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**DECISION**  
of 14 January 2004

**Case Number:** T 0782/01 - 3.3.3  
**Application Number:** 91306441.6  
**Publication Number:** 0467646  
**IPC:** C08F 285/00  
**Language of the proceedings:** EN

**Title of invention:**

Multi-shell emulsion particle and process of preparing same

**Patentee:**

Mitsui Chemicals. Inc.

**Opponent:**

Rohm and Haas Company European Operations and Patent  
Department

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 54, 56, 83

**Keyword:**

"Disclosure - enabling - undue burden (main request)"  
"Disclosure - enabling (yes) (auxiliary request)"  
"Novelty - combination of features (yes)"  
"Inventive step (yes)"

**Decisions cited:**

T 0035/85, T 0068/85, T 0409/91, T 0653/93, T 0713/98,  
T 0925/98, T 0172/99

**Catchword:**

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Case Number: T 0782/01 - 3.3.3

**DECISION**  
of the Technical Board of Appeal 3.3.3  
of 14 January 2004

**Appellant:**  
(Opponent)

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**Respondent:**  
(Proprietor of the patent)

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**Decision under appeal:**

Decision of the Opposition Division of the  
European Patent Office dated 24 April 2001 and  
posted 14 May 2001 rejecting the opposition  
filed against European patent No. 0467646  
pursuant to Article 102(2) EPC.

**Composition of the Board:**

**Chairman:** R. Young  
**Members:** W. Sieber  
J. Van Moer

## Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 467 646, with 8 claims, in respect of European patent application No. 91306441.6, filed on 16 July 1991 and claiming a JP priority of 16 July 1990 (JP 185323/90), was published on 3 March 1999 (Bulletin 1999/09). Claim 1 read as follows:

"A process for preparing a multi-shell emulsion particle comprising the steps of:

- i) emulsion polymerising a first vinyl monomer component (a) to form polymer (A) with a particle diameter of 0.08-0.2  $\mu\text{m}$ ;
- ii) subsequently adding a second vinyl monomer component (b) to polymer (A) in an amount of 1 to 10 times by weight of the weight of polymer (A) and polymerised to form polymer (B), the vinyl monomer component (b) being added at a rate of from 3 to 15 times by weight of Polymer A per hour at a temperature of 60°C to 100°C;
- iii) the polymer (B) is then treated with an alkaline material at a temperature in the range of 50°C to 100°C and a pH of 7 to 12 to neutralize and swell the polymer (A),

to form the multi-shell emulsion particle with a dry state structure having a void in the interior of the particle and one or more pores penetrating from the particle surface to the interior void and the particle having a diameter of 0.1 to 0.5  $\mu\text{m}$ ; wherein the first vinyl monomer component (a) comprises 8 to 80% by weight of an unsaturated carboxylic acid and 8% by

weight or less of a crosslinkable monomer and vinyl monomer component (b) contains 6% by weight or less of an unsaturated carboxylic acid."

Claims 2 and 3 were dependent claims directed to elaborations of the process according to Claim 1.

Claim 4 was directed to a multi-shell emulsion particle obtainable by the preparation process according any one of claims 1 to 3.

Claim 5 was a dependent claim directed to a preferred embodiment of the particle according to Claim 4.

Claims 6, 7 and 8 were directed to a paper coating resin composition, a paint resin composition and a heat-sensitive recording material, respectively, each composition comprising the multi-shell emulsion particle according to claim 4 or claim 5.

II. A notice of opposition was filed on 1 December 1999, requesting revocation of the patent in its entirety on the grounds of Article 100(a) EPC, ie lack of novelty and lack of inventive step, on the grounds of Article 100(b) EPC, ie lack of sufficiency of disclosure, and on the grounds of Article 100(c) EPC, ie added subject-matter. The opposition was supported by document D1:

D1: EP-A-0 188 325.

Furthermore, the opponent cited on 12 February 2001 and 18 April 2001, respectively, documents D2 to D4 and D5:

D2: EP-A-0 451 940;

D3: EP-B-0 451 940;

D4: EP-A-0 321 096; and

D5: EP-A-0 198 089.

However, the opposition division admitted only D4 into the proceedings, a document cited already during the examination procedure.

III. By a decision announced orally on 24 April 2001 and issued in writing on 14 May 2001, the opposition division rejected the opposition since the grounds of opposition did not prejudice the maintenance of the patent as granted.

IV. On 12 July 2001, a notice of appeal against the above decision was filed by the opponent (hereinafter referred to as the appellant) with simultaneous payment of the prescribed fee.

