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Datasheet for the decision of 10 April 2018

Case Number: T 1304/15 - 3.3.03

Application Number: 07727030.4

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Title of invention:
POLYETHYLENE IMINE BASED PIGMENT DISPERSANTS

Patent Proprietor:
BASF SE

Opponents:
The Lubrizol Corporation
BYK-Chemie GmbH

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - main request (yes)
Inventive step - main request and auxiliary requests 1 to 4 (no)

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Case Number: T 1304/15 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 10 April 2018

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Respondent: (Opponent 1)	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092-2298 (US)
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Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 22 May 2015 concerning maintenance of the European Patent No. 1999185 in amended form.**

Composition of the Board:

Chairman	D. Semino
Members:	D. Marquis
	C. Brandt

Summary of Facts and Submissions

I. The appeal lies with the decision of the Opposition Division posted on 22 May 2015 concerning the maintenance of the European patent No. 1 999 185 in amended form on the basis of the fourth auxiliary request filed as fifth auxiliary request with letter of 21 August 2013.

II. Two notices of opposition were filed in which revocation of the patent in its entirety was requested.

III. The following documents form part of the decision of the opposition division:
D6: WO 98/19784
D29: Additional tests filed by the patent proprietor on 23 December 2014
D30: Additional tests filed by opponent 1 on 20 February 2015

The decision was based on a main request filed with letter of 21 August 2013, on the first and second auxiliary requests filed as second and third auxiliary requests on 20 February 2015 and on the third and fourth auxiliary requests filed as fourth and fifth auxiliary requests on 21 August 2013.
The relevant claims of these requests were as follows:

Main request

"1. A polyethyleneimine (PEI)-based pigment dispersant of the formula I

$$X-(T)_m-P-(T)_n-H$$

wherein
P is a polyethyleneimine (PEI) backbone;

T is a residue -CO-A-O- wherein A is C_4-C_5 alkylene optionally substituted with C_1-C_6 alkyl with the proviso that each linkage between P and T is an amide bond and each linkage between X and T is an ester bond,
X is a modifier or terminator residue R-CO- wherein R-CO- is a hydroxycarboxylic residue selected from a 12-hydroxystearic acid residue or a polyester residue obtained from polycondensation of 12-hydroxystearic acid;
n, m independently are a number from 1 to 100."

"2. A process to prepare a polyethyleneimine (PEI)-based pigment dispersant of the formula I, as defined in claim 1, characterized by
a) using PEI as macroinitiator to initiate the ring-opening polymerisation of lactones by the primary amines and the secondary amines of PEI to obtain

$$P\text{-}(T)_n\text{-}H$$

b)(trans)esterification of grafting copolymers with the modifier or terminator selected from a 12-hydroxystearic acid, poly(12-hydroxystearic acid) and ester derivatives thereof."

First auxiliary request

The claims of the first auxiliary request differed from the main request in that the product of claim 1 was further characterized by the formulation "wherein the PEI-based pigment dispersant of formula I is obtainable by a process characterized by
a) using PEI as macroinitiator to initiate the ring-opening polymerisation of lactones by the primary amines and the secondary amines of PEI to obtain

$$P\text{-}(T)_n\text{-}H$$

b)(trans)esterification of grafting copolymers with the modifier or terminator selected from a 12-

hydroxystearic acid, poly(12-hydroxystearic acid) and ester derivatives thereof."

Second auxiliary request

The claims of the second auxiliary request differed from the claims of the first auxiliary request in that the product-by-process feature of claim 1 was further characterized by the specification "wherein step a) is followed by step b)" and the deletion of claim 3.

