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**Datasheet for the decision
of 6 March 2008**

Case Number: T 1453/05 - 3.3.03

Application Number: 96906946.7

Publication Number: 0818506

IPC: C08L 27/18

Language of the proceedings: EN

Title of invention:

Aqueous polytetrafluoroethylene dispersion composition and use thereof

Patentee:

DAIKIN INDUSTRIES, LIMITED

Former Opponents:

Ausimont S.p.A.
Dyneon LLC

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56, 83, 123(2)

Relevant legal provisions (EPC 1973):

-

Keyword:

"Main request, First Auxiliary Request - novelty (no)"
"Second, Third Auxiliary Requests - added subject-matter (yes)"
"Fourth Auxiliary Request- novelty (yes)"
"Fourth Auxiliary Request - inventive step (yes) "

Decisions cited:

T 0201/83, T 0267/91, T 0064/03

Catchword:

-



Case Number: T 1453/05 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 6 March 2008

Appellant:

(Patent Proprietor)

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office dated 5 August 2005 and
posted 19 September 2005 revoking European
patent No. 0818506 pursuant to
Article 102(1) EPC.

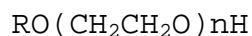
Composition of the Board:

Chairman: R. Young
Members: M. C. Gordon
H. Preglau

Summary of Facts and Submissions

- I. Mention of the grant of European patent No. 0 818 506 in respect of European patent application No. 96906946.7 in the name of Daikin Industries, Limited, was announced on 31 May 2000 (Bulletin 2000/22) on the basis of 5 claims. Independent claim 1 read as follows:

"An aqueous polytetrafluoroethylene dispersion composition characterized in that the composition comprises 30 to 65 wt. % of polytetrafluoroethylene and a polyoxyethylene alkyl ether in an amount of 2 to 10 wt. % based on the polytetrafluoroethylene, the polyoxyethylene alkyl ether being represented by the formula



wherein R is a saturated or unsaturated hydrocarbon group having 8 to 18 carbon atoms, and n is 5 to 18, having a cloud point of over 45 °C to not higher than 85 °C and containing 65 to 70 wt. % of ethylene oxide in the molecule."

Claim 2 was a dependent claim directed to a preferred embodiment of the subject matter of claim 1.

Claim 3 was directed to an article prepared by coating a base material with a dispersion composition as defined in claim 1.

Claim 4 was directed to a binder for batteries comprising a dispersion composition as defined in claim 1.

Claim 5 was directed to a coating composition comprising a dispersion composition as defined in claim 1 and a pigment etc. admixed therewith.

II. Notices of Opposition, requesting revocation of the patent in its entirety on the grounds of Art. 100(a) EPC (lack of novelty, lack of inventive step) were filed on 23 February 2001 by Ausimont S.p.A (Opponent I) and on 27 February 2001 by Dyneon LLC (Opponent II). The opponents cited inter alia the following documents in the course of the opposition proceedings:

- D1: US-A-3 704 272 (corresponding to JP-B-21532/1977);
- D7: US-A-4 369 266;
- D11: Technical Brochure "Genapol X-080" by Clariant (10.1998) and
- D14c: Technical Brochure "Genapol X-080" by Clariant Italia, 1991

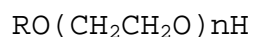
III. By a decision announced orally on 29 October 2002 and issued in writing on 14 November 2002 the opposition division revoked the patent on the grounds pursuant to Art. 83/100(b) EPC. These grounds had however not been invoked in either of the notices of opposition. The patentee appealed against this decision (notice of appeal filed on 10 January 2003). In decision T 64/03 of 1 February 2005 (not published in the OJ EPO) the Board of Appeal held that the procedure adopted by the opposition division had been flawed with the consequence that the decision did not fulfil the requirements of Art. 113(1) EPC (T 64/03 reasons 2.7 and 2.8). Specifically it was held that the separate steps of:

- deciding on the admissibility of said new ground of opposition (Art. 83/100(b) EPC) and
- deciding on the substantive merits of the objection raised under this new ground

had been "telescoped" into a single step. Thus the patentee had not been informed - in advance of the decision revoking the patent on the grounds of Art. 83/100(b) EPC - that this ground had been admitted into the proceedings. Accordingly the patentee had been *de facto* denied an opportunity - separately from the discussion of the admissibility of the new ground - to present comments on the substantive merits thereof or even to indicate if he was in a position to do so (T 64/03, Reasons 2.2-2.4).

Accordingly the decision of the opposition division was set aside and the case remitted to the opposition division for further prosecution on the basis of the set of claims filed as the auxiliary request at the oral proceedings before the Board. This set of claims corresponded to the claims as originally filed and granted with the differences that in claim 1 the wording "characterized in that the composition comprises" had been replaced by "which comprises" and further in that the alternative that the R group could be an unsaturated radical had been deleted (cf T 64/03, Reasons 3.8). Accordingly claim 1 of this request read as follows:

"An aqueous polytetrafluoroethylene dispersion composition which comprises 30 to 65 wt.% of polytetrafluoroethylene and a polyoxyethylene alkyl ether in an amount of 2 to 10 wt.% based on the polytetrafluoroethylene, the polyoxyethylene alkyl ether being represented by the formula



wherein R is a saturated hydrocarbon group having 8 to 18 carbon atoms, and n is 5 to 18, having a cloud point of over 45 °C to not higher than 85 °C and containing 65 to 70 wt.% of ethylene oxide in the molecule."

In a second decision dated 5 August 2005 and issued in writing on 19 September 2005 the opposition division again revoked the patent.

The decision was based on a main request and an auxiliary request, both filed with a letter dated 10 June 2005, and each consisting of 5 claims.

The main request was the set of claims constituting the auxiliary request considered in decision T 64/03 and on the basis of which the case was remitted to the opposition division (see above).

Claim 1 of the auxiliary request differed from claim 1 of the main request in that the content of ethylene oxide was specified as being from 65.5 to 70 wt. %.

Claims 2-5 of the main and auxiliary requests corresponded to claims 2-5 of the patent as granted.

- (a) The decision held that the amended claims met the requirements of Art. 84 and 123 EPC.
- (b) With respect to Art. 83 (cf discussion of the first decision of the opposition division resulting in T 64/03 above) it was held that the cloud point of the surfactant represented an essential feature, as evidenced by the examples and comparative examples.

After reassessment and after consideration of new facts submitted during the appeal procedure and during the oral proceedings before the opposition division on 5 August 2005 and with reference to the corresponding case law T 267/91 (28 April 1993, not published in the OJ EPO) the opposition division held that there was sufficient disclosure of the invention. In particular the opposition division was convinced that the cloud point was a parameter which was known and usual in the art at

the priority date of the patent in suit and which could be determined by known methods. Accordingly the findings of T 172/99 (7 March 2002, not published in the OJ EPO) relating to the determination of an unfamiliar parameter (invoked by the opponents) was not applicable.

The surfactant could also comprise at least two components as set out at page 3 line 41 of the patent specification. Taking into account the patentee's confirmation, the experimental data of the patent and the information of D1, col. 2 lines 57-60 it was held that the skilled reader would have realised that the cloud point of such a surfactant system could, and in fact had been, determined by calculation. It was also held that there was no doubt that the cloud point had been measured with neat substances including e.g. commercially available products as supplied by the manufacturers.

With regard to the method for determining the cloud point it was held that whilst the opposed patent did not provide an explicit teaching of the method to be employed the skilled person would have employed the method of D1.