In the statement of grounds of appeal, filed on 14 September 2001, the appellant argued in substance as follows:

(a) The subject-matter as claimed in the patent in suit lacked novelty over D1 which disclosed a process for making void containing particles, ie particles comprising a hollow core surrounded by a shell. Whilst the presence of pores was not expressed verbatim in D1, a person skilled in the art knew that such pores must inherently exist in

the sheaths of the particles formed in D1. The sheath of the particle formed in D1 was permeable and permitted water held in the void of the particle to be removed by volatilization thereby rendering the particles opaque. For the sheath to be permeable, it must contain passages through which the water could pass and which must extend from the interior of the void to the exterior surface of the sheath. By definition, such passages were pores as could be seen from Chambers English Dictionary (1990) page 1082 (definition of permeate) and page 1136 (definition of pore). Moreover, it was disclosed on page 9, line 26 of D1 that the sheath contained pores. That such pores were also present in the dried state was obvious to a person skilled in the art because the particles of D1 dried when exposed to normal atmospheric conditions and so were rendered opaque. Without the sheath being permeable, the water held within the void of a particle would not dry and would not be rendered opaque. Consequently, the sheaths of the particles of D1 comprised pores as defined in Claim 1 of the patent in suit. As yet further support for its position, the appellant prepared a sample of microvoid containing polymer particles according to D1 with the relevant process parameters as claimed in the patent in suit used, and evaluated the oil absorbency of these particles.

- (b) For Comparative Example 16 of the patent in suit, oil absorption of 55% was reported in Table 3 although it was indicated that the particles of this example had no penetrating pore. This fact

confirmed that the particles of Comparative Example 16, as well as those of D1, being permeable to water and being permeable to oil, inherently contained pores but of such a small size that they could not be seen by the proprietor's measuring device. However, the patent in suit did not provide for a person skilled in the art any indication as to what really constituted a pore, how big it was and how it could be measured, thereby enabling a person skilled in the art to make a particle with a "pore" and to distinguish between producing a particle with a "pore" which was within the scope of the patent and a particle of the prior art which, being permeable to water or oil, must inherently comprise some form of passage or pore. Without such a clear and complete teaching, the patent in suit lacked sufficiency.

V. The proprietor of the patent (hereinafter referred to as the respondent) presented its counterarguments in a written submission filed on 4 February 2002. They can be summarized as follows:

- (a) The feature of the penetrating pore was a clear structural feature which distinguished the subject-matter of Claims 1 to 8 from D1. That feature imparted the restriction to the process of Claim 1 that the various polymerisation conditions and constituents must be selected so as to form the penetrating pore. The skilled person would have no difficulty in adjusting the process parameters to achieve this penetrating pore by following the directions given in the patent. The

appellant had failed to prove that any penetrating pore existed in the dry state structure of the particles of D1. The particles prepared by the appellant in the additional experiment filed on 14 September 2001 could not form evidence of the properties of the particles of D1 as they had not been made by a process according to D1.

Furthermore, the appellant's argument based on the inherent presence of pores in the particles of D1 was in glaringly contradiction with its own statements in D6:

D6: EP-A-0 565 244.

D6 was not prior art against the opposed patent but served as a contemporary document which aided in the understanding of terms used in the patent in suit.

- (b) The opposed patent solved the problem of poor oil absorption capacity and gas permeability which had been lacking in conventional particles that were useful in paints, etc as binding or opacifying agents (page 2, lines 44 to 46). This problem was solved by providing a particle having one or more penetrating pores and by providing a method of obtaining the inventive particle by selecting the appropriate conditions to form the pore. D1 did not suggest that the particle should be formed with a penetrating pore. Absent such directions, the skilled person could only arrive at the present invention, starting from D1, by using *ex post facto* analysis.



(c) Having regard to sufficiency of disclosure, a person skilled in the art would have no difficulty replicating the invention when following the guidance given in the patent in suit, eg Examples 1 to 57 and Comparative Examples 1 to 42, and doing the tests described therein, ie oil absorption and electron microscopy.

(d) With the same letter, an auxiliary request 1 was filed comprising a set of 7 claims.

VI. In support of its view that at least D1 anticipated the claimed subject-matter, the appellant filed in a further letter on 3 June 2003 a certified copy of a declaration made by Robert Mitchell Blankenship and a copy of Appendix 2 mentioned therein. According to the appellant, Dr Blankenship's declaration provided unequivocal evidence to the effect that the polymer shell of the particles formed in D1 comprised many pores which passed from the interior periphery of the polymer shell to the exterior of the polymer shell. Since pores were inherent in the formation of the polymer shell by the process used in eg D1, and there were no processing differences between the disclosure of D1 and the claimed subject-matter, the particles were all the same. Consequently, the claimed subject-matter could also not include an inventive step. As regards the respondent's arguments based on D6, they were wrong and without technical foundation.

Furthermore, documents D2, D3 and D5 were relevant since at least the subject-matter of Claim 4 was anticipated by D2 and D5.

In view of the content of Dr Blankenship's declaration there appeared to be no mechanism, claimed or disclosed in the opposed patent, which distinguished the claimed invention from at least D1. As there was no distinguishing feature on which a person skilled in the art might attribute an invention, it was evident that the alleged invention of the patent was not described in a manner sufficiently clear or complete for a person skilled in the art to perform the alleged invention.