Third auxiliary request

Claim 1 of the third auxiliary request was based on a reformulation of the process of claim 2 of the main request as follows:

"1. A process to prepare a polyethyleneimine (PEI)-based pigment dispersant of the formula I,

$$X-(T)_m-P-(T)_n-H$$

wherein
P is a polyethyleneimine (PEI) backbone;
T is a residue -CO-A-O- wherein A is C_4-C_5 alkylene optionally substituted with C_1-C_6 alkyl with the proviso that each linkage between P and T is an amide bond and each linkage between X and T is an ester bond,
X is a modifier or terminator residue R-CO- wherein R-CO- is a hydroxycarboxylic residue selected from a 12-hydroxystearic acid residue or a polyester residue obtained from polycondensation of 12-hydroxystearic acid;
n, m independently are a number from 1 to 100;
the process being characterized by
a) using PEI as macroinitiator to initiate the ring-opening polymerisation of lactones by the primary amines and the secondary amines of PEI to obtain

$P-(T)_n-H$

b)(trans)esterification of grafting copolymers with the modifier or terminator selected from a 12-hydroxystearic acid, poly(12-hydroxystearic acid) and ester derivatives thereof."

Fourth auxiliary request

The claims of the fourth auxiliary request corresponded to the claims of the third auxiliary request for which the process of claim 1 was further characterized by the specification "wherein step a) is followed by step b)".

IV. As far as relevant to the present decision, the decision of the opposition division can be summarized as follows:

(a) D29 and D30 were admitted into the proceedings because they were prima-facie relevant for the assessment of the inventive step.

(b) The features defining claims 1 and 2 of the main request were only disclosed in isolation and not in combination with one another in D6. A three-fold selection was needed within D6 in order to arrive at the claimed subject matter, the first relating to the presence of a hydrogen as terminating group, the second concerning 12-hydroxystearic acid and the third concerning polyethyleneimine (PEI). For that reason, the main request was novel over D6.

(c) The evidence available on file did not establish the presence of an improvement over the closest prior art D6. In that respect, D29 was not relevant to the single stage process dispersants also disclosed in D6. Thus, starting from D6, the

problem was the provision of further polyethyleneimide (PEI)-based dispersants. As D6 disclosed 12-hydroxystearic acid in a list of terminating groups for dispersants, its use in the preparation of further dispersants was not inventive. Claim 1 of the main request lacked therefore an inventive step. The first and second auxiliary requests lacked an inventive step for the same reasons.

(d) The description of the reaction kinetics provided in the patent in suit made credible that even in a single stage process, step b) of the claimed process occurred at least in part after step a). The process of claim 1 of the third auxiliary request did therefore not exclude a single stage process from the claimed subject matter. Since D6 already taught a single stage process, the third auxiliary request also lacked an inventive step.

(e) Claim 1 of the fourth auxiliary request was directed to a two steps process wherein the terminating group was reacted in the second step. By contrast, D6 taught the use of 12-hydroxystearic acid to initiate the ring opening polymerization of lactones in the first step. The process of claim 1 of auxiliary request 4 was a non obvious alternative over D6.

V. The patent proprietor (appellant I) and opponent 2 (appellant II) lodged an appeal against that decision.

VI. In a communication sent in preparation of the oral proceedings, the Board summarised the points to be dealt with and provided a preliminary view on the disputed issues.

VII. Oral proceedings were held on 10 April 2018.

VIII. The arguments provided by appellant I, as far as relevant to the present decision, can be summarised as follows:

Main request

Novelty in view of D6

(a) D6 did not disclose dispersants having both hydrogen and carboxylic acid groups as terminating groups. That was also reflected in the preparation process described in D6 that differed fundamentally from the process of the patent in suit. Using 12-hydroxystearic acid for the ring opening polymerization of lactones as taught in D6 did not result in a dispersant having 12-hydroxystearic acid residues as end groups. There was also no teaching in D6, in particular regarding the stoichiometry, the use of carboxylic acids and the reaction conditions that could have led to the claimed dispersants. The additional experimental data P-085 and P-086 provided in D30 were not relevant to D6 since the process that had been used to prepare these dispersants did not correspond to the process of D6. A multiple selection within D6 was necessary to arrive at the claimed subject matter. That selection was not taught in D6. The main request was therefore novel over D6.

Inventive step

(b) The dispersants of the main request differed from those of D6 in the presence of two types of

terminating groups, one being hydrogen and the other being derived from 12-hydroxystearic acid. The test report D29 showed that the claimed dispersants had improved rheological properties and led to paints having improved gloss as compared to the dispersants of D6. D6 did not teach dispersants with two different terminating groups as claimed. Even if hydrogen or 12-hydroxystearic acid were mentioned as terminating groups in D6, it was not suggested to use both of them at the same time in a dispersant.