This document was cited in several passages of the patent in suit, and was identified as being the starting point of the invention, reference being made to paragraph [0007] of the patent in suit. The skilled person would be unequivocally guided by the reference to D1 to use said method rather than other known methods for determining the cloud point.

This conclusion was supported by reference to point 2 of the reasons of the aforementioned

T 267/91 according to which a simple cross reference to a prior art method might be sufficient for the required enablement. There was held to be perfect coincidence between the present case and that underlying T 267/91. In both cases the general, and crucial question was whether the skilled reader might find sufficient information in the patent specification in order properly to perform the measurement of a parameter, which requirement was held to be fulfilled by the full contents of the patent in suit.

With regard to an objection that the composition of comparative example 5 would satisfy all features of claim 1, but would not solve the problem underlying the patent in suit, it was held that this example did fall within the scope of the claims. The final ethylene content of 70.5 wt. % was the result of the addition of a "surfactant for adjustment". The surfactant first added - the "surfactant for concentration" met all features of claim 1. The wording of operative claim 1 was not restricted to a surfactant concentrate, and did not exclude the presence of a second surfactant for adjustment, reference being made to the presence of the term "comprising" in the claim. Thus it was held that the designation of this example as "comparative" was incorrect.

In this connection the patentee had submitted at the oral proceedings (minutes of the oral proceedings before the opposition division, page 4 3rd paragraph) that comparative example 5 did not fall within the scope of the claims as the average ethylene oxide content (i.e. the average of the two surfactants) was higher than the maximum of

70% permitted by the operative claims. In this context reference had been made to the above indicated passage of D1 (col. 2 lines 57-60) concerning the averaging out of the cloud points. In any case, comparative example 5 was of no relevancy for the discussion of enablement (minutes of the oral proceedings before the opposition division, page 5, 6th sentence).

- (c) With regard to novelty it was held that the subject matter of claim 1 of both the main and first auxiliary requests was anticipated by the disclosure of example 4 of D7.

In particular the opposition division held that the cloud point of the surfactant employed in the composition of example 4 of D7, ("Genapol X-080") when measured in accordance with the method of D1 would be within the claimed range.

With regard to the content of ethylene oxide in the surfactant, it was held that the value of n being "about 8" reported in technical brochures D11 and D14c was approximate. It was further held to be reasonable to assume a margin of error of 5% in this value, which would result in it encompassing a range of 7.6 to 8.4. At the upper limit the content of ethylene oxide would be within the claimed range.

- (d) Accordingly the patent was revoked.

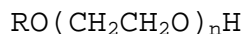
IV. A notice of appeal against this decision was filed on 23 November 2005, the requisite fee being paid on the same day.

V. The statement of grounds of appeal was filed by the patentee, now the appellant on 27 January 2006.

The two requests as considered by the opposition division in their second decision were maintained as the main request and auxiliary request 1 (see section III above). Two further sets of claims forming auxiliary requests 2 and 3 were submitted. Auxiliary request 2 is not relevant for the present decision.

Auxiliary request 3 consisted of a single claim directed to a process and read as follows:

"A process for preparing an aqueous polytetrafluoroethylene dispersion comprising heating an aqueous polytetrafluoroethylene dispersion in the presence of a polyoxyethylene alkyl ether represented by the formula



wherein R is a saturated hydrocarbon group having 8 to 18 carbon atoms, and n is 5 to 18, having a cloud point of over 45°C to not higher than 85°C and containing 65 to 70 wt.% of ethylene oxide in the molecule, to separate the dispersion into two layers and obtain a concentrated aqueous dispersion containing 30 to 65 wt.% of polytetrafluoroethylene, and optionally, adding to the concentrated aqueous dispersion further polyoxyethylene alkyl ether to adjust the amount of polyoxyethylene alkyl ether to 2 to 10 wt.%, based on the polytetrafluoroethylene". With respect to the objection of lack of novelty in view of the disclosure of D7, it was submitted that "Genapol X-080" was not a surfactant according to operative claim 1 of either request since the content of EtO units of 63.8 wt.% fell outside the range of 65 to 70 wt.% of operative claim 1. It was submitted that the variabilities assumed by the opposition division in

reaching its conclusion had no basis in the prior art (see section III.(c) above).

Calculations were provided for the EtO content to demonstrate that even if arbitrary assumptions were applied and the explicit disclosure of D7 thus distorted, it still would not be concluded that example 4 of D7 anticipated the subject matter of operative claim 1. Specifically it was shown that assuming a value of 8.4 for n would result in an EtO content of 64.9 wt,% which was outside the range of 65-70 wt.% required by the claim. Further an experimental report was submitted showing that the cloud point of "Genapol X-080" fell outside the claimed range.

VI. Rejoinders were filed on 12 July 2006 by opponent II - now respondent II and on 27 July 2006 by opponent I - now respondent I.

(a) With respect to Art. 83 EPC it was submitted that the cloud point was an essential feature of the invention. Due to the absence of sufficient precise information regarding the measurement of the cloud point it was impossible to determine with certainty whether a particular compound would yield the effect. It was referred to the fact that a number of methods existed in the prior art which, as demonstrated by evidence submitted by both the appellant and the respondents, critically influenced the value that will be obtained. Thus a surfactant could be determined by one method to have a cloud point as being within the specified range, and hence on this basis would be expected to yield the required technical effect. However since the determination of the cloud point was dependent on the method employed, if this

parameter had been determined by an incorrect method the correct cloud point - as would have been determined applying the missing information on the precise measurement - might be outside the scope of the claim and thus the purported technical effect would not be found even though the cloud point had been determined as being within the scope of the claim.

With respect to mixtures of surfactants, it was submitted that there was no disclosure in the patent in suit as to how this was to be determined. The reference to D1 did not address this as D1 did not disclose that in the case of mixtures the cloud point was to be determined by calculation using the cloud points of the individual surfactants. All that D1 taught was that the cloud points of the surfactants averaged out. It did not disclose what this average was or how it could be calculated.

With regard to the status of comparative example 5, the respondent I submitted that this was a comparative example.

- (b) Objections of lack of novelty with respect to the disclosure of D7, example 4 were maintained, respondent I submitting supporting experimental data giving cloud point data for Genapol X-080.

VII. With a letter dated 24 January 2007 the respondent OII withdrew its opposition.

VIII. The Board issued on 25 October 2007 a summons to attend oral proceedings.

IX. In a letter dated 31 January 2008 the appellant submitted:

(a) With respect to Art. 83 EPC and the determination of the cloud point that the method of D1 was the correct one to use.

With respect to comparative example 5 it was submitted that the question of whether this example fell inside or outside claim 1 was irrelevant for the questions of novelty and sufficiency at issue. Nevertheless, this example explicitly stated that the ethylene oxide content of the surfactant mixture was 70.5% which was outside the claimed range, reference being made to the statement of respondent I (see section VI.(a) above).

(b) With respect to the objection of lack of novelty with respect to example 4 of D7 it was submitted that the surfactants to be employed in accordance with the invention were limited not only in respect of their ethylene oxide content but also in respect of their cloud point, which established a distinction with respect to "Genapol X-080" employed in the cited example of D7. A further experimental report was submitted in support of this contention.

X. In a letter dated 6 February 2008 the respondent OI maintained its objections with respect to Art. 83 EPC in view of the determination of the cloud point. The objection of lack of novelty with respect to example 4 of D7 was maintained. An objection was also raised with respect to example 21 of D7. Further, an objection of lack of novelty in respect of the third part of example 1 of D1 was raised. This

example had been invoked against novelty during the opposition procedure by OI (letter of 28 August 2002) and a response thereto filed by the patentee (letter of 25 October 2002), but had played no further role in the procedure to date.