VII. In a communication, issued on 11 July 2003, accompanying a summons to oral proceedings, the salient issues as to the merits of the appeal were identified by the board as being firstly, the formation of pores in the production of core-sheath particles according to D1 and according to the patent in suit, respectively, secondly, why Comparative Examples 8 and 13 to 16 in the patent in suit were designated "comparative" although they apparently were prepared according to a process falling within the scope of Claim 1 (sufficiency of disclosure) and thirdly, which prior art document disclosed a process as required in Claim 1 or particles which were identical to the particles resulting from such a process (novelty). In the context of the latter, the board pointed out that D2 and D3 were disregarded by the opposition division as late filed documents of no particular relevance. Though D5 was listed in the "Facts and Submissions" of the decision under appeal, there was no indication that the opposition division considered this document specifically relevant to be introduced into the proceedings. Therefore, from the documents relied upon by the appellant, only D1 and D4 were in the proceedings. As regards D6, this was not prior art

against the patent in suit, and any discussion based on it would not be relevant.

VIII. With a submission filed on 11 December 2003, the respondent emphasized that the claims of the patent specified the physical condition of the product in the dry state. Comparative examples 8 and 13 to 16 were not prepared by a process according to Claim 1 as granted as was apparent from the relevant passages on pages 4 to 6 of the patent specification.

With the same letter, an auxiliary request 2 was filed which was withdrawn during the oral proceedings (see point IX, below).

IX. On 14 January 2004, oral proceedings were held before the board.

Regarding sufficiency of disclosure, the parties essentially relied on their written submissions. Thus, the appellant emphasized that the patent in suit did not clearly define what had to be understood by the term "pore" and how such a pore had to be made, whereas the respondent was of the opinion that the formation of the penetrating pore was a functional feature which was sufficiently disclosed in the patent in suit. Following a discussion whether or not Comparative Examples 8 and 13 to 16 in the patent in suit were within the scope of the process of Claim 1, the respondent filed a new auxiliary request 1 comprising a set of 7 claims. Furthermore, auxiliary request 1 filed on 4 February 2002 was renumbered as auxiliary request 2, and auxiliary request 2 filed on 11 December 2003 was withdrawn.

Claim 1 of auxiliary request 1 read as follows  
(compared with the claim as granted, additions are  
shown underlined and deletions in square brackets):

"A process for preparing a multi-shell emulsion  
particle comprising the steps of:

- i) emulsion polymerising a first vinyl monomer component (a) to form polymer (A) with a particle diameter of 0.08-0.2  $\mu\text{m}$ ;
- ii) subsequently adding a second vinyl monomer component (b) to polymer (A) in an amount of 1 to 10 times by weight of the weight of polymer (A) and polymerised to form polymer (B), the vinyl monomer component (b) being added at a rate of from 3 to 15 times by weight of Polymer A per hour at a temperature of 60°C to 100°C;
- iii) the polymer (B) is then treated with an alkaline material at a temperature in the range of 50°C to 100°C and a pH of 7 to 12 to neutralize and swell the polymer (A); further
- iv) adding a vinyl monomer component (c) in an amount of 1 to 20 times by weight to the total weight of polymers (A) and (B) to the neutralised polymer (B) solution, and subsequent polymerisation to polymer (C),

to form the multi-shell emulsion particle with a dry state structure having a void in the interior of the particle and one or more pores penetrating from the particle surface to the interior void and the particle having a diameter of 0.1 to 5.0  $\mu\text{m}$ , [;] wherein the first vinyl monomer component (a) comprises 10 [8] to

80% by weight of an unsaturated carboxylic acid and 8% by weight or less of a crosslinkable monomer, [and] the vinyl monomer component (b) contains 0.1 to 2.0 [8]% by weight [or less] of an unsaturated carboxylic acid [.] and 0 to 3% by weight of a crosslinkable monomer and the vinyl monomer component (c) contains up to 3% by weight of unsaturated carboxylic acid and up to 3% by weight of a crosslinkable monomer."

Claims 2 to 7 corresponded to granted Claims 2 and 4 to 8, whereby in Claims 3 to 7 the dependencies were amended accordingly.

The claims of auxiliary request 2 corresponded to the claims as granted, except that the subject-matter of dependent Claim 3 was incorporated into Claim 1 and granted Claims 4 to 8 were renumbered to Claims 3 to 7 including an amendment of the dependencies.

Having regard to auxiliary request 1, no objections under Articles 123(2) and (3) EPC were raised by the appellant but it was emphasized that the objections under Article 83 EPC raised against the main request equally applied to auxiliary request 1. The appellant did not contest novelty of the claimed subject-matter of auxiliary request 1 but raised an objection under Article 56 EPC against the claimed subject-matter. If one took the preferred process features of the process disclosed in D1, such a process would be substantially the same as the process of Claim 1 and automatically produce the required penetrating pore.

- X. The appellant requested that the decision under appeal be set aside and that European patent No. 0 467 646 be revoked.

The respondent requested that

- the appeal be dismissed, ie that the patent be maintained on the basis of claims 1 to 8 as granted (main request); or in the alternative,
- the patent be maintained on the basis of Claims 1 to 7 filed as auxiliary request 1 at the oral proceedings; or
- the patent be maintained on the basis of Claims 1 to 7 of auxiliary request 2 originally filed as auxiliary request 1 on 4 February 2002.