First and second auxiliary requests - Inventive step

(c) The arguments relating to inventive step of the main request also applied to the first and second auxiliary requests. The limitation of claim 1 by features relating to the preparation process of the dispersant was associated with an improvement of the resistance to yellowing of paints obtained from the claimed dispersants. The claims of the first and second auxiliary requests were therefore inventive over D6.

Third and fourth auxiliary requests - Inventive step

(d) D6 remained the closest prior art for the process of claim 1 according to the third and fourth auxiliary requests. The addition of formula I defining the dispersants to the definition of the process implied a specific stoichiometry between polyethyleneimine and 12-hydroxystearic acid that ultimately limited the claimed process. D29 showed that that stoichiometry resulted in a more flexible process. The claims of the third auxiliary request

were therefore inventive over D6.

(e) The claims of the fourth auxiliary request were directed to a two steps process that was not suggested in D6. On that basis, the fourth auxiliary request was inventive over D6.

IX. The arguments of appellant II and of opponent 1 (respondent), as far as relevant to the present decision, can be summarised as follows:

Main request

Novelty in view of D6

(a) D6 disclosed dispersants of a general formula encompassing the claimed products. Since D6 taught the same necessary reactants, terminal groups and reaction conditions as those according to the patent in suit, the dispersants of D6 had to be according to claim 1 of the main request. Moreover, since it had not been shown that the process according to the patent in suit effectively resulted in a dispersant having two types of terminating groups, the presence of these two groups could not constitute a distinguishing feature in view of D6. Regarding the preparation of the dispersants, in particular by way of a single stage process, the teaching of D6 was the same as that of the patent in suit. D30 further established that dispersants obtained by the process according to D6 were identical to the claimed dispersants. In any case, D6 taught the presence of different terminating groups on the dispersant as well. The main request lacked therefore novelty over D6.

Inventive step

(b) D6 was the closest prior art since that document concerned the same technical problem as that of the patent in suit. The evidence on file did not establish that the presence of two different terminating groups on the dispersant had any effect on the properties of the claimed dispersants. The problem that had been solved over D6 was therefore the provision of alternative dispersants. Since D6 already provided a teaching relating to all the claimed features and in particular concerning the terminating groups of the dispersant, the main request lacked an inventive step.

First and second auxiliary requests - Inventive step

(c) Since the data available did not show that the process features introduced in claim 1 of the first and second auxiliary requests resulted in any difference in the product, these request too lacked an inventive step.

Third and fourth auxiliary requests - Inventive step

(d) The process claimed in the third auxiliary request encompassed both methods of preparation of dispersants, the two steps method and the single stage process. The alleged improved properties of the dispersants described in the patent in suit were already taught in D6. The third auxiliary request lacked therefore an inventive step.

(e) The patent in suit taught that the reaction kinetics of the ring opening polymerisation was such that the reaction of lactones with

polyethyleneimine was much faster than the reaction with an acid. Thus, the formulation of the process of claim 1 of the fourth auxiliary request did not exclude a single stage process, since the kinetics of the ring opening polymerisation implied that step b) could still take place after step a). The fourth auxiliary request therefore lacked an inventive step for the same reasons as outlined for the third auxiliary request.

X. Appellant I requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request filed with letter dated 21 August 2013 or, alternatively, on the basis of any of the first or second auxiliary requests (corresponding to the second and third auxiliary requests filed on 20 February 2015) or on the basis of the third or fourth auxiliary requests (corresponding to the fourth and fifth auxiliary requests filed on 21 August 2013).

Appellant II requested that the decision under appeal be set aside and that the European patent No. 1 999 185 be revoked.

The respondent (opponent 1) agreed with the decision of the opposition division regarding the main request and the first to third auxiliary requests as well as with the arguments of appellant II.

Reasons for the Decision

Main request

1. Novelty over D6

1.1 D6 concerns dispersants of general Formula (1) $T-(A)_n(B)_p-Z$ wherein T is hydrogen or a polymerisation terminating group; Z is an acidic or basic group or a moiety containing either an acidic or basic group; A and B are each, independently, oxyalkylene carbonyl groups derivable from δ-valerolactone, ε-caprolactone or alkyl substituted ε-caprolactone provided that both are not ε-caprolactone or δ-valerolactone; n and p are integers; and n + p is from 2 to 100; including salts thereof (page 1, lines 20-31).