XI. With a letter dated 5 March 2008 the respondent OI withdrew its opposition.

XII. Oral proceedings before the Board took place on 6 March 2008 attended only by the appellant.

(a) The Board indicated, with reference to the reasoning of the opposition division (see section III.(b) above), that it was satisfied that the patent in suit met the requirements of Art. 83 EPC.

(b) With regard to the construction of the claims, in particular in the light of the objections raised with respect to the status of comparative example 5 (see sections III.(b), VI.(a) and IX.(a) above) the appellant submitted that although the operative claims defined a specific polyether of defined ethylene oxide content and cloud point in practice it was often necessary to employ mixtures of such compounds. The chain length of the polyethers varied in production giving a Gaussian distribution. This variation also occurred on a batch to batch basis for nominally the same surfactant as was demonstrated by example 1 and comparative example 3 of the patent in suit. Both employed as the surfactant "Dispanol TOC", however from different batches, one having a EtO content of 8.5 wt. %, the other a content of 8.3 wt. %. This variation occurred also with respect to the cloud point. Simple arithmetic averaging was

employed to arrive at the desired EtO content. This was however not possible with the cloud point. This had to be determined experimentally and could not be determined by calculation.

It was submitted with respect to comparative example 5 that it was the average properties of the final dispersion which were important. In the case of comparative example 5 these were outside the scope of the claim. Thus this example was correctly designated as comparative.

- (c) With respect to the objection of lack of novelty over D1 (see section X above) the Board noted that this had already been the subject of discussion during the part of the opposition procedure prior to issue of decision T 64/03 and referred to the exchanges in the written opposition procedure. The Board further observed, as explained by the appellant in respect of the submissions on the use of mixtures of surfactants (see section XII.(b) above) that the claim was not limited to a single surfactant but was directed to a collective of surfactants, the average properties of which were specified in the claim. Since the average properties of the surfactants employed in the cited example of D1 met the corresponding requirements of operative claim 1, the Board came to the conclusion that this objection was supported by the facts with the consequence that the subject matter claimed lacked novelty.
- (d) The appellant submitted an amended set of claims forming a main request and replacing that previously filed (see sections III and V above), claim 1 of which had been modified with the

intention of limiting the polyethers to those of the formula of specified in the claim.

Claim 1 of this request differed from claim 1 of the previous main request in that the first part (i.e. that prior to the formula of the polyoxyethylene alkyl ether) had been amended to read as follows, the amendments compared to the former claim being indicated in **bold**:

"1. An aqueous polytetrafluoroethylene dispersion composition which comprises 30 to 65 wt.% of polytetrafluoroethylene and **one or more** polyoxyethylene alkyl ethers in an amount of 2 to 10 wt.%, based on the polytetrafluoroethylene, the polyoxyethylene alkyl ethers being represented by the formula..."

The basis for this claim in the application, reference being made to the A-publication, was stated to be page 3 lines 38-41.

It was submitted that this claim required that each and every polyoxyethylene alkyl ether present fell within the specified formula, i.e. all had to meet the ethylene oxide content and cloud point requirements. Hence the claim excluded the presence of any polyoxyethylene alkyl ethers which did not meet these conditions. It was submitted that this restriction arose due to the use of the term "being" which was considered to exclude the "averaging" of properties of polyethers which singly did not meet the requirements of the claim (see submission of the appellant in respect to comparative example 5 reported in section XII.(b) above).

In this context it was proposed to delete example 3 which employed two polyethers, one of

which was outside the scope of the claim, although the averaged properties of the mixture of polyethers were within the scope claimed.

It was submitted that this approach did not amount to a reinterpretation of the invention, but was merely a limitation which had a basis in paragraphs [0014] and [0016] of the patent.

As a consequence it was submitted that the subject matter of this claim was not anticipated by the cited example 1 of D1 since this included a polyoxyethylene alkyl ether which did not meet the requirements specified in the claim.

The Board indicated that it did not consider that the claim could be interpreted as petitioned by the appellant, in particular since - contrary to the submission of the appellant - the wording thereof did not exclude the averaging of the properties of surfactants. This had the consequence that the anticipation by the disclosure of D1, example 1 had not been overcome.

(e) Following a further break the appellant submitted sets of claims forming auxiliary requests 1 to 4.

(i) The first part of claim 1 of auxiliary request 1 differed from that of claim 1 of the main request, the deletions being indicated by ~~striketrough~~ and additions in **bold** and read as follows:

"An aqueous polytetrafluoroethylene dispersion composition which comprises 30 to 65 wt.% of polytetrafluoroethylene and ~~one or more polyoxyethylene alkyl ethers~~ a **surfactant** in an amount of 2 to 10 wt.%, based on the polytetrafluoroethylene ~~the~~ characterized in that the surfactant

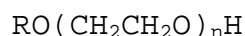
consists of one or at least two polyoxyethylene alkyl ethers ~~being~~ represented by the formula.."

The appellant submitted that a basis for this claim was to be found at page 3 lines 30, 38 and 47 of the A-publication.

- (ii) Auxiliary request 2 consisted of a single claim directed to a process. This claim differed from the third auxiliary request submitted with the statement of grounds of appeal (see section V above) in that the final phrase read as follows, the amendment compared to the former third auxiliary request being indicated in **bold**:
- "...optionally, adding to the concentrated aqueous dispersion further polyoxyethylene alkyl ether **as defined above** to adjust the amount of polyoxyethylene alkyl ether to 2 to 10 wt.% based on the polyfluoroethylene". The basis for this claim was submitted to be the aforementioned page 3 lines 19-22 and page 4 lines 13-15 of the A-publication.
- (iii) Auxiliary request 3 was identical to the auxiliary request 3 as submitted with the statement of grounds of appeal (see section V above).
- It was submitted that the basis for this claim was in the examples, and page 3 lines 20-22 and 38-40 of the A-publication; it was however acknowledged that the claim might need to be redrafted.

(iv) Auxiliary request 4 consisted of a single claim and read as follows:

"A process for preparing an aqueous polytetrafluoroethylene dispersion comprising heating an aqueous polytetrafluoroethylene dispersion in the presence of a polyoxyethylene alkyl ether represented by the formula



wherein R is a saturated hydrocarbon group having 8 to 18 carbon atoms, and n is 5 to 18, having a cloud point of over 45°C to not higher than 85°C and containing 65 to 70 wt.% of ethylene oxide in the molecule, to separate the dispersion into two layers and obtain a concentrated aqueous dispersion containing 30 to 65 wt.% of polytetrafluoroethylene, and 2 to 10 wt.%, based on the polytetrafluoroethylene, of polyoxyethylene alkyl ether."

It was submitted that the basis for this claim was at page 3 lines 28-40 of the A-publication.

- (f) Following debate, the Board indicated that the newly filed first auxiliary request was open to the same objection of lack of novelty as the main request (see section XII.(d) above).
- (g) With respect to the second and third auxiliary requests, following an invitation of the Board for the appellant to indicate the basis in the application as filed, for the feature that a further amount of the **same** surfactant was to be added, the appellant submitted that all examples involved the addition of a further quantity of

surfactant. The feature that the surfactant to be added in a second step was identical to the surfactant defined in the first part of the claim was simply a limitation which had a basis in the application as filed. The Board however considered that there was no basis for this limitation in the application as filed, with the consequence that the second and third auxiliary requests did not meet the requirements of Art. 123(2) EPC.