### Reasons for the Decision

1. The appeal complies with Articles 106 to 108 EPC and Rule 64 EPC and is therefore admissible.
2. *Sufficiency of disclosure (main request)*
  - 2.1 The opposed patent is concerned with a multi-shell structured emulsion particle which has a void in the interior of the particle, ie a particle comprising a hollow core surrounded by one or more shells. As explained in the opposed patent (page 2, lines 7 to 9 and the passage bridging pages 2 and 3), the characterizing feature of this particle lies in the presence of one or more pores, in the dry state,

penetrating from the particle surface to the interior void. Such morphology is, according to the respondent, not previously disclosed in the prior art.

2.2 Still, the particle is not defined by reference to concrete technical parameters relating to these morphological characteristics, but in terms of a process for its preparation, ie a product-by-process claim (Claim 4; point I, above).

2.3 The process of forming the multi-shell emulsion particle comprises the polymerization steps i) and ii) and the neutralizing step iii) which define the monomer components and the process conditions to be employed in these process steps (Claim 1). When dried, the particles exhibit the desired morphology. However, as can be seen from Tables 2 and 3 in the patent in suit, working within the limits set out in Claim 1 does not necessarily result in a multi-shell particle having the desired structure. For example, the particles obtained in Comparative Example 8 (having a divinyl benzene content of 5% in the sheath polymer (B)) and in Comparative Examples 13, 14 and 16 (comprising a further sheath made out of polymer (C)), do not have a penetrating pore although they were prepared according to a process meeting all the requirements of Claim 1. In fact, the process of Claim 1 does not impose any restriction on the amount of crosslinkable monomer present in polymer (B), eg divinyl benzene, or on a possible further sheath layer, eg polymer (C).

2.4 The respondent argued that the wording of Claim 1 "to form the multi-shell emulsion particle with a dry state structure having a void in the interior of the particle

and one or more pores penetrating from the particle surface to the interior void" had to be considered as a functional feature of the claim which imparted the restriction that the various polymerization conditions and constituents of Claim 1 must be selected so as to form the penetrating pore. This functional feature was chosen out of the legitimate interest of the respondent to protect the invention in the most general terms possible. Further necessary guidance was provided in the patent specification. For example, it was stated at page 4, line 16 in the patent in suit that the amount of crosslinkable monomer that could be present in the formation of polymer (B) was "usually from 0 to 3% by weight". The composition of a further optional sheath polymer (C) was defined in dependent Claim 3 or at page 4, lines 26 to 49.

- 2.5 According to T 68/85 (OJ EPO 1987, 228, point 8.4.3 of the reasons), a functional feature "must provide instructions which are sufficiently clear for the expert to reduce them to practice without undue burden, if necessary with reasonable experiments". In other words, a functional feature must not only be such that the skilled person can understand it, but he must also be able to implement it, without exceeding his normal skills and knowledge. Whilst in relation to the claim itself, the former requirement (understanding) is one of clarity and the latter (implementation) one of support, both in the sense of Article 84 EPC, the latter viewed in relation to the disclosure as a whole, is also highly relevant to the question of sufficiency in the sense of Article 83 EPC (see T 409/91 OJ EPO, 1994, 653, points 3.3 to 3.5 of the reasons; T 713/98



of 17 January 2002, not published in the OJ EPO, point 3.2 of the reasons).

2.6 In the present case, the functional feature defines a result to be achieved, namely the process steps i) to iii) have to be carried out such that a multi-shell particle with a dry state structure having a void in the interior of the particle and one or more pores penetrating from the particle surface to the interior void is formed. Thus, the aim of the functional feature is clear (understanding). However, the existence of a penetrating pore and the preparation thereof is not common general knowledge and has never been described so that the issue of implementation of the functional feature boils down to the question as to whether or not the patent in suit itself contains sufficient instructions reliably to produce the desired morphology of the multi-shell emulsion without undue burden.

2.6.1 As explained in point 2.3, above, the patent in suit contains two different levels of information, namely the polymerization conditions and constituents identified in Claim 1 and the further information in the patent specification, ie the information concerning the crosslinkable monomer in the monomer component (b) or the nature of the further sheath polymer (C), although, in the end, both levels of information are evidently equally important to achieve the desired result.

2.6.2 Apart from this particularity in the presentation of the relevant technical information, the patent specification is rather vague with respect to the "additional" information, in particular with respect to

the optional crosslinkable monomer in component (b). It is stated at page 4, lines 12 to 18, that "The vinyl monomer (b) can also contain a crosslinkable monomer which can copolymerize with the vinyl monomer (b) in order to improve the resistance of the desired particle to blocking, heat and solvent. ... The effect of the crosslinkable monomer can be exhibited in the range of usually from 0 to 3% by weight ... . Use of more than 3% of weight is unfavorable because stability in the polymerization is liable to be impaired." Firstly, the term "usually" is, as correctly pointed out by the appellant, not a clear indication that the amount of crosslinkable monomer has to be within the indicated limits. Secondly, that passage in the patent in suit does not specifically associate the presence of a crosslinkable monomer in component (b) with the formation of the desired penetrating pore but with the stability of the polymerization. On the other hand, as can be seen from Comparative Example 8, the use of 5% by weight of crosslinkable monomer does not impair the stability of the emulsion. Nevertheless, a penetrating pore is not formed. Thus, contrary to the respondent's assertion, there is no clear guidance in the patent in suit with respect to the amount of crosslinkable monomer in component (b).

