect of the odour of the polymer, the many advantages reported in D3, D20 and D24 would render it obvious to employ those processes to prepare the polymers to be subjected to the treatment process of D10 for the reason that the process of D10 was explicitly directed to removing the catalyst residues that occur in the processes of these documents, in particular D24. The only effect shown was that taught by D10 i.e. reduction of odour.

Alternatively it could be seen that two separate problems were addressed, namely reduction in odour problems by means of the process of D10 and an improvement of productivity by the process of D3/ D20/D24. Since each of those effects were explicitly mentioned in the two sets of documents, solving one of those problems automatically and inevitably resulted in the solution of the second one. Thus the resulting reduction in odour was nothing more than a bonus resulting from the obvious combination of the processes of D10 and D24.

The question also arose whether the purported effect would arise when only powder steaming was employed or whether a pellet steaming step - as carried out in the examples of the patent - was required. The evidence of the examples of D10 suggested that powder steaming alone did not result in sufficient removal of odour. Thus the claims were too broadly formulated and extended to subject-mater for which no problem was solved.

XIII. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims filed with the statement setting out the grounds of appeal.

XIV. The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. Art. 83 EPC

The objections raised under this Article appear to relate either to matters covered by Art. 56 EPC or by Art. 84 EPC in that the essence thereof is that the claims are too broadly formulated, lack essential features and/or cover subject-matter that would not solve the technical problem.

No evidence has been advanced by the respondents to show that the disclosure of the various steps of the claimed process in the description and examples of the patent are such that the skilled person would not be able to put it into operation and obtain the reported result, or that essential details in relation thereto are missing. In particular no arguments or evidence have been advanced to show that the skilled person seeking to put the claimed process into practice faces an undue burden of experimentation.

The respondents have therefore failed to demonstrate that there is a lack of sufficiency of disclosure.

The requirements of Art. 83 EPC are satisfied.

3. Art. 54 EPC

D11 relates to a fluidised bed process for gas phase polymerisation of olefins in the presence of metallocene catalysts. According to claim 1 a compound selected from water, alcohols and ketones is added to the reactor. Those compounds fall within the definition of ligand removers according to the patent in suit. However operative claim 1 defines a multistep process in which the polymerisation step and the ligand removing step are explicitly separated. It therefore appears questionable whether a process in which the polymerisation and ligand removal - apparently - happen concurrently, falls within that definition.

According to the examples of D11 propane - a saturated aliphatic hydrocarbon - is present in the reaction system. The amount specified is 69.4 mol% which is outside the range of 2-30 mol% required by the operative claims. A further indication of the amount of aliphatic hydrocarbon to employ is given on page 8, lines 6 and 7, in terms of the minimum fluidisation rate (U_{mf}); it is however not explained how this measurement corresponds to the mol% or how the two measurements are to be converted. The examples of D11 report that the product is obtained in the form of free flowing spherical particles of size 750-820 µM. It is not stated how this form of the product is attained. There is no disclosure of a pelletisation as required by operative claim 1. The word "pellet" is not employed in D11. Nor is there any statement in D11 that would indicate, even implicitly, that a pelletisation of any type had been carried out.

Consequently D11 does not disclose the required amount of saturated aliphatic hydrocarbon in the reactor, does not disclose a ligand removal step that is separate from the polymerisation step and does not disclose a pelletisation step.

The requirements of Art. 54 EPC are satisfied.

4. Art. 56 EPC

4.1 Closest prior art

The patent in suit relates to a process for producing a polyolefin having a low content of components that might generate odours or might change taste. The polyolefin is intended for food use.

Such a process is known from D10 which according to the decision under appeal and all parties is the closest prior art.

D10 discloses a process for treating polyolefin obtained by the use of a transition metal catalyst, comprising the steps of contacting polyolefin with a ligand decomposer and then heating the polyolefin (claim 1).

According to the first paragraph of the description of D10 it relates in particular to a method of removing residual ligands having cyclopentadienyl skeleton from polyolefins obtained by the use of a transition metal compound containing ligands having cyclopentadienyl skeleton. In the following paragraph reference is made to metallocene catalysts, noting that those exhibit high polymerisation activity and yield polymers with a narrow molecular weight distribution. The "detailed description" of D10 provides further details about the metallocene catalysts employed. This part of D10 corresponds broadly to the teaching in the patent in suit in respect of the catalysts.