- (h) With respect to the fourth auxiliary request the Board found that this met the requirements of Art. 123(2) EPC.

The appellant submitted that the process of D1 involved adding a surfactant with a very low cloud point and then adding a second surfactant with a higher EtO content and cloud point.

The disadvantage of using the surfactant with low cloud point was that the suspension was opaque even at room temperature and it was difficult to carry out the separation of the PTFE layer and the supernatant, as the interface was difficult to identify.

It had been shown that the polyether specified according to the fourth auxiliary request had specific utility in the preparation of batteries and the impregnation of fibrous materials. It had also been shown that at an EtO content below 65 wt.% a high viscosity was obtained, as in D1, which was a disadvantage.

A content of EtO above 70 wt.% led to hydrophilicity which caused problems of cissing (blistering) especially in multilayer constructions.

Thus the EtO content and cloud point specified exerted an influence both on the process and on the resulting product.

D7 related to a different concentration process using semipermeable membranes and was not comparable to the process specified in the fourth auxiliary request.

Examples 1 and 2 compared with comparative example 3 of the patent in suit illustrated the benefits of the invention.

In this connection it was stated that the patent in suit contained a translation error since in the examples the content of surfactant should be based on the content of PTFE, as specified in the claim, not on the dispersion as a whole.

Comparative example 5 was outside the scope of the claims as the second surfactant did not meet the requirements specified in claim 1.

- (i) Following deliberation the Board announced the conclusion that:
- the main request and first auxiliary request did not meet the requirements of Art. 54 EPC;
 - the second and third auxiliary requests did not meet the requirements of Art. 123(2) EPC.
- The fourth auxiliary request was held to meet the requirements of Art. 54, 84 and 123(2) EPC. The Board also considered that this subject matter met the requirements of Art. 56 EPC.

XIII. The appellant (patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or the first to fourth auxiliary requests, all requests filed during the oral proceedings. As a further auxiliary

request remittal to the first instance for examination of inventive step was requested.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request - Art. 83 EPC*

Claim 1 of the main request defines the subject matter *inter alia* in terms of the cloud point of the surfactant (see sections I, III and XII.(d) above).

2.1 The description of the patent does not contain any explicit description of a method for determining this parameter - this fact is not in dispute.

In the section entitled "Background Art" of the patent in suit reference is made to the Japanese equivalent of D1. As stated in paragraph [0004] of the patent in suit, D1 relates to dispersions of polytetrafluoroethylene in which a polyoxyethylene alkyl ether is used. The dispersions of D1 are discussed in detail starting at paragraph [0006] of the patent in suit. The teachings of D1 are further discussed in paragraph [0007] of the patent in suit where it is stated *inter alia* that the invention of D1 was characterised by using as surfactants two kinds of polyoxyethylene alkyl ethers, i.e. one having a cloud point of up to 45°C and the other having a cloud point of at least 10°C higher than the former and not lower than 50°C.

In the section of the patent in suit entitled "Disclosure of the Invention" in paragraph [0019] the cloud point of the surfactant employed is discussed, and is taught to be "an important factor". In this context reference is again made to the teaching of D1

and the cloud points of the surfactants employed therein. In the following paragraph [0020] it is disclosed that the cloud point of the first surfactant described in D1 is "approximate to room temperature and too low..".

In paragraph [0021] of the patent the selection of a surfactant having a cloud point in the range specified in operative claim 1 is emphasised and in paragraph [0022] it is stated "Thus the invention provides an aqueous polytetrafluoroethylene dispersion...by a method **which basically differs from the method disclosed in [D1].**" (emphasis of the Board).

2.2 It is thus apparent from the indicated passages that the starting point of the invention of the patent in suit is D1. The essential point of difference - according to the discussion in the patent - is the nature of the surfactant, and the cloud point of the surfactant is placed at the centre of the invention and of the distinction with respect to D1. In these circumstances the Board is satisfied - in the absence of any statement to the contrary - that the "cloud point" referred to in the patent in suit is to be understood in the same terms as that disclosed in D1.

2.3 Regarding the method of determination thereof, since the skilled person would understand the cloud point to be that disclosed in D1 it would, in the absence of any indication to the contrary, likewise be understood that the cloud point was to be determined in the same manner as disclosed in D1 (cf point 2 of the reasons of T 267/91, cited in section III.(b) above).

2.4 Accordingly the Board can only concur with the conclusion of the opposition division, (see section III.(b) above) that the skilled person would have been guided by the reference to D1 to employ the

method therein disclosed for determining the cloud point in the patent in suit.

2.5 Regarding the question of determination of the cloud point in the case of mixtures, this matter is also explicitly addressed in D1. At col. 2 lines 56-60 it is disclosed that the cloud points of a mixture of compounds of different cloud points average out. In the light of this disclosure the Board is satisfied that the cloud point of mixtures can be determined, and hence that this aspect of the invention is sufficiently disclosed.

2.6 An objection was raised pursuant to Art. 83 EPC relating to the status of comparative example 5 (see sections III.(b), VI.(a), IX.(a), and XII.(b) above). In essence, it was argued that the composition of comparative example 5 fell within the scope of the claims yet failed to provide the required result. This issue was originally raised with respect to an objection pursuant to Art. 56 EPC (OII Notice of Opposition section III.B.1). The Board is of the view that this objection does in fact properly belong with a consideration of inventive step, not of sufficiency, in particular since the opponents have not shown that there would be any particular difficulty in repeating comparative example 5 of the patent in suit. Further the operative claims do not rely on any particular technical effect for the definition of the subject matter thereof. Accordingly the status of comparative example 5 does not give rise to any objection pursuant to Art. 83 EPC.

2.7 Hence the main request meets the requirements of Art. 83 EPC.

3. *Main Request - Construction of the claims.*

Claim 1 of the main request is directed to a dispersion which **comprises** *inter alia* "one or more polyoxyethylene alkyl ethers" in a specified amount, which are **represented** by a generalised formula (emphasis of the Board).

3.1 The use of the term "**comprises**" indicates that the named components must be mandatorily present, but does not restrict the composition to these, i.e. other, unnamed components may be present, including components belonging to the same classes as those components explicitly defined. Further the specified contents of polytetrafluoroethylene (30 to 65 wt.%) and polyoxyethylene alkyl ethers (2 to 10 wt.%) represent restrictions only insofar as the defined lower limits are concerned. The upper limits do not result in limitations since a composition with a total content of e.g. 20 wt.% of the polyoxyethylene ether still "comprises" 2 to 10 wt.% of said component.

3.2 The polyoxyethylene ether is defined as being **represented** by a **generalised** formula. The consequence of this is, in particular that it is not required that either of the indices R or n - which are both defined as lying within specified ranges - are to be limited to a single value. Further it is not specified that the index n can only assume integral values. Accordingly this formula does not define a single, specific molecule but is an average formula, i.e. defines a collective of compounds, which are **represented** by said **generalised** formula, and thus which collective of compounds jointly, i.e. on average:

- fall within the specified formula (indices R and n);
- are present in the specified amount and

- exhibit the required cloud point.

The requirement that the collective of molecules be **represented** by said formula has the consequence that it is not required that any of the polyoxyethylene ether molecules present individually lies within the terms of the formula. On the contrary the claim permits the presence exclusively of molecules none of which - alone - falls within the limits disclosed. It is only required that the collective, average properties of this collective of molecules comply with the specified parameters.

