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**D E C I S I O N**  
**of 10 October 2003**

**Case Number:** T 0575/99 - 3.3.6

**Application Number:** 93911770.1

**Publication Number:** 0672102

**IPC:** C11D 17/00

**Language of the proceedings:** EN

**Title of invention:**

Capsule which comprises a component subject to degradation and a composite polymer

**Applicants/Patentees:**

UNILEVER PLC, et al

**Opponent:**

Henkel Kommanditgesellschaft auf Aktien

**Headword:**

Polymer capsule/UNILEVER

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Main request: inventive step (no) - claimed detergent compositions do not represent a technically meaningful alternative to prior art"

"Auxiliary request: inventive step (yes) - non obvious alternative prior art"

**Decisions cited:**

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**Catchword:**

-



Case Number: T 0575/99 - 3.3.6

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.6**  
**of 10 October 2003**

**Appellant:**  
(Opponent)

Henkel  
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TTP / Patentabteilung  
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**Respondents:**  
(Proprietors of the  
patent)

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**Decision under appeal:**

**Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
29 March 1999 concerning maintenance of  
European patent No. 0672102 in amended form.**

**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** P. Ammendola  
C. Rennie-Smith

## Summary of Facts and Submissions

I. This appeal is from the interlocutory decision of the Opposition Division concerning the maintenance in amended form of European patent No. 0 672 102 relating to a polymer capsule and to a heavy duty liquid detergent composition (here after "HDL detergent composition") containing that polymer capsule.

II. The Appellant (Opponent) had sought revocation of the patent only on the grounds of lack of novelty and of inventive step (Article 100(a) in combination with Articles 52(1), 54 and 56 EPC) and cited, *inter alia*, the following documents:

Document (1) = DE-A-2 413 561

Document (2) = EP-A-0 356 239

III. The Respondents (Patent Proprietors) had requested that the patent be maintained on the basis of an amended description and an amended set of 11 claims, wherein claims 1 and 5 read:

"1. Polymer capsule, suitable for use in a heavy duty liquid detergent composition, that comprises:

(a) detergent sensitive active ingredient; and

(b) composite polymer comprising:

(i) hydrophobic polymer core particles, formed by emulsion polymerizable monomers that contain an ethylenically unsaturated group;

(ii) hydrophilic polymer that is chemically or physically attached to the hydrophobic polymer core particles;

wherein said hydrophilic polymer is selected from synthetic nonionic water soluble polymers, polysaccharides, modified polysaccharides; proteins, modified proteins, polymers bearing hydroxyl groups, polymers bearing carboxylic groups and copolymers thereof;

said nonionic water soluble polymers being selected from the group consisting of polyvinyl alcohol, copolymers of polyvinyl alcohol and vinyl ester salts, polyvinyl pyrrolidone, copolymers of pyrrolidone with styrene and copolymers of pyrrolidone with vinyl ester salts; modified polysaccharides selected from the group consisting of cellulose acetate, alkyl cellulose and hydroxy alkyl cellulose; and acrylic polymers selected from the group consisting of polyacrylic acid, polymethacrylic acids and esters of said acids;

the ratio of said hydrophobic core particles to hydrophilic water soluble polymer being from 2:8 to 7:3."

"5. Heavy duty liquid detergent composition comprising from 5% to 85% by weight of a surfactant and a polymer capsule, that comprises:

(a) detergent sensitive active ingredient; and

(b) composite polymer comprising:

- (i) hydrophobic polymer core particles, formed by emulsion polymerizable monomers that contain an ethylenically unsaturated group;
- (ii) hydrophilic polymer that is insoluble in the detergent composition, but is dissolved or dispersed upon dilution of said composition with water;

the ratio of said hydrophobic core particles to hydrophilic water soluble polymer being from 2:8 to 7:3."

Dependent claims 2 to 4 and 11 defined preferred embodiments of the polymer capsule of claim 1 while dependent claims 6 to 10 defined preferred embodiments of the HDL detergent composition of claim 5.

IV. In its decision, the Opposition Division found that the subject-matter of these amended claims credibly solved the problem of providing HDL detergent compositions containing a detergent sensitive active ingredient which was protected during storage and yet released upon the dilution of the compositions with water.