D10 does not provide even a general description of the process by which the polymer is made beyond the above indications regarding the catalyst. In the examples of

D10, in which the structure of the ligand is reported, the preparation of the polymer is not discussed. The examples are restricted to the treatment of the polymer, i.e. the ligand decomposition step and two ligand removal steps.

Ligand decomposition is accomplished by exposing the polymer to water vapour-containing nitrogen gas at 80°C for 3 minutes. Alternatively the ligand decomposer is selected from the group of oxygen, alcohol, alkylene oxide, peroxide.

The first ligand removal step is carried out by pelletising the polymer using a twin screw extruder. The second ligand removal step is carried out by exposing the pellets to water vapour containing air for 12 hours at 90°C.

The polymers resulting from the process of D10 are stated to be suitable for use in the field of foods.

The Board is therefore satisfied that D10 represents the closest prior art.

4.2 The problem to be solved

According to paragraph [0007] of the patent in suit the object of the invention was to provide an olefinic polymer having reduced content of components that might generate odours and of components that might change tastes and to provide a process for producing the olefinic polymer.

4.3 The solution to the problem

The problem is solved by a process according to claim

1, comprising a polymerisation step of (co)polymerising olefins with allowing a saturated aliphatic hydrocarbon to exist in a concentration of 2 to 30 mol% in the fluidised bed reactor and ligand removing steps (see recitation of claim 1 above).

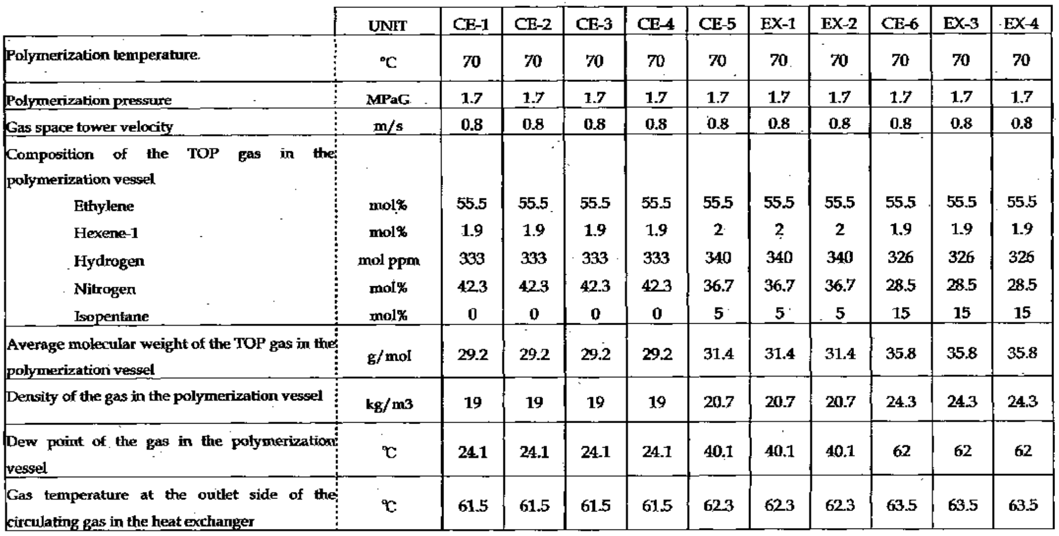
The subject-matter of claim 1 differs from the disclosure of D10 in that the process by which the polymerisation is carried out is defined in particular by the presence of a saturated hydrocarbon in the fluidised bed reactor. As noted above, D10 is silent about the conditions of the polymerisation, beyond specifying the catalyst system to be employed.

4.4 Success of the solution.

4.4.1 The examples of the patent fall into three groups:

- Comparative examples 1-4,
- comparative example 5 and examples 1 and 2 and
- comparative example 6 and examples 3 and 4.

