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**D E C I S I O N**  
of 30 September 1999

**Case Number:** T 1048/93 - 3.3.6

**Application Number:** 87100406.5

**Publication Number:** 0234221

**IPC:** C11B 3/10

**Language of the proceedings:** EN

**Title of invention:**

Method for refining glyceride oils using acid-treated  
amorphous silica

**Patentee:**

W.R. Grace & Co.-Conn.

**Opponent:**

SÜD-CHEMIE AG

**Headword:**

Refining glyceride oils/GRACE

**Relevant legal provisions:**

EPC Art. 123, 84, 54, 56

**Keyword:**

"Novelty - yes (after amendment)"  
"Inventive step - yes (after amendment)"

**Decisions cited:**

-

**Catchword:**

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Boards of Appeal

Chambres de recours

Case Number: T 1048/93 - 3.3.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.6  
of 30 September 1999

**Appellant:**  
(Opponent)

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

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**Decision under appeal:**

Interlocutory decision of the Opposition Division  
of the European Patent Office posted 13 October  
1993 concerning maintenance of European patent  
No. 0 234 221 in amended form.

**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** H. H. R. Fessel  
M. B. Günzel

## Summary of Facts and Submissions

- I. The appeal is from an interlocutory decision of the Opposition Division to maintain European patent No. 0 234 221 with Claims 1 to 7 received on 6 April 1993 (then first auxiliary request).
- II. These claims were submitted by the respondent (patent proprietor) in response to oppositions filed by Süd-Chemie AG (OI) and UNILEVER N.V. (OII) (of which the latter withdrew its opposition by letter dated 20 October 1992). The oppositions were based on lack of novelty and sufficiency of disclosure (Articles 100(a) and (b) EPC). They were supported inter alia by the following documents:
- D1: FR-A-2 241 613;
- D2: Fette Seifen und Anstrichmittel 84, No. 1 (1982), pages 15 to 17;
- D3: GB-A-612 169;
- D4: US-A-4 049 686;
- D6: JP-A-55 147 596, English translation;
- D8: Alfa-Laval AB, Res.Discl., Vol. 203, pages 110 to 111 (1981);
- D9: CA-A-1 157 883;
- D10: GB-A-1 509 664, and
- D11: Römpps Chemie-Lexikon, 8th Ed. (1983), pages 2107 to 2109.

III. The Opposition Division held that the subject-matter of said claims met the requirements of Article 123(2) and (3) EPC, as well as those of Articles 83 and 52(1) EPC. It considered D6 to represent the closest prior art and the problem underlying the present invention to provide an improved refining process for reducing the phospholipids to very low levels in glyceride oils. According to the Opposition Division, this problem was solved by impregnating with organic acid an amorphous silica as specified in Claim 1. That teaching did not form part of the cited prior art and was thus considered to be new since according to the only documents concerned with a combination of silica gel and phosphoric or citric acid (D3 and D7) these adsorbents were used for a different purpose. In D3 the purpose was to improve the bleaching of glyceride oils with oxygen and the purpose of D7 was to remove from used cooking oils contaminants resulting from food juices. In the light of such teachings a skilled person would not have considered that prior art when seeking to solve the above problem.

IV. The appellant (opponent I) filed an appeal and provided in support of his case the following new documents:

D13: US-A-2 176 851;

D14: (a) Chem.Abstr. 87 (1977), page 100, Ref. 87:  
86655y;

(b) English translation of the original Russian publication;

D15: DE-A-2 360 146, and

D16: Römpps Chemie-Lexikon, 8th Ed. (2985), pages 3159 to 3160.

D20: Ullmanns Encyklopädie der technischen Chemie,  
4. Auflage, Band 11 (1976), pages 483 and 484, and

D21: Ullmanns Encyklopädie der technischen Chemie,  
4. Auflage, Band 23 (1983), pages 322 and 323;

.The respondent submitted:

D22: a report presented on the World Conference on  
Processing Palm, Palm Kernel & Coconut Oils, 11 to  
16 November 1984, Kuala Lumpur, Malaysia.

The last three citations were only submitted during  
oral proceedings, which took place before the Board on  
30 September 1999.

V. In response to a communication from the Rapporteur  
indicating that novelty of the claimed compositions had  
to be discussed in the oral proceedings the respondent  
filed with his letter dated 30 August 1999 a new main  
and various auxiliary requests. During oral proceedings  
all former requests, including that to remit the case  
to the opposition division, were replaced by a new main  
and 8 auxiliary requests. Independent Claims 1 and 5 of  
the main request read as follows:

"1. A refining process for the removal of trace  
contaminants, specifically phospholipids and associated  
metal ions, from glyceride oils by adsorbing said trace  
contaminants onto organic acid-treated amorphous silica  
to yield glyceride oils having commercially acceptable  
levels of said trace contaminants, comprising:

(a) selecting a glyceride oil with a phosphorous  
content in excess of 1.0 ppm up to 200 ppm,