It considered that the same problem was addressed in Document (2), but that this document disclosed only capsules formed by copolymers rather than by the composite polymer described in the patent in suit. The Opposition Division found that the person skilled in the art faced with that technical problem would have

no reason to alter the teaching in Document (2) so as to produce a capsule comprising a composite polymer.

V. The Appellant lodged an appeal against this decision. It filed under cover of the grounds of appeal an additional experimental report labelled Document (5) and two citations:

Document (6) = B. Vollmert "*Grundriss der Makromolekulare Chemie*" Band 1, E.Vollmert-Verlag, Karlsruhe, 1988, pages 180 to 184.

Document (7) = "Minispray-Information NR.1 (Grundlagen)" for Mini Spray Dryer Büchi 190, Büchi Laboratory- Techniques Ltd., Flawil, 1981, pages 1, 11 and 12.

It argued for the absence of inventive step vis-à-vis Document (2) in combination with Document (6).

It relied on Document (5) in maintaining that during the spray drying step of the process for producing the capsule described in the patent in suit, the structure of the previously synthesized polymer composite is substantially modified.

VI. At the oral proceedings held before the Board on 10 October 2003, the Appellant stressed the presence of evident unclarities in claims 3, 4 and 10 as maintained by the Opposition Division and expressed initially the intention to argue that the patented invention was also lacking novelty. The Board then observed that the Appellant had not in its grounds of appeal challenged

the Opposition division's conclusion that the maintained patent was novel and, therefore, that any submission in this respect could possibly take the other party by surprise and require adjournment of the proceedings. The Appellant finally decided not to present any argument in this respect and discussed only the issue of inventive step, presenting submissions based on Documents (1), (2) and (6).

It also stated that it did not wish to rely any longer on the data of Document (5).

VII. At the oral proceedings, the Respondents filed a set of five claims as an auxiliary request. These claims are substantially identical to claims 1 to 4 and 11 of the amended patent found allowable by the Opposition Division.

The Appellant did not object to the filing of this auxiliary request at the oral proceedings.

VIII. The Appellant submitted in writing and orally that the claimed subject-matter was not based on an inventive step by arguing substantially as follows.

It maintained that the prior art described in Document (2) represented the most appropriate starting point for the assessment of inventive step and that the technical problem credibly solved by the claimed polymer capsules was that of providing an alternative to the encapsulated enzymes of Document (2). In particular, the claimed polymer capsules differed from those obtained according to example 2 of Document (2) only in that the former comprised two polymers of different

hydrophilicity directly attached to each other, while in the latter an oil layer was interposed between them.

The Appellant concluded that the person skilled in the art would have considered the well known grafted polymers with different hydrophilicity, such as those disclosed in Document (6) (see page 184, lines 19 to 22), as an obvious alternative to the polymer pair of example 2 of Document (2), thereby arriving at capsules according to present claim 1 without exercising any inventive skill.

The Appellant also emphasized that Document (1) disclosed capsules comprising an enzyme and grafted polymers, and which addressed the problem of stability as regards moisture, water and water-soluble compounds. It admitted however that this citation did not disclose that these capsules were suitable for use in liquid detergent compositions.

IX. The Respondents refuted the Appellant's arguments maintaining that the capsules disclosed in Document (2), which were the closest to the claimed ones, were obtained by using in the azeotroping process the film forming polymer disclosed at column 5, lines 16 to 46 of this citation, which however formed a single random copolymer phase rather than comprising two contiguous polymer domains directly attached to each other.

They also argued that the person skilled in the art would find in Document (2) no pointer to Document (6), i.e. no suggestion that further suitable encapsulating polymers could be found among the known grafted polymers obtainable by emulsion polymerization.



At the oral proceedings before the Board, in replying to the Board's observation that claim 5 as maintained contained no explicit limitation as to the maximum amount of water, the Respondents admitted that claim 5 as maintained by the Opposition Division embraced HDL compositions with an amount of water which the patent itself implicitly defined as "critical" (e.g. larger than 80 wt%, compare to page 9, lines 52 to 53).