Table 1 of the patent is reproduced below:



	UNIT	CE-1	CE-2	CE-3	CE-4	CE-5	EX-1	EX-2	CE-6	EX-3	EX-4
Polymerization temperature.	°C	70	70	70	70	70	70	70	70	70	70
Polymerization pressure	MPaG	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Gas space tower velocity	m/s	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Composition of the TOP gas in the polymerization vessel											
Ethylene	mol%	55.5	55.5	55.5	55.5	55.5	55.5	55.5	55.5	55.5	55.5
Hexene-1	mol%	1.9	1.9	1.9	1.9	2	2	2	1.9	1.9	1.9
Hydrogen	mol ppm	333	333	333	333	340	340	340	326	326	326
Nitrogen	mol%	42.3	42.3	42.3	42.3	36.7	36.7	36.7	28.5	28.5	28.5
Isopentane	mol%	0	0	0	0	5	5	5	15	15	15
Average molecular weight of the TOP gas in the polymerization vessel	g/mol	29.2	29.2	29.2	29.2	31.4	31.4	31.4	35.8	35.8	35.8
Density of the gas in the polymerization vessel	kg/m3	19	19	19	19	20.7	20.7	20.7	24.3	24.3	24.3
Dew point of the gas in the polymerization vessel	℃	24.1	24.1	24.1	24.1	40.1	40.1	40.1	62	62	62
Gas temperature at the outlet side of the circulating gas in the heat exchanger	℃	61.5	61.5	61.5	61.5	62.3	62.3	62.3	63.5	63.5	63.5

Ratio of the condensed liquid at the outlet side of the circulating gas in the heat exchanger	wt%	0	0	0	0	0	0	0	0	0	0
Supply amount of the prepolymerized catalyst	g/h	58	58	58	58	54	54	54	49	49	49
Polymerized amount	kg/h	100	100	100	100	100	100	100	100	100	100
Polyethylene											
Density	kg/m3	903	904	903	903	902	903	904	901	903	902
MFR	g/10 min	3.7	3.9	3.6	3.8	3.8	3.8	3.5	3.9	3.5	3.4
Retention time	hrs	3	3	3	3	3	3	3	3	3	3
STY	kg/h·m3	100	100	100	100	100	100	100	100	100	100
Catalyst activity	*1	6900	6900	6900	6900	7400	7400	7400	8200	8200	8200
Powder steaming time	min	0	5	5	5	0	5	5	0	5	5
Pellet steaming time	hrs	0	6	12	30	0	6	12	0	6	12
Concentration of the ligand	ppb	10	1	<1	2	10	1	<1	9	1	<1
n-Decane-soluble content	wt%	12.2	11.8	11.1	11.6	8.4	8.1	7.5	2.3	2.2	1.9
Odor	-	×	×	△	○	×	○	◎	×	◎	◎

*1) g-PE/g-Bare Cat.

There are three sets of examples differing from each other in the amount of saturated aliphatic compound present in the reactor, this being 0, 5 or 15 mol%. Furthermore there are differences in the properties and constitution of the gas in the polymerisation vessel and in the supply rate of the catalyst. According to the appellant the reason for those further differences was to ensure that, as far as possible, identical polymers were produced across the examples, despite the difference in the content of saturated aliphatic compound.

The Board observes that all the polymers do indeed have very similar properties. None of the respondents challenged the submission of the appellant regarding the explanation of the differences in the polymerisation process conditions.

Other differences e.g. in the catalyst activity, gas density, dew point and gas temperature at the outlet side would appear to be consequences of the aforementioned distinctions between rather than further independent modifications to the process. No submissions have been made to suggest that this is not the case.

Consequently the Board is satisfied that, the differences in the process conditions notwithstanding, the examples can be fairly compared with each other.

4.4.2 From the examples the following can be determined. Comparative example 2, example 1 and example 3 employ the same post treatment steps. Comparative example 2 does not employ isopentane in the reactor, example 1 employs 5 mol% isopentane and example 3 employs 15 mol% isopentane. The results, in particular the odour reported, show a continuous improvement from X (the worst rating) to open circle (second best rating) and concentric circle (best rating - odour free).

A similar though less pronounced trend can be seen when comparing comparative example 3, example 2 and example 4, both of the inventive examples showing the best odour rating whilst the comparative example has a value corresponding to the second worst of the four ratings.