1.2 Novelty of the main request was contested in view of the general formula (1) described in pages 1 to 5 of D6. In that respect, it was not argued that D6 contained an explicit disclosure of a dispersant falling under the Formula I of the main request, rather, the question was whether whether the general process for the preparation of the dispersants of D6 implied the presence of two types of terminating groups on the dispersants, one being hydrogen and the other being derived from 12-hydroxystearic acid and, accessorily, whether starting materials described individually in D6 such as polyethyleneimine (page 3, line 28) and 12-hydroxystearic acid (page 4, line 28) could be seen as being disclosed in combination with one another in the preparation of a dispersant.

1.3 According to established case law, a prior art document anticipates the novelty of a claimed subject-matter if the latter is directly and unambiguously derivable from that document, including any features implicit to a person skilled in the art. However, a disclosure can only be considered "implicit" if it is immediately apparent to the skilled person that nothing other than the alleged implicit feature forms part of the subject-matter disclosed (Case Law of the Boards of Appeal, 8th edition, 2016, I.C.4.3, first paragraph). In a case as the present one, in which a method for the production of a product is described in the prior art and a feature of such a product which is of interest for the claim under analysis is not mentioned in the prior art, lack of novelty can only be concluded on application of the general principle if carrying out the process of the prior art inevitably results in a product having the required feature (still Case Law, *supra*, I.C.4.3).

1.4 The passage of the description on pages 1 to 5 of D6 was seen as the most relevant to the question posed.

1.4.1 The first passage on pages 1 and 2 of D6 concerns a general definition of the dispersants of D6 by means of formula (1). The preparation of dispersants is disclosed in general terms in the passage on page 2, lines 17-23. While that passage mentions dispersants having chains ending with hydrogen or a polymerisation terminating groups (group T), it does not disclose the preparation of a dispersant having hydrogen in combination with any other terminating group. Also, that part of D6 does not disclose the use of polyethyleneimine as basic group Z nor that of 12-hydroxystearic as terminating groups T. The passage of D6 concerning the description of the general formula (1) does therefore not anticipate the claimed subject

matter.

1.4.2 Further dispersants according to "the first aspect of the invention" are disclosed in the passage beginning on page 2, line 32 and ending on page 5, line 27 of D6. Regarding their preparation process, the passage on page 4, lines 4-10 essentially teaches that the end group on the chains of these dispersants is hydrogen unless a chain stopper, such as carboxylic acid, was used to control the length of the chains in the course of the preparation. While that passage pertains to both end groups (hydrogen and carboxylic acid residue), it does not disclose the presence of both groups on the same dispersant. The dispersants according to the first aspect of D6 are therefore not according to claim 1 of the main request.

1.5 The test report D30 describing the preparation of the dispersants P-085 and P-086 according to an example of D6 does not alter that conclusion. The dispersants P-085 and P-086 were obtained by way of a two steps process involving polyethyleneimine and 12-hydroxystearic acid. In that respect, it was acknowledged by the parties that the preparations P-085 and P-086 as disclosed in D30 were not disclosed as such in D6, but that these preparations represented fictitious examples based on starting materials selected within the general disclosure of D6. A basis for the selection of these starting materials within the ambit of D6 was however not provided. There is in particular no clear and unmistakable teaching in D6 that would have led to the combination of starting materials and process conditions as disclosed in the preparations P-085 and P-086. Under these circumstances, the dispersants obtained from the preparations P-085 and P-086 according to D30 cannot be

seen as being clearly and directly derivable from D6.

1.6 Claim 1 of the main request is therefore novel over D6.

2. Inventive step in view of D6

2.1 The aim of the patent in suit was to provide dispersants having improved storage stability and improved compatibility in medium polar or non-polar systems as well as showing less yellowing in white pigment formulations and less viscosity of pigment concentrates (paragraphs 7, 41 and 42).

2.2 Document D6 was considered as the closest prior art in the decision under appeal and has been used as such by both parties in their arguments. The Board sees no reason to choose a different approach.