Further, due to the presence of the term "comprises" it is not even necessary that the entirety of the molecules collectively average out to the indicated formula. On the contrary it is permissible to select from within the totality of molecules physically present a subset thereof which collectively - on average - satisfies the requirements specified in the claim, other molecules present thus being disregarded.

3.3 This interpretation is consistent with statements made by the appellant/patentee during the opposition procedure. It was confirmed in the response to the notices of opposition (letter of 15 October 2001, page 8, section 5.4 2nd paragraph, in connection with the status of the above mentioned comparative example 5) that the claim covered using mixtures of polyoxyethylene alkyl ethers which **on average** had cloud points and ethylene oxide contents within the claimed ranges (emphasis of the Board). In this respect reference was made to example 3 of the patent in suit which employs two polyoxyethylene alkyl ethers, one of which is within the claimed scope, the other of which is not. The properties of these two however average out to the specified values. In making this submission, the

appellant/patentee also invoked the above referenced statement in D1 at col. 2 lines 56-60 concerning averaging out of the cloud points. This argument with relation to the status of comparative example 5 was reiterated during the oral proceedings before the opposition division (see section III.(b) above).

- 3.4 This interpretation is not changed by the presence of the term "being", as was submitted by the appellant at the oral proceedings before the Board (see section XII.(d) above). The claim specifies that the polyoxyethylene alkyl ethers are "being represented" by the said formula. This wording does not require that the formula precisely and exactly reproduce the structure of the compounds present but that it defines in a general manner - representatively - the permissible structure thereof. As this is however a generalised, average formula, for the reasons explained above, it is not required that each and every, or indeed any, molecule present falls within the scope of the stated formula, as long as a subset of the molecules present collectively satisfies the requirement of "being represented" by said formula. thereof. Accordingly the addition of the word "being" does not result in the claim being limited only to molecules which individually fall within the defined formula.
- 3.5 The consequences of the foregoing is thus that claim 1 requires the presence of components which - on average - exhibit the properties specified. The claim however does not require that any of the components present individually exhibit the specified properties. Further the claim does not require that **all** the components present in a given prior art disclosure on average, i.e. taken together as a totality exhibit the specified

properties. On the contrary the phrase "which comprises" in claim 1 means that it is permissible, when assessing whether a given disclosure falls within the scope of the claim, to consider whether a notional subset of the components thereof exhibits - jointly and collectively - the required properties, other components present in the composition of the prior art thus being disregarded.

4. *Main request- Art. 123(2) and (3) EPC*

4.1 Claim 1 of the main request differs from claim 1 as granted in that it is specified that "one or more" polyoxyethylene alkyl ethers are present. This feature is disclosed at page 3 line 38 of the A-publication, corresponding to page 6 lines 15 and 16 of the A-publication) where it is stated that "one or at least two surfactants of the type described are usable" (Art. 123(2) EPC).
Since the term "a polyoxyethylene alkyl ether" as employed in the operative claim relates to a plurality of compounds (see discussion of the construction of the claims above), it is apparent that claim 1 as granted encompassed within its scope also a plurality of such compounds, i.e. "one or more". Accordingly the scope of the amended claim is not extended compared to claim 1 as granted (Art. 123(3) EPC).

4.2 Claim 1 of the main request further differs from claim 1 of the patent as granted in that the group R is restricted to one of the two alternatives originally disclosed in claim 1 of the application as filed, i.e. to being a saturated hydrocarbon group, the alternative "unsaturated" having been deleted.

4.3 Accordingly claim 1 of the main request meets the requirements of Art. 123(2) EPC.

4.4 Neither of these amendments results in an extension of the scope of the claim as compared to the patent as granted. Accordingly the requirements of Art. 123(3) EPC are likewise satisfied.

4.5 Claims 2-5 of the main request are identical to claims 2-5 of the application as originally filed and as granted.

4.6 Accordingly the main request meets the requirements of Art. 123(2) and (3) EPC.

5. *Main request - Art. 54 EPC*

5.1 *D1*

As reported in section X above, an objection of lack of novelty was raised with respect to the disclosure of D1, in particular the third part of example 1 thereof, which objection had originally been raised during the first instance proceedings.

5.1.1 According to claim 1 of D1 there is disclosed a process for concentrating an aqueous dispersion of polytetrafluoroethylene particles involving adding sufficient polyoxyethylated aliphatic alcohol having a cloud point of no greater than 45°C to the dispersion. Following adjustment of the pH to at least 8 the dispersion is heated at a temperature of no greater than 45°C to form two layers. The layers are separated and to the bottom layer is added a stabilizing amount of an polyoxyethylene alkyl ether having a cloud point of at least 10°C greater than the first surfactant and at least 50°C.

According to example 1 of D1 a starting aqueous dispersion of negatively charged polytetrafluoroethylene particles - the preparation of which is not described - containing 35 wt.% of polymer solids based on the weight of the dispersion was

employed. To this dispersion was added initially a surfactant having, in the notation employed in D1, the formula $\text{CH}_3(\text{CH}_2)_m\text{CH}_2(\text{OCH}_2\text{CH}_2)_3\text{OH}$ wherein m was 4 to 6, having a cloud point of 38°C ("Plurafac A-16") (n.b. D1 employed the index "n" however in order to avoid ambiguity with respect to the index "n" of the operative claims of the patent in suit the Board has employed the index "m" in the discussion of this component of D1.) The general concentration procedure - according to example 1 of D1 - involved the addition of 8 % (based on the weight of polymer solids) of this non-ionic surfactant to the dispersion and sufficient ammonium hydroxide to adjust the pH of the dispersion from a starting pH of about 3 to a pH of about 10. The resultant dispersion was stirred with mild agitation for several minutes and then heated to 35°C , followed by siphoning off of the resultant clear supernatant layer. The time between the beginning of heating after stirring and the measurement of the extent of concentration was 30 minutes. The percent solids of the concentrated dispersion was 62 % based on the weight of the concentrated dispersion and the surfactant content ("Plurafac A-16") was 3 %. According to the final part of example 1 of D1 (starting at col. 5 line 22), to 100ml of this dispersion was added 3 % by weight of a surfactant having, according in the notation employed in D1, the formula $\text{CH}_3(\text{CH}_2)_8\text{CH}_2(\text{OCH}_2\text{CH}_2)_{10-11}\text{OH}$, and having a cloud point of 97.5°C .

- 5.1.2 It is apparent from the text preceding example 1 of D1 (D1, col. 4 lines 56, 57) that the percentages referred to were by weight. Accordingly the final dispersion contained equal parts by weight of the two surfactants. The proportions of polymer and surfactants in the final dispersion can be calculated as follows:

To the 100 parts of the initial dispersion - containing 3 parts by weight of "Plurafac A-16", and 62 weight percent of solids (i.e. polytetrafluoroethylene) was added 3 wt.% of the second surfactant.

Thus the total weight of this dispersion was 103 parts of which $62/103 = 60.2$ wt.% was the PTFE and each surfactant made up 2.9 wt.%, i.e. a total surfactant content of 5.8 wt.%.

Thus the content of PTFE and polyoxyethylene alkyl ethers present in this composition of D1 are within the scope of the corresponding features of operative claim 1 (see sections III.(b) and XII.(d) above).

5.1.3 The cloud points of the two polyoxyethylene alkyl ethers were, as reported above, 38°C and 97.5°C respectively. In view of the teaching of D1, col. 2 lines 56-60, that the cloud point of mixtures averages out it can be calculated that the cloud point of the mixture of surfactants was 67.8°C.