2.6.3 As regards the further monomer (c), the respondent argued that it was clear from page 5, line 57 of the patent in suit that the invention required the amount of monomer component (c), when present, to be from 1 to 20 times the total weight of polymers (A) and (B). However, that passage relied upon by the respondent states that the amount of the vinyl monomer (c) is preferably (emphasis by the board) from 1 to 20 the

total weight of polymers (A) and (B). The indication of a preferred range cannot be interpreted as a teaching that a person skilled in the art trying to repeat the invention has to work within this range.

2.6.4 A possibility to verify the formation of the desired pore would be by means of a test. However, apart from the statement on page 6, lines 23 to 24 of the patent in suit that "The structure of said particle can be identified with ease by observing the particle itself or a section of the particle with an electron microscope", there is no further information, let alone an example, concerning such a measurement. Tables 1 to 3 in the patent in suit merely indicate whether or not a penetrating pore is present in the respective example without any reference to the method of measurement. As regards the electron micrograph shown in the only figure of the patent in suit, it is rather blurred and there is no explanation thereof in the patent specification contrary to Rule 27(1)(d) EPC. Hence, it is not clear whether or not the vaguely recognizable convoluted area on the surface of the particle is indicative of a pore. Furthermore, there is no information how the photograph of the surface of a particle could verify the presence of a pore that penetrates to the interior void.

2.6.5 As regards the measurement of the oil absorption, it is evident from Tables 1 to 3 that all particles, ie particles with a penetrating pore and particles without a penetrating pore, show some degree of oil absorption. Since the patent in suit provides no correlation between the degree of oil absorption and the presence of a penetrating pore, a person skilled in the art can

not verify the desired result by measuring the oil absorption either.

2.6.6 In the end, the only concrete information of how the desired pore is to be obtained and how it is to be verified is to be found in the examples and comparative examples in the patent in suit. For each example and comparative example it is indicated in Tables 1 to 3 whether or not a pore has been obtained, although without mentioning the method of measurement. Therefore, these examples and comparative examples are the prime guide for a person skilled in the art trying to reduce the functional feature to practice. However, with comparative examples employing process features falling within the scope of Claim 1 and being not against the general teaching in the patent in suit but still not yielding the desired result, a person skilled in the art is deprived of the most serious, if not the only, guide to implement the functional feature.

2.6.7 The situation is further aggravated by the fact that the penetrating pore is a technical feature not previously described in the prior art (see point 2.1, above). According to T 172/99 of 7 March 2002 (not published in the OJ EPO, point 4.5.6 of the reasons), an applicant or patentee relying on a newly formulated and, hence, unfamiliar parameter to define the invention, is under a particular obligation to disclose all the information necessary reliably to define the new parameter. Since relying on a technical feature previously not described in the prior art, ie the penetrating pore, bears a resemblance to relying on a new parameter, the appellant or proprietor is, in analogy to the findings in T 172/99 (*supra*), under a

particular obligation to disclose all the information necessary reliably to obtain the new technical feature. This it has not done, for the reasons given above.

2.7 In summary, the patent in suit provides not enough information as to how the process claimed has to be carried out to obtain the desired result in a reliable way and as to how this result is to be verified. Therefore, it is not possible, in the board's view, to reduce the functional feature, ie the formation of the penetrating pore, to practice without undue burden.

2.8 Consequently, the subject-matter of Claim 1 and, by the same token, that of Claim 4 does not meet the requirements of Article 83 EPC. Hence, the main request of the respondent is refused.

3. *Amendments (auxiliary request 1)*

3.1 Claim 1 of auxiliary request 1 differs from Claim 1 as granted in four aspects, namely in that

(a) the lower limit for the amount of unsaturated carboxylic acid in the first vinyl component (a) has been amended to 10% by weight, so that the range for the amount of carboxylic acid in component (a) is now from 10 to 80% by weight;

(b) the amount of unsaturated carboxylic acid contained in the second vinyl component (b) has been restricted to 0.1 to 2% by weight;

- (c) the requirement that the second vinyl component (b) contains 0 to 3% by weight of a crosslinkable monomer has been introduced; and
- (d) a further mandatory process step (iv) has been added, ie adding a vinyl component (c) in an amount of 1 to 20 times by weight to the total weight of polymers (A) and (B) to the neutralized polymer (B) solution, and subsequent polymerization to polymer (C), whereby the vinyl component (c) contains up to 3% by weight of unsaturated carboxylic acid and up to 3% by weight of a crosslinkable monomer.