2.3 D6 sets out to provide a new class of dispersants for dispersions and millbases in paints and printing inks (page 1, lines 1-3). The dispersants according to D6 are said to exhibit superior solubility in organic media and improved storage stability, in particular at low temperatures, and, when incorporated into paints and painting inks, give rise to higher gloss readings and lower haze values in the resultant paints and inks (page 15, lines 16-22).

2.4 Refuting the findings of the opposition division, which had concluded that the problem effectively solved by the claimed subject matter was the provision of further PEI-based dispersants (points 3.4.7 of the contested decision), appellant I argued on the basis of the test report D29, that the claimed dispersants, which differed from those of D6 in the presence of at least two poly(oxyalkylenecarbonyl) chains having two

different terminating groups, one being hydrogen and the other being a hydroxycarboxylic residue selected from a 12-hydroxystearic acid residue or a polyester residue obtained from polycondensation of 12-hydroxystearic acid, were shown to have improved rheological properties and resulted in paints having a better gloss.

2.4.1 To that effect, it was referred to dispersant A2, alleged to represent the closest prior art D6, and to dispersants B2 and C2 representing the claimed subject matter. In particular, D29 discloses that dispersant A2 was prepared according to Example 166 of D6 with the exception that 12-hydroxystearic was used instead of ricinoleic acid. Also, dispersants according to the patent in suit were prepared by a two step process (B2) or a single stage process (C2) whereby the same starting materials in about the same relative amounts were used. However, lower amounts of 12-hydroxystearic acid were used for dispersants B2 and C2 as compared to dispersant A2 in order to keep part of the polyester chains terminally unmodified, as required by claim 1 of the main request.

2.4.2 In accordance thereto, table 1 shows that less 12-hydroxystearic acid per part of PEI was used in the preparation of dispersants B2 and C2 (3.9 parts) representing the patent in suit than for dispersant A2 (5.4 parts) representing D6. It was however not shown how the amount of 12-hydroxystearic acid per part of PEI actually relates to the number of terminating groups present on the dispersants. Furthermore, no structural data showing the number of terminating end groups on the dispersants A2, B2 and C2 was provided. Under these circumstances, it cannot be established that the feature distinguishing dispersants B2 and C2

from dispersant A2 is the presence of chains having two different terminating groups, one being hydrogen and the other being a 12-hydroxystearic acid residue. It can not be concluded on the basis of D29 that any effect reported therein is causally linked to the feature allegedly differentiating the claimed dispersants from those according to D6. These effects can therefore not be taken into account for the formulation of the technical problem solved over the closest prior art D6.

2.4.3 Under these circumstances, the technical problem solved by the subject matter claimed in the main request can only be seen as the provision of further PEI-based dispersants.

2.5 The question remaining is whether the skilled person would have considered the dispersants of claim 1 as a solution to the problem posed.

2.5.1 D6 discloses dispersants of general formula (3) (page 3), preferably based on polyethyleneimine (PEI) and that are further defined by having at least two poly(oxyalkylenecarbonyl) chains (q=2 to 2000 on page 3, lines 15-33) terminated by a group T that can be hydrogen or a polymerisation terminating group. That last group may further derive, among others, from 12-hydroxystearic acid (page 4, line 28). These dispersants, which belong to the general disclosure of D6, are characterized by their storage stability, solubility in organic media and optical properties (page 15, lines 16-22). These dispersants of D6 are therefore, as far as their properties are concerned, on a par with the dispersants of the patent in suit (see point 2.1 above).

2.6 With regard to obviousness, the Board cannot follow the argument of the appellant I that D6 would teach the presence of only one terminating end group on a given dispersant. The definition of the dispersants of formula (3) in D6 encompasses dispersants having multiple poly(oxyalckenecarbonyl) chains for which the end groups are not explicitly limited to only one type of terminating groups.