This value is within the range of over 45°C to not higher than 85°C specified in operative claim 1.

5.1.4 It will be noted that D1 and the patent in suit employ different formats for the presentation of the formulae of the surfactants - compare the claims as granted reported in section I above and the report of the formulae as presented in D1 in section 5.1.1 above. Accordingly in order to carry out a comparison of the structures of the surfactants employed in the D1 and those specified according to the operative claims, it is necessary to convert these to the format employed in the operative claims.

This transcription of the formulae as disclosed in D1 yields the following:

For "Plurafac A-16": $\text{CH}_3(\text{CH}_2)_m\text{CH}_2\text{O}(\text{CH}_2\text{CH}_2\text{O})_3\text{H}$

The second surfactant added: $\text{CH}_3(\text{CH}_2)_8\text{CH}_2\text{O}(\text{CH}_2\text{CH}_2\text{O})_{10-11}\text{H}$.

5.1.5 The average length of the hydrocarbon group R and the average value of the index n, according to the notation employed in operative claim 1 can be calculated for each of the surfactants of Example 1, third part of D1 as follows:

For "Plurafac A-16" the group R contains from 6 to 8 carbon atoms, i.e. for $m=4$ the saturated alkoxy group will be $\text{CH}_3(\text{CH}_2)_5\text{O}-$, and for $m=6$ the saturated alkyl group will be $\text{CH}_3(\text{CH}_2)_7\text{O}-$.

The molecule contains 3 ethyleneoxy units, i.e. the index n according to the operative claims is 3.

Accordingly the molecular weight and wt% of ethylene oxide in the molecules covered by this formula can be calculated to be:

m	Mol. Wt RO	Mol. wt EtO	Mol. wt molecule	Wt% EtO
4	101	132	234	56.4
6	129	132	262	50.4

In the second (unnamed) polyoxyethylene alkyl ether the RO group is $\text{CH}_3(\text{CH}_2)_8(\text{CH}_2)\text{O}$ i.e. the R group has 10 carbon atoms, and the EtO group is $(\text{CH}_2\text{CH}_2\text{O})_{10-11}$.

Performing a similar calculation to that reported above gives the following results:

n	Mol. wt RO	Mol. Wt EtO	Mol. Wt Molecule	Wt% EtO
10	157	440	589	73.6
11	157	484	642	75.3

Based on these values it is thus possible to calculate the average ethylene content in the blend of surfactants present in the composition of the example:

	2nd surfactant n=10	2nd surfactant n=11
Plurafac A-16 m=4	$(56.41+73.58)/2=65.0$	$(56.41+75.3)/2=65.9$
Plurafac A-16 m=6	$(50.38+73.58)/2=61.98$	$(50.38+75.3)/2=62.84$

From the foregoing calculations it is apparent that in the case of the explicitly disclosed value of m=4 for the first surfactant - "Plurafac A-16" - the average content of ethylene oxide in the mixture of polyoxyethylene alkyl ethers will be within the range specified in claim 1, i.e. from 65 to 70 wt%.

The average length of the group R in this combination is 8 (6 carbon atoms in Plurafac A-16 and 10 in the second surfactant). This value is within the range specified in operative claim 1.

The average value of the index n, i.e. the number of ethylene oxide groups, is 6.5 (3 in Plurafac A-16 and 10 in the second surfactant). This is within the range specified in operative claim 1.

5.1.6 Accordingly the cited example of D1 discloses a aqueous polytetrafluoroethylene composition which comprises:

- 60.19 wt% of polytetrafluoroethylene,
- 5.8 wt% of a polyoxyethylene alkyl ether having, on average:
 - a "R" group having 8 carbon atoms;
 - a value of n of 6.5;
 - 65.0 or 65.9 wt.% of ethylene oxide in the molecule.

- A cloud point of 67.8°C.

It is true that there is no single polyoxyethylene alkyl ether compound which, on its own meets all the requirements of the operative claim. However, as explained in section 3 above, it is the average properties of the surfactant which are significant. As demonstrated by the foregoing, the average properties of two of the explicitly disclosed embodiments of D1 example 1 do fall within the scope of operative claim 1.

5.1.7 Therefore the subject matter of claim 1 of the main request is anticipated by the disclosure of the third part of example 1 of D1 and consequently does not meet the requirements of Art. 54 EPC.

5.2 The main request is therefore refused.

6. *First auxiliary request- Art 123(2)and (3) EPC.*

6.1 Claim 1 of the first auxiliary request differs from claim 1 of the main request by designating the polyoxyethylene alkyl ether as a "surfactant" and in that the phrase "characterized in that the surfactant consists of one or at least two" is inserted before the definition of the polyoxyethylene alkyl ether (See section XII.(e).(i) above).

6.2 As noted in respect of the main request it is disclosed at page 3 line 38 of the A-publication that "one or at least two surfactants of the type described are usable". Thus the application as filed defines the polyoxyethylene alkyl ethers as being "surfactants" and also discloses that one or more thereof may be present.

6.3 Accordingly claim 1 of the first auxiliary request meets the requirements of Art. 123(2) EPC.

6.4 For the reasons explained in section 4.1 this amendment also meets the requirements of Art. 123(3) EPC.

6.5 Claims 2-5 of the first auxiliary request are identical to claims 2-5 of the application as originally filed.

6.6 Accordingly the first auxiliary request meets the requirements of Art. 123(2) and (3) EPC.

7. *First auxiliary request - Art 54 EPC*

7.1 Claim 1 of the first auxiliary request retains the term "comprises", which as explained in section 3 above constitutes a restriction insofar as it makes mandatory the presence of compounds meeting the indicated requirements, but does not exclude the presence of any other materials, even of the same class.

Further, as in the case of the main request, the surfactant is required to be "represented" by a formula which is a generalised - average - formula. Thus, for the reasons set out in section 3, and in particular section 3.4 above, claim 1 of the first auxiliary request does not even require that there be present any molecule which - singly - meets all the parameters specified for the "surfactant", but only requires that the totality of the molecules present, or a subset thereof on average satisfies these requirements.

7.2 Accordingly the scope of claim 1 of the first auxiliary request is identical to that of claim 1 of the main request, and lacks novelty for the same reasons (see section 5 above).

7.3 Claim 1 of the first auxiliary request therefore does not meet the requirements of Art. 54 EPC.

7.4 The first auxiliary request is therefore refused.

8. *Second auxiliary request - Art. 123(2) EPC*

This request consists of a single claim directed to a process (see section XII.(e).(ii) above).

8.1 There no claim corresponding to this in the application as originally filed or in the patent as granted.

8.2 The disclosure of the application with respect to the method commences at page 3 lines 19-22 of the A-publication (corresponding to page 5 lines 11-17 of the application as filed). This passage discloses that the aqueous polytetrafluoroethylene dispersion is heated in the presence of the "surfactant specified above", i.e. the surfactant as defined in claim 1 of the application as filed and thereby separated into two layers to obtain the desired concentrated dispersion.

According to page 3 line 38 of the A-publication (corresponding to page 6 lines 15-16 of the application as filed) "one or at least two surfactants of the type described are usable". However this passage does not relate to the sequence in which the "at least two" surfactants are added. In particular this does not disclose that the second surfactant "of the type described" is to be added to the **concentrated** dispersion (emphasis of the Board).