4.4.3 In the light of that evidence it can be concluded that the problem of providing polymers having a reduced content of odours is effectively solved by the claimed subject matter, in particular the feature of the presence of the saturated aliphatic hydrocarbon in the fluidised bed reaction system.

4.4.4 The respondents objected that none of the examples correctly reflected the teaching of D10 since the polymerisation conditions of D10 had not been shown to have been replicated and furthermore in that the treatment steps employed in the examples of D10 had not been replicated.
Both these observations are correct.

(a) Since the polymerisation conditions employed in D10 are not reported it is inherently not possible to provide a direct comparison with D10 in this respect. The comparative examples of the patent have thus to be regarded as representing some kind of "notional" prior art that is in fact closer to the teaching of the patent than the disclosure of D10. Since these examples and comparative examples differ in one aspect of the process, i.e. the presence of the saturated aliphatic compound, they are appropriate to show an effect compared to D10.

(b) Regarding the treatment conditions, according to the examples of D10 powder steaming was carried out for 3 minutes at 80°C whereas in the examples of the patent 5 minutes at the same temperature were employed. The removal step - pelletisation - was carried out at 180°C in D10 and at 205°C according to the patent.

(c) The distinguishing feature of the claimed subject-matter with respect to D10 resides not in the details of the post-treatment steps but elsewhere, namely in the process by which the polymer was made. It was therefore not necessary for the purposes of demonstrating an effect compared to D10 to replicate precisely the post treatment steps thereof.

(d) The respondents have advanced no evidence that those - relatively minor - differences in the post treatment conditions would materially affect the outcome of the examples or the general conclusions to be reached. Thus it has not been shown that the differences between the conditions employed in the examples of the patent and those in the examples of D10 would be such as to invalidate the results or evidential value of the examples of the patent.

(e) It is correct, as argued by the respondents that the results of D10 already showed optimum odour within the evaluation regime employed. However it does not follow therefrom that there would have been no incentive to attempt to improve on the process of D10 or that the skilled person would not have considered it feasible to attempt to do so. It is a valid, and frequently encountered, phenomenon to attempt to further improve on known products or processes despite these being presented as optimal. The fact that a known prior art process or product might be considered to provide satisfactory or better results does not in itself mean that any further attempt to improve thereon is unfeasible, invalid or inherently incapable of meeting the requirements of inventive step, as the respondents seem to argue. Consequently the argument that the skilled person would have had no incentive, or would consider it unfeasible to improve on the process of D10, is not convincing.

4.5 Obviousness

4.5.1 D10 itself contains no discussion of the process employed for preparing the polymers beyond specifying the type of catalyst system.

4.5.2 Three documents were invoked as rendering the claimed subject-matter obvious.

(a) D3 is directed to a condensed mode process for polymerising olefins in a gas phase fluidised bed reactor. The focus of D3 is on the process conditions i.e. temperature, ratio of monomers, ratio of hydrogen, which it is stated have a great influence on the outcome of the process and the stability of the reactor. In the prior art discussed in D3 said parameters had been subjected to restrictions (col. 2 lines 1-27). The aim of D3 was to provide a process not subject to such limitations, or at least to relax these. The problem was solved, according to D3, by operating the process in the condensed state, having a recycle stream containing a "dew point increasing component". This component can be a saturated aliphatic compound of 3 to 10 carbon atoms, isopentane being explicitly named (D3, col. 7 lines 44-55). D3 is however silent with respect to residual ligand or odour.

(b) D20, presented at a conference, appears to be primarily of promotional/commercial rather than of detailed technical nature. It relates to "super condensed mode" technology in which a gas stream is recycled through the fluidised bed. According to page 68, right hand column the polymers produced are usable for blown and cast stretch films, can liners and heavy duty sacks. It is further stated that metallocene produced polyethylenes have *inter alia* lower extractibles, although it is not stated with respect to which polymers or processes that comparison is made. On page 69, middle column it is stated that the process gives rise to polymers with a narrow molecular weight distribution and a lack of low molecular weight amorphous components. From figure 2 on page 70 it can be learnt that in the process ca 12% isopentane is present in the reactor.

D20 is however silent with respect to odour and contains no explicit reference to food use.