2.7 That is especially the case for the dispersants of the first aspect of D6 (formula (3) on page 3) obtained from a single stage process by reacting polyallylamine or PAI, polymerisation terminating agent and lactone(s) as defined on page 5, lines 10-17 and analogous to the one pot process of the patent in suit. In that respect, the passage only mentioning hydrogen as the end group T of dispersants of the first aspect of D6 is not relevant to the disclosure of the single stage preparation process, since that passage only concerns the preparation of dispersants by the two stage process whereby a TPOAC acid of Formula 4 is reacted with polyallylamine or a PAI (page 4, lines 8-10).

2.8 In view of the teaching of D6 regarding the properties of the dispersants of that document (see point 2.5.1 above), the skilled person, aiming at providing further PEI-based dispersants, would have considered the claimed dispersants of the main request which are not disclosed as such in the document, but fall under its general disclosure as an obvious solution to the problem posed. Therefore the claim 1 of the main request does not involve an inventive step.

First and second auxiliary requests

3. Independent claim 1 of the first auxiliary request differs from that of the main request by the characterization of the claimed PEI-based dispersant by features relating to its process of preparation. In order to be patentable however, it must be shown that the claimed product as such differs from known products by virtue of the method of preparation and is inventive on its own due to these differences. In that respect, appellant I argued on the basis of paragraphs 40 and 42 of the patent in suit that the process features as defined in claim 1 resulted in a general improvement of the process and in paints having improved resistance to yellowing.

3.1 With regard to the resistance to yellowing briefly mentioned in paragraph 42 of the patent in suit, appellant I did not provide any evidence that such an improvement was the result of the process features now part of claim 1 of the first auxiliary request. The data contained in D29 describing the preparation of dispersants according to D6 (A2) and the patent in suit (B2 and C2) cannot establish the presence of an effect causally linked to the claimed process features added to claim 1, since the dispersants were prepared under different conditions, in particular different amounts of 12-hydroxystearic acid (see point 2.4.2 above). That effect can therefore not be taken into account to identify a difference in the product and for the definition of the technical problem solved by the claimed subject matter.

3.2 Under these circumstances, it was not shown that the dispersants obtained from the process features defining claim 1 of the first auxiliary request were different

from those of the main request and solved a different technical problem than that already defined for the main request in a non obvious way. Claim 1 of the first auxiliary request lacks therefore an inventive step over D6 for the same reasons as detailed for the main request.

4. The same applies to independent claim 1 of the second auxiliary request, which differs from claim 1 of the first auxiliary request only in that the process is characterized such that "step a) is followed by step b)". That formulation added to claim 1 does not constitute a limitation of the process since step a) can only be followed by step b) anyway as the (trans)esterification of the grafting copolymers with the modifier or terminator defined in step b) can only be performed once at least some amount of copolymer has been produced in step a). Also, it has not been shown that the fact that step a) is followed by step b) results in any particular difference in the claimed dispersant. Claim 1 of the second auxiliary request lacks therefore an inventive step for the same reasons as the first auxiliary request.

Third and fourth auxiliary requests

5. Claim 1 of the third auxiliary request corresponds to the process of claim 2 of the main request. That claim was also edited to contain the definition of formula I as it was defined in claim 1 of the main request.

5.1 While the preparation process of the product of formula I is defined by a step a) and a step b) in claim 1, it is clear from the patent in suit (paragraph 27), that that process can be carried out as a one pot process. In that regard, paragraph 40 of the

patent in suit teaches that a one pot process is advantageous to prepare dispersants of formula I since the amine-initiated ring-opening polymerisation kinetics, as taking place between the PEI and the lactone(s) in step a) is very much faster than the acid initiated polymerisation that may occur once the modifier or terminator is added in step b). The kinetics of the amine-initiated ring-opening polymerisation between the polyethyleneimime (PEI) and the lactones in the presence of the modifier or terminator derived from 12-hydroxystearic acid is more importantly the sole process parameter that appears to be critical to the one pot process of the patent in suit.

5.2 Among the processes for the preparation of the dispersants of formula (3) disclosed in D6 (first aspect of the invention) is a single stage process characterized by reacting polyallylamine or a PAI with a lactone(s) in the presence of a polymerisation terminating compound (page 3, lines 33-35) that is analogous to the one pot process described in the patent in suit. Document D6 was considered as the closest prior art for that process claim by both parties. The Board sees no reason to choose a different approach.