3.1.1 Amendment (a) is supported by the passage on page 3, lines 31 to 33 of the patent specification (page 7, lines 17 to 20 of the application as originally filed) which discloses for the amount of unsaturated carboxylic acid in the first vinyl monomer component (a) a general range of 5 to 80 parts by weight and a preferred range of 10 to 50 parts by weight for 100 parts by weight of the vinyl monomer (a). Thus, the range of 10 to 80% by weight originates from a combination of a general range and a preferred range. According to established case law (eg T 925/98 of 13 March 2001, not published in the OJ EPO, point 2 of the reasons; and Case Law of the Boards of Appeal, 4<sup>th</sup> edition 2001, III.A.3.3) such a combination does not contravene the requirements of Article 123(2) EPC.

3.1.2 For the amendments (b) and (c), support can be found on page 4, lines 8 and 16 in the patent specification (page 10, line 16 and page 11, line 8 of the application as originally filed).

3.1.3 Amendment (d) finds its support in granted Claim 3.

3.2 Claim 2 corresponds to Claim 2 as granted. Claims 3 to 7 correspond to Claims 4 to 8, respectively, as granted, whereby the dependencies have been amended accordingly.

3.3 In summary, the claims of auxiliary request 1 meet the requirements of Article 123(2) and (3) EPC.

4. *Clarity (auxiliary request 1)*

No objections under Article 84 EPC against the amendments made to the claims were raised by the appellant. Also the board is satisfied that the amended claims meet the requirements of Article 84 EPC.

5. *Sufficiency of disclosure (auxiliary request 1)*

5.1 In contrast to the main request, Claim 1 of auxiliary request 1 contains all the essential information necessary to obtain the desired penetrating pore. Neither further details from the description nor is a further selection of process features required. It is evident from the examples and comparative examples in the patent in suit that working within the more narrowly defined corridor of process conditions of Claim 1 will automatically result in the formation of the desired penetrating pore.

5.2 Therefore, the wording in Claim 1 of auxiliary request 1 "to form the multi-shell emulsion particle with a dry state structure having a void in the interior of the particle and one or more pores

penetrating from the particle surface to the interior void" does not represent a functional feature requiring further concrete technical measures for its implementation but merely describes the inevitable outcome of narrowly defined process steps. Consequently, there is no need to verify the result of the process, since working within the limits of Claim 1 of auxiliary request 1 will always result in the formation of the penetrating pore. Although the verification of the formation of the penetrating pore by means of a test may be desirable, there is, in contrast to the main request, no need to do so. Thus, an incomplete information as to the test method in the patent in suit (see point 2.6.4, above) does not amount to a lack of sufficiency for Claims 1 and 4 of auxiliary request 1.

5.3 According to the appellant, the patent in suit, even in the amended form, still lacked sufficiency, because it did not contain a clear and complete teaching as to what really constituted a pore. Consequently, a person skilled in the art was not in a position to make a particle with a "pore" and to distinguish between producing a particle with a "pore" which is within the scope of the patent in suit and a particle of the prior which inherently comprised some form of passage or pore which extended from the surface of the particle to the void within it. However, as explained in point 5.1 and 5.2, above, the process conditions of Claim 1 automatically will produce a particle comprising the penetrating pore. Simply by following the required process steps a person skilled in the art will obtain a particle according to the invention. Whether or not such a particle is different from the particles known



from the prior art is a question of novelty (see point 6, below) and not a question of sufficiency.

5.4 In summary, the subject-matter of Claims 1 and 4, and, by the same token, that of Claims 2, 3 and 5 to 7 does meet the requirements of Article 83 EPC.

6. *Novelty (auxiliary request 1)*

It may be convenient to recall at this juncture that D1 and D4 are the only documents in these proceedings (see point II and VII, above).

6.1 Document D1 is concerned in general terms with the production of core-sheath polymer particles containing a microvoid. The polymer particles so formed may be useful as binding or opacifying agents in coating, impregnating and moulding compositions (page 1, lines 7 to 9). A comparison between the relevant features of the general teaching of D1 on the one hand (claims and description), and of Claim 1 of auxiliary request 1 on the other hand is presented in the following table.

	Claim 1 (auxiliary request 1)	D1
	i) vinyl component (a)	
(1)	10-80% carboxylic acid	at least 5% (page 3) at least 10% (preferred)
(2)	≤ 8% crosslinkable monomer	0.1-20% (page 4) 0.1-3% (preferred)
(3)	particle diameter 0.08-0.2 μm	0.05-1.0 (page 7) 0.1-0.5 (preferred)
	ii) vinyl component (b)	
(4)	0.1-2.0% carboxylic acid	0-10% (Claim 1) 2%, 5%, 10% (in examples)
(5)	0-3% crosslinkable monomer	not indicated (page 7) 1-50% (preferred, page 11)
(6)	polymer (B)/(A) 1 to 10	not indicated 9:1 and 20:1 (in examples)
(7)	rate of addition 3 to 15 times by weight of polymer (A)/h	not indicated about 4.5 (in Example 1)
(8)	60 to 100°C	not indicated 80°C (in Example 1)
	iii) treating with alkaline	
(9)	pH 7 to 12	not indicated
(10)	50 to 100°C	50-100°C (page 8)
	iv) vinyl component (c)	at least one additional sheath (preferred; page 9; Example 2)
(11)	up to 3% carboxylic acid	not indicated none (in Example 2)
(12)	up to 3% crosslinkable monomer	not indicated none (in Example 2)
(13)	1 to 20 times of (A)+(B)	not indicated not apparent (in Example 2)
(14)	particle diameter 0.1-5 μm	0.07-4.5 μm (page 9)