- (b) selecting an adsorbent comprising a suitable amorphous silica selected from the group consisting of silica gels, precipitated silicas, dialytic silicas and fumed silicas having an effective average pore diameter from 6 nm (60 Å) to 500 nm and a BET surface area between 100 and 1200 m<sup>2</sup>/g which has been treated with an organic acid, in such a manner that at least a portion of that organic acid is retained in the pores of the silica and which has a total volatiles content of at least 10%,
- (c) contacting the glyceride oil of step (a) and the adsorbent of step (b) in the absence of solvents,
- (d) allowing that trace contaminants to be adsorbed onto said adsorbent, and
- (e) separating the resulting phospholipid- and metal ion-depleted glyceride oil from the adsorbent.

5. A composition for use in the process of claims 1 to 3, consisting of amorphous silica selected from the group consisting of silica gels, precipitated silicas, dialytic silicas and fumed silicas having an effective average pore diameter from 6 nm to 500 nm and a BET surface area between 100 and 1200 m<sup>2</sup>/g, whose pores contain an organic acid selected from the group consisting of citric acid, tartaric acid, and ascorbic acid and which has a total volatile content of at least 10%."

Claims 2 to 4 and 6 relate to subject-matter dependent thereupon.

Novelty of the process claims was not under dispute. As to the compositions of Claim 5 the appellant acknowledged their novelty during oral proceedings.

The appellant disputed that the claimed process involved any inventive step vis-à-vis the teaching provided by D6, D22 and D2 in view of the common general knowledge of a person skilled in that art, evidenced by D20 and D21.

The respondent submitted that none of the cited documents gave any hint to the positive effect resulting from the combination of an adsorbent and of an organic acid as claimed. Based on D22, he disputed that the general knowledge alleged by the appellant existed in reality.

- VI. The appellant requested that the decision under appeal be set aside and that the European patent No. 0 234 221 be revoked.

The respondent eventually requested as main request that the decision under appeal be set aside and that the patent be maintained on the basis of the request filed as first auxiliary request in the oral proceedings. As auxiliary requests 1 to 7 the respondent requested that the patent be maintained on any of requests 2 to 8 filed in the oral proceedings, taken in their consecutive order.

### **Reasons for the Decision**

1. The Board admitted late filed documents D20 and D21 since these encyclopaediae were intended to support the allegation of the existence of common general knowledge. D22, not being a handbook, was admitted since it was used as evidence for rebutting such allegation.

*Main request*

2. Claims 1 and 5 were amended in the appeal proceedings. Claim 1 differs from the claim on which the decision under appeal was based in that an upper limit of the phosphorus content of the glyceride oil (a) of "up to 200 ppm" and an upper limit of the pore size of the adsorbent (b) of "500 nm" as well as a BET surface area between "100 and 1200 m<sup>2</sup>/g" was introduced. The Board is satisfied that said amendments are supported by page 4, line 16 (degummed) in conjunction with Table 1 (degummed, i.e. 60-200) in the application as filed corresponding to page 2, line 57 and page 3, Table 1 of the patent specification. The BET range of 100-1200 is disclosed on page 9, line 15 of the original application (page 4, line 33 of the patent specification).

Amendments to Claim 5 were the addition of the above-mentioned BET surface, the specification of the organic acid by the addition of "selected from the group consisting of citric acid, tartaric acid, and ascorbic acid" as disclosed in Claim 10 of the application as filed (Claim 8 of the patent specification). In this context the deletion of acetic acid is not objectionable under Article 123(2) EPC.

In addition thereto the claimed composition now **consists** of the specified amorphous silica whereas in the former claim it **comprised** the specified amorphous silica. This amendment too does not extend the claimed subject-matter beyond the content of the application as filed (Article 123(2) EPC).

Since these amendments amount to a restriction of the claimed subject-matter, the provisions of Article 123(3) EPC are met.



3. The Board is satisfied that the subject-matter of the independent Claim 5 was not disclosed in the cited prior art which was no longer disputed. A detailed reasoning is thus not necessary.
  
4. The patent in suit concerns a method for refining glyceride oils using acid-treated amorphous silica and purifying compositions used therefore. More specifically the refining process concerned the removal of trace contaminants, specifically phospholipids and associated metal ions (see Claim 1).
  - 4.1 D6, relating to a method of purifying gum-containing fat/oil and a purifying agent used therefor, has been agreed by the Board and the parties to represent the most relevant prior art. This document discloses a method of purifying gum-containing plant fat/oil. As is specified in Claim 9, the purifying agent is a fluid powder prepared by impregnating 3-300% by weight (based on inorganic porous carrier) of degumming acid into the inorganic porous carrier wherein "the porous volume of 100A or larger radius as measured by the pressurized mercury method is 0.2 cc/g or more and the number average particle size is 0.5 mm or smaller". As specified in Claim 10, the degumming acid in the purifying agent is phosphoric acid and the inorganic porous carrier is diatomaceous earth. Among the oils to be used as starting materials in the claimed process are those containing less than 200 ppm gum composed mainly of phosphatides (see page 6, second paragraph in conjunction with Table 1). On page 7, lines 1 and 2 in conjunction with page 8, lines 6 to 8 citric acid or other organic acids are suggested as degumming acid. Further inorganic porous carriers to be preferably used, are specified on page 8, last full paragraph. The synthetic amorphous silicas specified in Claim 1 of the patent in suit which are used in Claim 1 in combination with organic acids are not mentioned in the citation.