- X. The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 672 102 be revoked.

The Respondents requested that the appeal be dismissed and that the patent be maintained as amended in the decision under appeal or alternatively that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 5 of the auxiliary request filed during the oral proceedings.

- XI. At the end of the oral proceedings the Chairman announced the decision of the Board.  
Reasons for the Decision

## **Reasons for the Decision**

1. *Distinction between hydrophilic and hydrophobic polymers*

- 1.1 The patent in suit provides no clear definition of the expressions "*hydrophobic polymer*" and "*hydrophilic polymer*". Moreover, it discloses that the same monomers

may form both the hydrophilic and the hydrophobic polymers (see e.g. claims 1 and 3 of the patent as maintained). Therefore, it has to be considered how a person skilled in the art would reasonably interpret these expressions.

- 1.2 The Board wishes to stress that, in the absence of a precise definition (e.g. in terms of a given water solubility at a certain temperature), the expressions "hydrophilic polymer" and "hydrophobic polymer" are normally used to indicate relative properties, for instance to indicate which polymer in a polymer pair is more water soluble or adsorbs more water and which is less water soluble or adsorbs less water. This derives from the fact that no generally accepted classification of the polymers belonging to each group is possible, since the extent of hydrophilicity of many polymers varies gradually from one extreme to the other depending on variations in the polymer composition, molecular weight, distribution of the monomeric units, etc., as is evident, for instance, from Document (2) where polyacrylic acid is defined as "less hydrophilic and water soluble" than its ammonium salt (see column 5, lines 53 to 64).

The Board thus concludes that the person skilled in the art of polymeric material would consider that, in the patent in suit, the only clear distinction between the hydrophobic polymer and the hydrophilic polymer respectively forming the core particles and the polymer attached thereto, is that they must have a **different solubility in water**.

2. *Admissibility of the Respondents' main request in view of the clarity of the claims*

2.1 At the oral proceedings before the Board, the Appellant argued, in respect of the clarity of the claims, that claim 3 contained an evident typing error

("methy**l**acrylic" instead of the correct expression "methacrylic"), that the end-values of the numerical range specified in claim 4 were rendered vague by use of the word "about", and that claim 10 encompassed an evidently erroneous dependency "to claims 5 - 10".

2.2 The Board observes that the evident typing error in claim 3 and the expression containing "about" in claim 4 were already present in claims 4 and 5 of the patent as granted, respectively. The Board thus finds that the Appellant's corresponding objections as to clarity under the provisions of Article 84 do not arise from amendments to the granted claims and, therefore, cannot be discussed in the appeal proceedings.

2.3 With regard to claim 10, however, the Appellant has correctly identified an evidently erroneous claim dependency. It is also self-evident that this impossible dependency arose from the amendments to the granted claims made by the Respondents in formulating their request during the opposition proceedings. Therefore, the Board finds that claim 10 of this request does not comply with the clarity of claims requirements of Article 84 EPC.

The Board wishes to stress however that, in view of the negative conclusion as to inventive step of this request (see below point 5), it was not necessary to

discuss at the oral proceedings whether or not such a lack of clarity could have been easily overcome by an amendment of claim 10 under Rule 88 EPC.

3. *Novelty of the subject-matter of the claims of the Respondents' main request*

The Board sees no reason to deviate from the decision of the Opposition Division that the maintained claims were in conformity with the requirements of Article 54 EPC.

It is not necessary to give further details since no objections were maintained by the Appellant in this regard during the appeal proceedings (see point VI above).

4. *Assessment of inventive step of the subject-matter of claim 1 of the Respondents' main request*

- 4.1 Claim 1 defines a polymer capsule suitable for use in a HDL detergent composition comprising a detergent sensitive active ingredient and a composite polymer, wherein the latter comprises hydrophobic polymer core particles, formed by emulsion polymerizable monomers that contain an ethylenically unsaturated group, and a hydrophilic polymer that is chemically or physically attached to the hydrophobic polymer core particles. The claim also specifies the chemical nature of the said hydrophilic polymer and its (weight) ratio to said hydrophobic core particles.