6.2 It follows from the above comparison that the subject-matter of amended Claim 1 of auxiliary request 1 lies partially within the more general disclosure of D1. However, in order to arrive at a process falling within the scope of Claim 1 one would have to pick and choose, ie make a "multiple selection", from the generic disclosure and the examples of D1. For example, one would have to select an appropriate amount of carboxylic acid and crosslinkable monomer for the vinyl component (a), an appropriate amount of carboxylic acid, crosslinkable monomer and polymer (B)/(A) ratio for the vinyl component (b), work within a certain pH range and select a specific sheath polymer (C).

6.2.1 According to decision T 653/93 of 21 October 1996 (not published in the OJ EPO, point 3.2 of the reasons), in case of "multiple selection", the question of novelty cannot be answered by contemplating the ranges of various parameters separately. Moreover, one would have to show that the "combined selection" emerges from the prior art.

6.2.2 In the present case, a person skilled in the art had no reason, when applying the teaching of D1, to concentrate on the combination of the above mentioned features (1) to (14). Such a combined selection is neither explicitly disclosed in nor derivable from D1. Example 1A, which has 2% by weight of methacrylic acid in the sheath (corresponding to polymer (B) in the patent in suit), has no second sheath and is, for that reason alone, outside the scope of Claim 1. Example 2, on the other hand, is the only example producing a particle with a second sheath (corresponding to polymer (C) in the patent in suit), but has 5% by

weight of methacrylic acid in the first sheath (corresponding to polymer (B) in the patent in suit), which is outside the scope of Claim 1. Also none of the other examples discloses the required combination of features: Examples 1B and 1C have 5% and 10% by weight of methacrylic acid in the sheath and have no second sheath; Examples 3 and 4 use a core to sheath ratio of 1:20, which is outside the scope of Claim 1 and, in addition, have no second sheath. Furthermore, none of the examples indicates the particle diameter of the core and the pH value in the treatment with fixed or permanent base.

6.2.3 In summary, D1 does not disclose the combination of process steps required in Claim 1 of the auxiliary request. Thus, the subject-matter of Claim 1 is novel over D1.

6.3 The particle claimed in Claim 3 of auxiliary request 1 (corresponding to Claim 4 as granted; see points I and 2.2, above) is defined in terms of a product-by-process, namely with reference to the process of Claim 1. Since the precise catalogue of process steps is not to be found in D1 (point 6.2, above), the decisive question is whether or not this particular combination of process features yields a particle that is different from the particles disclosed in D1.

6.3.1 The comparative examples in the patent in suit demonstrate that working outside the narrowly defined process conditions of Claim 1 produces different particles. For example, when the particle diameter of the core polymer (A) is not within the defined range (Comparative Examples 1 and 2) or the amount of

crosslinkable monomer in the vinyl component (b) is too high (Comparative Example 8), the vinyl component (b) is added too slowly or too fast (Comparative Examples 9 and 10) or the amount of crosslinkable monomer in the vinyl component (c) is too high (Comparative Example 13), the penetrating pore is not formed. That these particles are different from particles obtained according to the process of Claim 1 is not only apparent from the absence of the penetrating pore but also from inferior oil absorption of these particles (Tables 1 to 3 in the patent in suit). It has to be emphasized that the process conditions in all these comparative examples are within the general disclosure of D1. Consequently, they qualify as "true" comparative examples representing something lying at least as close to the claimed subject-matter as the closest state of the art (cf T 35/85 of 16 December 1986, not published in the OJ EPO, point 4 of the reasons).

6.3.2 There is also no evidence that the particles produced in the examples of D1, and in particular those of Example 2, are identical with the particles claimed in Claim 3. The experiments filed by the appellant with the statement of grounds of appeal on 14 September 2001 are deficient since they were not carried out according to one of the examples of D1. In fact, they were not carried out according to the teaching of D1 at all. Therefore, no conclusion can be drawn from these experiments with respect to the particles of D1.

6.3.3 Hence, it has to be assumed, in the absence of evidence to the contrary, that the combination of process features required in Claim 1, being different from

those made available in D1, yields particles which are different from those disclosed in D1.