Accordingly the description of the application as filed does not disclose the addition to the concentrated dispersion of a second quantity of a polyoxyethylene alkyl ether meeting the requirements specified in the claim of the second auxiliary request.

8.3 It is also the case that such a requirement is not derivable - even implicitly - from the examples of the application as filed.

Example 3, which is indicated to be according to the invention employs two surfactants the second of which is added to the concentrated dispersion. This second

surfactant however does not correspond to the requirements set out in the claim since it has a cloud point of 98°C, and an ethylene oxide content of 76 wt. %.

8.4 According to the appellant (see section XII.(e).(ii) above) the basis for this claim in the application as filed was to be found at the aforementioned page 3 lines 19-22 and page 4 lines 13-15 (corresponding to page 8 line 24 to page 9 line 1 of the application as filed).

The first of the referenced passages - discussed in section 8.2 above - discloses that the dispersion is heated in the presence of the surfactant (defined by the formula indicated above), and thus separated into two layers.

The second passage referred to (page 4 lines 13-15) teaches that the use of the specified polyoxyethylene alkyl ether provides a dispersion "having relatively high storage stability" without the need to add the "latter" surfactant, or with only a small amount of the "latter" surfactant. The antecedent for the term "latter" is to be found in the first two paragraphs on page 4 of the A-publication (corresponding to the paragraph bridging pages 7 and 8 of the application as filed) in which passage the teaching of D1 is discussed. The first surfactant ("former") discussed in these passages is that with a low cloud point (30°C to 45°C). The second surfactant discussed in these paragraphs ("latter") is the surfactant of "high cloud point". This passage thus relates to the optional addition of the second polyoxyethylene alkyl ether as defined in D1 to the concentrated dispersion.

8.5 The claim of the second auxiliary request however specifies that the second surfactant added is "as

- defined above", i.e. meets the requirements specified for the first surfactant, defined *inter alia* by the structural formula and the defined cloud point.
- 8.6 The passages indicated by the respondent do not however define these requirements. The only property of the surfactants which is defined in any direct and unambiguous way by reference to D1 is the cloud point which, being a minimum of 50°C with no upper limit is not identical to that specified for the first mentioned surfactant in operative claim 1 of the second auxiliary request (cloud point 45°C to 85°C). The further properties of the surfactant as specified in the operative claim are not disclosed in D1.
- 8.7 Accordingly there is no basis in the application as filed for the feature that a further polyoxyalkylene ether, which corresponds to the definition specified in the claim, is added to the concentrated dispersion.
- 8.8 Therefore the sole claim of the second auxiliary request does not meet the requirements of Art. 123(2) EPC.
- 8.9 The second auxiliary request is therefore refused.
9. *Third auxiliary request - Art 123(2) EPC.*
The third auxiliary request corresponds to the third auxiliary request as submitted with the statement of grounds of appeal (see sections V and XII.(e).(iii) above).
The sole claim of this request differs from that of the second auxiliary request in that the properties of the further polyoxyethylene alkyl ether added to the concentrated dispersion are not specified.
- 9.1 According to the respondent the basis for this claim is to be found at page 3 lines 20-22 and 38-40 of the A-publication (section XII.(e).(iii) above),

corresponding to page 5 lines 11-17 and page 6 lines 15-19 of the application as filed.

The first of these passages specifies that the dispersion is heated in the presence of the surfactant (defined by the formula indicated above), and thus separated into two layers.

The second of the passages referred to discloses that one or at least two of the surfactants "of the type described" are usable, that "When the aqueous dispersion is concentrated by the method described, the surfactant becomes incorporated in the resulting concentrate in an amount of at least 2%". The following sentence (page 3 lines 40-42 of the A-publication) discloses that a content of surfactant of more than 10 wt.% produces an undesired result.

This passage however does not relate to the addition of a quantity of surfactant to the **concentrated** dispersion. On the contrary the wording "When the aqueous dispersion is concentrated.." renders it unambiguous that this disclosure relates to addition of the surfactant **prior** to the concentration of the dispersion.

9.2 Therefore the passage relied upon by the respondent, does not disclose a process according to which a quantity of a polyoxyethylene alkyl ether is added to a concentrated dispersion of polytetrafluoroethylene, but on the contrary explicitly and exclusively discloses addition of surfactant to dispersions prior to concentration.

Consequently there is no basis in the general description for the amendment according to which further polyoxyethylene alkyl ether is added to the concentrated dispersion.

9.3 Although examples 1-4 of the application as filed disclose addition of further surfactant to the

concentrated dispersion, in each case this is to specific first and second surfactants each of which is added in a specific amount to result in a specific final solids content and surfactant content. It has not been shown that the specific amounts and combinations of surfactants used in the procedures of these examples are not, or not closely linked to the other parameters of the examples in such a way as to determine the effect thereof in a unique manner or to a significant degree (following T 201/83, OJ EPO 1984, 481). Thus these - specific - examples cannot provide a basis for the generality of the indicated feature of the claim of the third auxiliary request.

9.4 Accordingly the third auxiliary request does not meet the requirements of Art. 123(2) EPC.

9.5 The third auxiliary request is therefore refused.

10. *Fourth auxiliary request- Art 123(2) and (3) EPC*

The sole claim of auxiliary request 4 relates to a process. This claim specifies the final concentration of polyoxyethylene alkyl ether but does not define an addition of a second portion thereof (see section XII.(e).(iv) above).

10.1 The process for preparation of the dispersions is discussed in the A-publication at page 3 lines 19 - 22 (application as filed page 5 lines 11-17) where it is disclosed that the aqueous polytetrafluoroethylene dispersion is heated in the presence of the surfactant, and thereby separated into two layers to obtain the dispersion containing 30 to 65 wt. % of polytetrafluoroethylene. The surfactant is defined at page 3 lines 11-16 and lines 30-35 of the A-publication, corresponding to page 4 line 27 to page 5 line 6 and page 6 line 4 to line 10 of the application as filed.

At page 3 line 11 of the A-publication application (page 4 line 2 of the application as filed) it is disclosed that the resulting dispersion contains 2 to 10 wt. %, based on the polytetrafluoroethylene of the polyoxyethylene alkyl ether.

Accordingly the subject matter of the sole claim of the fourth auxiliary request is disclosed in the application as filed.

The fourth auxiliary request thus meets the requirements of Art. 123(2) EPC.

10.2 The patent as granted contained only claims directed to products. These claims contained no restriction as to the process in which the products were prepared, i.e. the products defined by the claims of the patent as granted could be prepared by any process.

The sole claim of the fourth auxiliary request is however directed to a single specific process for preparing said products.

Accordingly the scope of this claim is not extended compared to the claims of the patent as granted.

The fourth auxiliary request thus meets the requirements of Art. 123(3) EPC.

11. *Fourth auxiliary request - Art. 54 EPC*

11.1 As noted in section 5.1.1 above, example 1 of D1 discloses adding to the dispersion, prior to concentration, a surfactant ("Plurafac A-16") which has a cloud point of 38°C which is below the minimum specified in the operative claim of the fourth auxiliary request. Further, as explained in section 5.1.5 above this surfactant does not exhibit the required content of ethylene oxide.

Whilst it is true that according to claim 1 of D1 the first added surfactant can have a cloud point of no

greater than 45°C which is adjacent to the lower value of "over 45°C" required by the operative claim, there is no disclosure in D1 of a cloud point value higher than 45°C in combination with a surfactant having the required content of EtO.

Accordingly D1 does not disclose a concentration process in which a surfactant as specified in the claim of the fourth auxiliary request is employed.