4.2 The Board finds that, to the person skilled in the art of polymer chemistry, it is immediately apparent that the definition of the capsule structure given in claim 1 implies at least the presence of two distinct domains made of polymers having different solubility in water (see also above point 1) and which are physically or chemically attached one to the other. This is also explicitly or implicitly confirmed by several passages in the specification of the patent in suit (see page 2, lines 25 to 27, lines 35 to 38 and 49 to 52).

In the following this structure will be also referred to as "contiguous polymer domains".

The fact that the claimed capsules comprise contiguous polymer domains and that such structure is also credibly present in the capsules produced according to the patent examples was not disputed by the Appellant at the hearing before the Board.

4.3 The Board observes:

- (a) that the patent in suit (see page 2, lines 14 to 16) addresses the technical problem of providing a HDL liquid detergent composition which comprises a detergent sensitive active ingredient (e.g. an enzyme), wherein the latter retains its activity during storage and yet is easily released when the liquid detergent composition is used by consumers for washing,
- (b) that the same technical problem has been addressed and solved by the polymer encapsulated enzyme disclosed in Document (2), and

(c) that the claimed polymer capsule has credibly provided a solution to that problem and, therefore, that it represents an alternative to the polymer encapsulated enzymes of Document (2).

This has not been disputed by the parties at the oral proceedings before the Board.

4.4 The parties did not agree however as to which embodiment of the prior art capsules disclosed in Document (2) had the structure closest to that of the capsules now claimed.

This citation discloses two alternative processes for encapsulating enzymes, as well as their combination in a two step process (see "and/or" in claim 1).

In the first process called "azeotroping" (which could also be the first step of the two step process) the final product may be an oil dispersion of polymer encapsulated enzyme, e.g. that formed while distilling off the water from a water-in-oil emulsion, wherein the aqueous phase comprises the enzyme and a film-forming polymer which may be soluble or insoluble in water, (see example 1, column 4, lines 31 to 33 and column 5, lines 13 to 29).

In the second process the enzyme is encapsulated by a coacervate polymer shell (see claim 1). In particular, when such a process represents the second step of the two step process, the oil dispersion of the polymer encapsulated enzyme formed by azeotroping is dispersed in an aqueous solution of coacervate-forming polymer(s)

in the form of little droplets, around which a coacervate coating of the latter polymer(s) is formed (see e.g. example 2 and column 8, lines 27 to 59).

While the Appellant maintained that the capsule produced at the end of the two step process, e.g. in example 2, contained a first polymer phase produced by azeotroping and a surrounding second polymer phase produced by coacervation, which could be alternatively regarded as the hydrophobic or the hydrophilic polymer mentioned in present claim 1, the Respondents relied in particular on the description at column 5, lines 17 to 46, of this citation which disclosed the use of an insoluble random copolymer of hydrophilic and hydrophobic monomers as film-forming polymer for the capsules formed by azeotroping. This latter was also the embodiment of this prior art considered more relevant by the Opposition Division.

- 4.5 With regard to the embodiment in Document (2) relied upon by the Appellant, the Board observes that it has a capsule structure substantially different from the contiguous polymer domains of the capsules of present claim 1, at least in that it comprises an oil phase interposed between the two different polymer layers.

With regard to the embodiment in this citation relied upon by the Respondents, the Board concurs with the Opposition Division (see point 4 of the decision under appeal) that the structure possibly resulting from the use in the azeotroping step of the insoluble random copolymer, described at column 5, lines 23 to 46, of Document (2), can only comprise a single homogeneous copolymer phase and is, therefore, also substantially

different from the structure of the capsule of claim 1 comprising different polymer domains.

The Board thus concludes that the capsules of present claim 1 differ from **all** prior art embodiments disclosed in Document (2) at least in that they have the contiguous polymer domain structure.

Therefore, the assessment of inventive step concerning the subject-matter of present claim 1 necessarily requires establishing whether or not the person skilled in the art would expect that the same advantageous properties of any of the capsules of Document (2), in respect of active ingredient protection during storage and easy active ingredient release during washing, could also be achieved in similar capsules with a contiguous domain structure.