- 4.2 The problem underlying the patent in suit vis-à-vis that prior art can be seen in the provision of an improved process, i.e. a process with increased efficiency to reduce the amount of phospholipids and metal ions.
- 4.3 With regard to the patent specification, especially the experimental results provided in Tables VI and VII, the Board is satisfied that said problem has been plausibly solved when using a specific adsorbent containing the organic acids in its pores as specified in feature (b) of Claim 1.
- 4.4 The appellant alleged the problem to be a less ambitious one, i.e. to provide an alternative process to that known from D6. He did, however, not produce any evidence (arguments) refuting the above accepted improvement. Therefore, the Board sees no reason to reformulate the above defined problem. It has now to be decided whether the claimed solution to the existing problem involves an inventive step.
5. As demonstrated in Table VI by comparison of adsorbents 1 to 4 with adsorbents 5 and 6 (adsorbents of the type as suggested in D6), the organic acid treated adsorbents defined in Claim 1 of the patent in suit display improved phospholipid reducing activities as compared with organic acid treated adsorbents known from page 8 penultimate paragraph of D6. Table VII, on the other hand, demonstrates that organic acid treated adsorbents according to the patent in suit have superior phospholipid reducing properties than the respective inorganic acid treated, in particular phosphoric acid treated adsorbents. It is evident from the latter table that organic and inorganic acids are not equivalent as a skilled worker would expect from the teaching provided by D6 when they are used in combination with the particular adsorbents specified in

Claim 1 of the patent in suit. It follows that D6 alone does not hint at the improvement achieved with the particular combination of adsorbent and organic acid as claimed in the patent in suit.

The appellant argued that a skilled person having the common general knowledge as that disclosed in D20 and D21 would have expected the claimed adsorbent to provide that improvement when reading D6 in the light of that knowledge. The common knowledge based thereupon was, however, limited to activated and inactivated bleaching earth and was silent as to synthetic silica as claimed and was also silent as to the effect of a combination with organic acid. Therefore, the Board cannot accept that the effect demonstrated in Tables VI and VII of the patent specification could have been expected by those skilled in the art, even if it was accepted that they had the alleged skills.

It is, thus, not necessary to decide whether or not the existence of the alleged common general knowledge was to be questioned in view of D22.

For these reasons, the Board concludes that neither D6 alone nor in conjunction with the alleged common general knowledge gave a skilled person any hint to the claimed solution.

- 5.1 D1 and D14 relate to a solvent-based process and do not mention adsorbents treated with acid. Thus they can neither alone nor in combination with D6 hint at the claimed process.

- 5.2 D2 concerns a process for column chromatographic separation of phospholipids from total lipid extracts. A solvent is used in that process. For this reason alone that process cannot hint at the claimed process.
- 5.3 D3 describes the bleaching of fatty oils and fats by use of phosphoric acid. Since the use of organic acids was neither mentioned nor hinted at, the claimed solution is not foreshadowed in this document.
- 5.4 D4, D8 and D9 describe adsorbent-free degumming processes and thus do not lead the skilled person, alone or in combination with any of the other citations, to the claimed process.
- 5.5 D10 and D13 do not mention adsorbents treated with an acid let alone an organic acid and, thus comprise no incentive for the skilled person to try the claimed solution.
- 5.6 D15 discloses a second degumming step using organic or phosphoric acid together with an adsorbent such as silica gel loaded with 10 to 20% of that acids (page 8, first paragraph). The process relates to the production of edible oils with a natural yellow golden colour and does not hint at any preference of organic vis-à-vis inorganic acids or the need to use silica gels having a specific amorphous structure when seeking to solve the above problem.

For the reasons given above, the Board concludes the subject-matter of Claim 1 to involve an inventive step. Since the subject-matter of dependent Claims 2 to 4 comprises all the features of the subject-matter of Claim 1 its patentability is supported thereby. The compositions of Claims 5 and 6 are essential for the unexpected improvement resulting from the process claimed which was considered to involve an inventive

claimed which was considered to involve an inventive step. Consequently the compositions as such involve also an inventive step, since they are causative for that unexpected effect.

**Order**

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

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of the request filed as first auxiliary request in the oral proceedings and a description to be adapted.

The Registrar:



G. Rauh

The Chairman:



P. Krasa

Kg Je 11/07/00  
gu 12.7.