6.4 Although the appellant has at no stage of this appeal procedure brought forward an argument based on D4, the board deems it appropriate to confirm that the claimed subject-matter is also novel over D4, the only other prior art document in the proceedings. D4 relates to core-sheath particles containing voids which have been prepared by a process employing non-volatile fixed or permanent bases as swelling agents and said swelling being carried out in a system free of organic solvent. However, D4 does not disclose the combination of process features required in Claim 1 of auxiliary request 1 and the appellant has not provided any evidence that the particles obtained in D4 are identical with the particles claimed in Claim 3 of auxiliary request 1.

6.5 It follows, in view of the above, that the subject-matter of Claims 1 and 3 and, by the same token, the subject-matter of Claims 2, and 4 to 7, is novel over D1 and D4 and meets the requirements of Article 54 EPC.

7. *Problem and solution*

7.1 The emulsion particles according to the patent in suit are used as additives in paints, paper coating and information recording papers, for example as a supplement to, or replacement of, organic pigments. The particles have high oil absorbing property and gas permeability without impairing hiding power and brightness of an organic pigment (page 2, lines 7 to 9 and 50 to 53 of the patent specification).

7.2 The microvoid containing core-sheath particles of D1 are useful as binding or opacifying agents in coating impregnating and moulding compositions. Thus, apart from being structurally closely related to the multi-shell emulsion particles of the patent in suit, the particles of D1 also serve a similar purpose. Hence, in accordance with the decision under appeal and the respondent, the board regards this document as representing the closest state of the art.

7.3 Core-sheath particles of the general kind described in D1 are evaluated as comparative examples in the patent in suit. It can be seen from the data in Tables 1 to 3 of the patent specification that the particles according to the invention have improved oil absorbing properties (see also point 6.3.1, above). Furthermore, it is evident from the examples and the comparative examples that the emulsion particles obtained according to the process of Claim 1 have a better performance, when used as organic pigments in paper coating (Table 4) and paints (Table 6) or as binder in a heat-sensitive recording material (Table 7), with respect to gloss, brightness, opacity, gas permeability and hiding power. Therefore, the objective technical problem to be solved by the patent in suit has to be seen in the provision of void-containing multi-shell particles having an improved balance of properties, in particular with regard to oil absorption, gas permeability, hiding power, brightness and gloss.

7.4 The solution proposed by the patent in suit is to carry out a sequential emulsion polymerization with narrowly defined process steps. Since the appellant has never

challenged the validity of the examples and the comparative examples in the patent in suit, the board has no reason to doubt that the claimed measures provide an effective solution of the stated problem arising from D1.

8. *Inventive step (auxiliary request 1)*

8.1 For the assessment of inventive step, it is necessary to consider whether the skilled person, in possession of the technical teaching according to D1, would have expected that the relevant properties of the core-sheath particles could be enhanced by employing the specific combination of process features outlined in Claim 1 of auxiliary request 1.

8.2 In D1 itself, there is no suggestion as to how the properties of the particles might be further improved, let alone a hint to the combination of process features of Claim 1 as a more promising variant within the general teaching of D1. Consequently, the disclosure of D1 itself offers no hint to the solution of the relevant technical problem.

8.3 As to the only other disclosure in the proceedings, D4, there is no reason why the skilled person should consider this teaching as relevant to the solution of the technical problem in the first place, since D4 is rather concerned with the avoidance of an organic solvent during swelling than with the improvement of the particle properties. Thus, there can be no pointer to the solution of the technical problem in the teaching of D4, either.



8.4 The appellant's argument submitted in the oral proceedings that the claimed subject-matter did not involve an inventive step since it was merely the inevitable result of the preferred process steps of the process disclosed in D1 is not convincing. Firstly, even within the preferred embodiments of D1 a further selection is required to arrive at something within the scope of Claim 1 (see table, point 6.1, above). Secondly, D1 does not contain a hint to the combination of the relevant process features of Claim 1. The mere fact that the process features are individually disclosed in D1 is not sufficient, as alleged by the appellant, to come to the conclusion that it was obvious to combine these process features to solve the relevant technical problem. Moreover, it appears that the appellant's argument is based on hindsight since without the knowledge of the teaching of the patent in suit a person skilled in the art had no incentive whatsoever to focus on the combination of process features now required in Claim 1.

8.5 In view of the above, it is evident that the subject-matter of Claims 1 and 3 of auxiliary request 1, and by the same token, that of Claims 2, and 4 to 6, does not arise in an obvious way from documents D1 and D4. Hence, the subject-matter of Claims 1 to 7 of auxiliary request 1 involves an inventive step.

**Order**

**For these reasons it is decided that:**

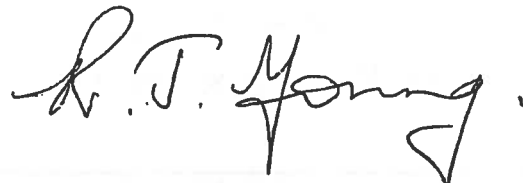
1. The decision under appeal is set aside.
2. The main request of the respondent is refused.
3. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 7 of auxiliary request 1 filed at the oral proceedings and after any necessary consequential amendment of the description.

The Registrar:



E. Gorgmayer

The Chairman:



R. Young