- 4.6 The Board notes that Document (2) provides no explicit or implicit indication that, in addition to the complex structures of the encapsulated enzymes obtained by the processes disclosed therein, **other** capsules with substantially different structures might also be suitable for providing the desired combination of active ingredient protection in the HDL detergent composition during storage and easy active ingredient release under washing conditions.

Nor do any of the other available prior art documents disclose that polymer capsules containing contiguous polymer domains are not permeable to HDL detergent compositions and easy to dissolve under washing conditions. In particular, Document (1) is in this respect of no relevance, since it does not disclose any



polymer capsule suitable for use in liquid detergent compositions (but only for use in solid granulate detergent compositions, see the whole page 2, the claims and the examples).

These facts have not been disputed by the Appellant.

On the other hand, the Appellant's submission, that particles containing contiguous polymer domains of different hydrophilicity (such as e.g. the grafted polymers disclosed in Document (6)) were already well known to the person skilled in the art, does not necessarily imply that these well known particles would also form capsules with the advantageous combination of properties observed in the substantially different capsules of Document (2).

- 4.7 Hence, the Board finds that it was not obvious for the skilled person to expect that the combination of properties of the encapsulated enzymes of Document (2) could also be achieved in capsules with substantially different structures and, in particular, in those comprising a contiguous polymer domains.

Therefore, the Board comes to the conclusion that the presently claimed capsule, which comprises such contiguous polymer domains, provides a non-obvious solution to the existing technical problem (see point 4.3 above) and, thus, that the subject-matter of claim 1 is based on an inventive step.

5. *Assessment of inventive step of the subject-matter of claim 5 of the Respondents' main request*

5.1 Claim 5 does not specify the maximum water content of the claimed HDL detergent compositions (see point III of the Facts and Submissions).

The Board observes, therefore, that the claimed subject-matter encompasses HDL detergent compositions wherein, due the presence of too much water, substantially all the active ingredient will be inactivated during storage.

This has been admitted by the Respondents at the oral proceedings and is evident from the fact that the patent specification implicitly indicates that an amount of water of more than 80 wt% is critical (see page 9, lines 53 to 54).

5.2 It is self-evident that such compositions could not possibly represent a solution to the only technical problem addressed in the patent in suit. Moreover, since this problem had already been solved in the prior art (see point 4.3 above), these compositions could not even represent a technically meaningful alternative to the prior art in the relevant technical field.

Thus, the Board concludes that the subject-matter of claim (5) encompasses compositions not based on an inventive step vis-à-vis the prior art and hence that the Respondents' main request does not comply with the requirements of Article 56 EPC.

6. *Admissibility of the Respondents' first auxiliary request in view of the clarity of the claims*

6.1 Claims 3 and 4 of the main request are identical to the corresponding claims in the first auxiliary request. Therefore the Appellant's above-mentioned clarity objections (see point 2.1 above) apply equally to these claims.

6.2 However, for the same reasons indicated above at point 2.2, these objections cannot be discussed in the appeal proceedings.

7. *Novelty of the subject-matter of the claims of the Respondents' auxiliary request*

Since the five claims of the Respondents' auxiliary request are substantially identical to claims 1 to 4 and 11 of the patent as maintained, the conclusion given above at point 3 in respect of the novelty of the main request also applies to the subject-matter of the claims of the auxiliary request.

It is not necessary to give further details since no objections were raised by the Appellant in this regard during the appeal proceedings.

8. *Assessment of inventive step of the subject-matter of claim 1 of the Respondents' auxiliary request*

This claim 1 is identical to claim 1 of the patent as maintained by the Opposition Division and the subject-matter of which is based on an inventive step for the reasons given above at point 4.

9. *Assessment of inventive step of the subject-matter of claims 2 to 5 of the Respondents' auxiliary request*

These dependent claims define preferred embodiments of the capsule defined in the independent claim 1 and derive their patentability from it.

Thus the Respondents' auxiliary request is found to comply with the requirements of Articles 52(1) and 56 EPC.

**Order**

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

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of claims 1 to 5 of the auxiliary request filed during the oral proceedings and a description to be adapted thereto.

The Registrar:

The Chairman:

G. Rauh

P. Krasa