5.3 The claimed process differs from the process of D6 in that specific reacting components, polyethyleneimine as the PAI, as well as 12-hydroxysteric acid as the terminating group, were chosen among the reactants disclosed in D6 (polyethyleneimine on page 3, line 28 and 12-hydroxysteric acid on page 4, line 28) and that the product obtained contains two end groups being hydrogen and a residue of 12-hydroxycarboxylic acid. In addition, no other difference can be identified between

the processes according to D6 and those described in the patent in suit. The reaction temperatures (150-180°C on page 5, line 17 of D6; 100-200°C in paragraph 30 of the patent in suit), the inert gas atmosphere (page 5, line 7 of D6; paragraph 30 of the patent in suit), the (trans)esterification catalysts (page 5, lines 12-15 of D6; paragraph 31 of the patent in suit) and the lactones (page 2, lines 10-16 of D6; paragraph 14 of the patent in suit) disclosed in these two documents all concur with one another. The ratio of polyethyleneimine to 12-hydroxysteric acid, contrary to the argument of appellant I, cannot be seen as a distinguishing feature of the claimed process since that ratio is not part of the claimed subject matter and is not even mentioned in the patent in suit.

5.4 No evidence was provided to show that the choice of the specific combination of reacting components defining formula I of the dispersants implies as such a difference in the claimed process over D6 for a one pot process. Also, it was not shown that the presence of two different end groups on the product resulting from the process of claim 1 implied a difference as to how that process was run. With respect to the flexibility of the claimed one pot process, no evidence was provided to show that the effect claimed by appellant I has been achieved by means of the selection of 12-hydroxysteric acid. As to the test report D29, while effects were shown for dispersant C2 prepared by a one pot process of the patent in suit, these effects cannot be attributed to the distinguishing feature over D6 since dispersant A2 was not prepared by a similar one pot process but by a two step process. Under these circumstances, the problem solved by claim 1 of the third auxiliary request over D6 can only be seen in the provision of a further process for the preparation of

PEI-based dispersants.

5.5 D6 already provided a number of solutions for that problem, including the selection of polyethyleneimine and 12-hydroxystearic acid. As far as the difference in the product is concerned, the same reasons as detailed for the main request apply to the third auxiliary request. The selection performed within the ambit of D6 is therefore not inventive. Finally, the argument of appellant I that document D6, and in particular the passage on page 5, lines 18-20, would teach away from the claimed process cannot be followed by the Board. While it is true that the cited passage of D6 suggests that a two stage process is preferred over a single stage process, that as such is not relevant to the question posed, which relates to to the selection of specific reacting components already disclosed in D6, a one pot process being in any case explicitly disclosed therein.

5.6 On that basis, it is concluded that the process of claim 1 of the third auxiliary request does not involve an inventive step.

6. Claim 1 of the fourth auxiliary request corresponds to the process of claim 1 of the third auxiliary request to which the formulation "wherein step a) is followed by step b)" has been added.

6.1 That feature however still does not exclude one pot processes from the claimed subject matter. Step b) of the claimed process is a step of (trans)esterification of grafting copolymers with a modifier or terminator. There is no doubt that the grafting copolymers mentioned in step b) are the copolymers of formula P-$(T)_n$-H produced in step a). Under these circumstances,

the definitions of the steps a) and b) in claim 1 already implies that step a) must be followed by step b), since the (trans)esterification can only be performed once at least some of the copolymers has been produced in step a). Even in the case of a one pot process conducted in the presence of polyethyleneimine, lactone(s) and 12-hydroxystearic acid, copolymers described in step a) will be formed before the (trans)esterification with the acid can occur as the result of the faster kinetics of the amine-initiated ring-opening polymerisation, as acknowledged in paragraph 40 of the patent in suit.

6.2 Thus, the amendment introduced in claim 1 relating to steps a) and b) is not seen as a limitation excluding one pot processes from the claimed subject matter and as such that amendment cannot change the analysis of inventive step provided for the third auxiliary request. In conclusion, claim 1 of the fourth auxiliary request lacks an inventive steps for the same reasons as outlined for the third auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. European patent No. 1999185 is revoked.

The Registrar: The Chairman:

L. Stridde D. Semino

Decision electronically authenticated