Therefore the disclosure of D1 does not anticipate the subject matter of the claim of the fourth auxiliary request.

- 11.2 An objection of lack of novelty was also raised during the opposition procedure with respect to D7 (see sections III.(c), V, VI.(b), IX.(b), X and XII(h) above).

D7 relates, according to claim 1, to a process for concentrating a colloidal dispersion of a fluorinated polymer which contains at least one fluorine containing emulsifier.

The process of D7 involves circulating the fluorinated polymer dispersion, after addition of a stabilizing emulsifier (0.5 to 12 wt.%) over units of semipermeable ultrafiltration membranes, conveying the dispersion in circulation with pumps, thus separating the dispersion into a fluorinated polymer dispersion concentrate and an aqueous permeate and recovering the emulsifiers from said aqueous permeate (D7, column 2, lines 32-51). The examples of D7 illustrate such a process.

In the introductory part of D7, there is a reference to a process of concentration of fluorinated polymers involving addition of a non-ionic surfactant, resulting in separation of a concentrated phase which is then decanted (column 1 lines 42-47). However this

discussion discloses neither the nature of the surfactant to employ, nor the amounts thereof. Accordingly neither the description nor the examples of D7 disclose a process as defined in the operative claim.

11.3 The subject matter of the fourth auxiliary request is therefore novel (Art. 54 EPC).

12. Fourth auxiliary request - Art. 56 EPC

12.1 *The patent in suit - the technical problem*

According to paragraph [0001] the patent in suit relates to a composition which is an aqueous polytetrafluoroethylene dispersion as concentrated and the use thereof. Such dispersions are employed *inter alia* for coating fibrous base materials, as a battery binder and as a material for coating compositions. According to paragraph [0002] the concentration of aqueous polytetrafluoroethylene dispersions by adding a surfactant, heating to form a transparent aqueous solution as an upper layer and to concentrate polymer particles as contained in a lower aqueous layer and removing the upper layer by decantation was already known.

The known concentrated dispersions have many problems as regards the application of impregnating fibrous base materials:

- thermal decomposition of the surfactant during the impregnating-baking step forming harmful aromatic compounds;
- partial thermal decomposition of the surfactant to produce tar like substances which accumulate on the inner wall of the baking apparatus;
- the surfactant, which is difficult to thermally decompose or dissipate, partly remains in the fibrous base material after baking, assuming a

brown colour, seriously impairing the hand of the impregnated material;

- carbonisation of the remaining portion of the surfactant results in impaired electric properties when the impregnated material is used in preparing circuit boards.

In paragraph [0004] of the patent in suit, reference is made to D1 as providing one solution to these problems. Specifically it is disclosed that D1 employs polyoxyethylene alkyl ethers which are lower than polyoxyethylene alkyl phenyl ethers in decomposition temperature and hence readily dissipate on thermal decomposition, in many cases are less likely to remain in polymers, and form films which are advantageous in yellow index.

According to paragraph [0005] of the patent in suit, polyoxyethylene alkyl ethers which contain no benzene ring do not convert to harmful organic compounds. It is further taught that aqueous polytetrafluoroethylene dispersions comprising a polyoxyethylene alkyl ether have various advantages yet are not in wide use because in the field of fibrous base materials impregnated with aqueous polytetrafluoroethylene dispersions - wherein the dispersion is used most frequently - the following properties are required of the dispersion:

- the dispersion is stabilized in viscosity; and low in viscosity-temperature dependence;
- low viscosity at room temperature (10 to 30 cp) and smoothly penetrates the fibrous base materials;
- when the dispersion is repeatedly applied in layers the coating remains free of cissing or coagulation.

It is noted in paragraph [0006] that D1 does not discuss such impregnation. It is further noted in paragraph [0007] that the invention of D1 was characterised by the use of two surfactants of differing cloud points (cf section 5.1.1 above). Thus the technical problem is defined in the patent in suit (paragraph [0008]) as being to provide an aqueous polyoxyethylene alkyl ether dispersion composition having excellent impregnation properties, releasing no harmful aromatic compounds and less likely to cause pollution. Further objects are to provide a coated product diminished in the amount of residual surfactant and having a high degree of whiteness and excellent electrical properties (paragraph [0009]). A further object is to provide a binder for use in batteries which is excellent in electric characteristics, or a coating composition for giving a clear colour of high lightness (paragraph [0010]).

The examples of the patent in suit, in particular those summarised in Table 5 show that when a polyoxyethylene alkyl ether surfactant meeting the requirements of the operative claim is employed a dispersion is obtained which exhibits good coating properties and whiteness. When a surfactant was employed which did not meet the specifications of the operative claim, in particular in terms of the cloud point and the ethylene oxide content, various disadvantages such as impossibility of concentrating the dispersion, poor coating properties or poor whiteness arose.

12.2 *The closest prior art.*

By common consent, D1, which is consistently presented in the patent as being the starting point for the invention is considered to represent the closest prior art.

In particular, as noted in section 5.1.1 above, D1 example 1 relates to a process in which the surfactant used had a cloud point of 38°C which is well below the lower limit in the operative claim. D1 does not however disclose the use of the dispersions for impregnation. Accordingly there is no discussion in D1 of properties relevant to this use, e.g. cissing,

12.3 *The objective technical problem, its solution*

Reference to the comparative examples of the patent in suit, especially comparative examples 2 and 3 shows that the use of polytetrafluoroethylene compositions made with a surfactant having a cloud point lying much closer to the claimed range than that exemplified in example 1 of D1, namely 40°C (comparative example 2) and 44.5°C (comparative example 3) produces results far inferior to those obtained using compositions made according to the operative claims, yielding dispersions with unsatisfactory properties. Specifically, the composition of comparative example 2 exhibited an excessively high viscosity and deposited an increased amount of resin by a single application, resulting in mud cracks and faults in the coating (see also the aforementioned Table 5 of the patent in suit). In the case of comparative example 3 a high viscosity/temperature dependence was observed, meaning that the dispersion was not suitable for impregnation. In contrast thereto the examples according to the invention, employing a surfactant meeting the requirements of the claim exhibited none of these deficiencies and had good coating properties. In the light of this evidence the technical problems as set out in paragraphs [0008]-[0010] of the patent in suit can be adopted as the objective technical problem. Furthermore it is, in the light of the above, credible

that the measures proposed according to the operative claim of replacing the particular surfactant of cloud point 38°C exemplified in D1 by a surfactant having a cloud point of over 45°C to not higher than 85°C and conforming to the definition in that claim provides an effective solution to the objective technical problem.

12.4 *Obviousness*

There is no suggestion in D1 - express or implied - to employ in the concentration step as the surfactant a polyoxyethylene alkyl ether represented by the formula and having the properties specified in the operative claim for any reason, let alone in order to solve the objective technical problem underlying the patent in suit.

Neither is the Board aware of any other document which would render it obvious to make the necessary modification to the teaching of D1.

Accordingly it is concluded that the subject matter of the sole claim of the fourth auxiliary request is not obvious.

12.5 The subject matter of the claim of the fourth auxiliary request thus meets the requirements of Art. 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The main, first, second and third auxiliary requests filed during the oral proceedings are refused.
3. The case is remitted to the first instance with the order to maintain the patent on the basis of the fourth auxiliary request (one claim) filed during the oral proceedings and after any necessary consequential amendment of the description and the drawing.

The Registrar:

The chairman:

E. Görgmaier

R. Young