The reference in D20 to the "lack of amorphous low molecular weight waxes" could, as submitted by the respondents, indeed be taken as an indication of a reduction in sources of odour. However this interpretation does not emerge from the disclosure of D20 itself or in association with any of the other prior art documents cited in the opposition and appeal procedure, but rather relies on reading D20 through the lens of the patent in suit, i.e. represents an *ex post facto* assessment.

(c) D24 also relates to a condensed mode polymerisation process carried out in a fluidised bed in the gas phase. Two reactors in series are employed. An aliphatic saturated hydrocarbon is present. The problem that D24 sets out to address (paragraph [0009]) is to avoid blocking of the reactor lines, which it is found can be achieved by the presence of the specified amount of aliphatic compound in the system. D24 relates to LLDPE of narrow molecular weight (paragraph 0005]) and also contains references to high yield/ productivity (paragraphs [0006] and [0047]). However D24 is silent with respect to the content of residual ligand in the resulting polymer, odour or food use.

4.5.3 The emphasis of D3, D20 and D24 is thus on process efficiency or other process related aspects.
None of those documents addresses the question of ligand residue, odour or suitability of the resulting polymers for food use. There is no indication in any of D3, D20 or D24 that would lead the skilled person to

expect that adopting the process conditions of one of these in combination with the process of D10 would result in a process that would yield polyolefins with improved odour or better suitability for food use as compared to those reported in D10. Consequently there would be no reason for the skilled person seeking to solve the problem of improving the process of D10 to produce polymers of lower odour, to consult any of those documents.

4.5.4 Consequently the subject-matter claimed does not emerge in an obvious manner from the state of the art.

4.6 Regarding the "bonus effect" argument of the respondents, it is recalled that this construct applies to the situation where, when something in the terms of the claims would be obvious, any further effect - even if unexpected - would merely be an inevitable outcome of this obvious modification and hence not appropriate to support an inventive step.

As explained in section 4.5 above, the solution to the problem underlying the patent in suit, i.e. the process conditions employed to prepare the olefinic polymer, does not emerge in an obvious manner from the further documents cited. Although, as shown by D3, D20 and D24 it is known to employ e.g. isopentane in the reactor in olefin polymerisation processes, this is in the context of optimising the conduct of the process, e.g. reactor stability (D3, D24). Insofar as advantages with respect to the product are reported, these do not relate to odour either explicitly or implicitly (D20). The conclusion is that in the light of the problem as set out in the patent in suit there is no incentive to apply the process conditions known from D3, D20 or D24 to the process of D10. Consequently the demonstrated improvement in odour does not constitute a "bonus effect" as set out in the case law.

4.7 Regarding the question of the pellet steaming step it is correct, as argued by the respondents, that the data of the patent in suit permit no assessment of the effect or necessity of this. There are no examples that perform only powder steaming but no pellet steaming, notwithstanding that the claim does not require pellet steaming. However the respondents themselves have advanced no evidence to support their position that pellet steaming is essential. By reference to the examples of D10, in particular examples 1 and 2 and comparative example 1, it can be seen that omitting the powder steaming step of duration 3 minutes results in a quantity of residual ligand of 10ppb and the worst possible odour assessment (comparative example 1). Example 1 employs both powder and pellet steaming and yields a product with 1 ppb residual ligand and the best possible odour assessment. Example 2 performs powder steaming but omits the pellet steaming step. There is no change in the content of residual ligand, this remaining at not more than 1 ppb and only a minor worsening in odour of one grade i.e. to the second best of the five levels.

Based on the evidence provided by the examples of D10 it can be concluded that pellet steaming is not essential to achieve the technical effect of reduction of residual ligand and odour identified above but provides merely an optimisation, or in the words of the appellant a "polishing" of the product obtained.

Consequently the absence of a step of pellet steaming from the claim does not give grounds to revise or invalidate the above assessment in respect of inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent in amended form on the basis of the request (claims 1 to 5) filed with the statement setting out the grounds of appeal of 26 November 2010 and after any necessary consequential amendment of the description.

The Registrar: The Chairwoman:

Beschwerdekammern des Europäischen Patentamts ✦ Boards of Appeal of the European Patent Office ✦ Chambres de recours de l'Office européen des brevets

B. ter Heijden B. ter Laan

Decision electronically authenticated