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**Datasheet for the decision  
of 2 July 2012**

**Case Number:** T 1014/07 - 3.3.04

**Application Number:** 98948100.7

**Publication Number:** 1114174

**IPC:** C12P 7/44, C12N 1/16

**Language of the proceedings:** EN

**Title of invention:**  
Process for making polycarboxylic acids

**Applicant:**  
Cognis IP Management GmbH

**Headword:**  
Saturated dicarboxylic acids/COGNIS

**Relevant legal provisions:**  
EPC Art. 123(2), 84, 83, 56, 54

**Keyword:**  
"Main request - added subject-matter (no); clarity, support,  
sufficiency of disclosure, novelty, inventive step (yes)"



Case Number: T 1014/07 - 3.3.04

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.04  
of 2 July 2012

**Appellant:** Cognis IP Management GmbH  
(Applicant) Henkelstrasse 67  
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**Representative:** Popp, Andreas  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 29 November 2006  
refusing European patent application  
No. 98948100.7 pursuant to Article 97(1) EPC  
1973.

**Composition of the Board:**

**Chairman:** C. Rennie-Smith  
**Members:** G. Alt  
B. Claes

## Summary of facts and submissions

I. This is an appeal by the applicant (hereinafter "appellant") against the decision of the examining division whereby the European patent application No. 98 948 100.7 published as International application No. WO 00/15828 was refused pursuant to Article 97(1) EPC. The application has the title "Process for making polycarboxylic acids".

II. The following documents are cited in the present decision:

D1 US 5,620 878

D2 US 5,254 466

D3 US 5,470,741

D4 US 2,813 113

D5 US 2 450 858

D6 Bio/Technology, 1992, vol. 10, pages 894-898,  
Picataggio, S. et al.

D7 US 4 447 882

D9 JAOCS, 1988, vol. 65, no. 4, pages 611-615,  
Zaidman, B. et al.

III. In the decision under appeal the examining division considered a single set of claims comprising an

independent claim and nine other claims dependent thereon. The independent claim 1 read:

"1. A process for making a saturated dicarboxylic acid comprising the steps of: (1) fermenting a beta-oxidation blocked *C. tropicalis* cell wherein both copies of the chromosomal POX5 gene and the chromosomal POX4A and POX4B genes are disrupted in a culture medium comprised of a nitrogen source, an organic substrate and a cosubstrate wherein said substrate is an unsaturated aliphatic compound having at least one internal carbon-carbon double bond and at least one terminal methyl group, a terminal carboxyl group and/or a terminal functional group which is oxidizable to a carboxyl group by biooxidation to form an unsaturated dicarboxylic acid having one or more carbon-carbon double bonds in a carbon chain terminated by at least one of the carboxyl groups of said dicarboxylic acid; (2) reacting said unsaturated dicarboxylic acid with an oxidizing agent to produce one or more saturated dicarboxylic acids."

IV. Inventive step was the only issue dealt with in the decision under appeal. The examining division decided that claim 1 lacked an inventive step for the following reasons.

Document D4 was the closest prior art document disclosing the oxidation by means of ozone and oxygene of the carbon-carbon double bond of oleic acid to produce the saturated dicarboxylic acid azalaic acid.

The problem to be solved was the provision of an alternative process to produce saturated dicarboxylic

acids. According to the subject-matter of claim 1 this problem was solved by reacting an unsaturated aliphatic compound with a mutated strain of the fungus *Candida tropicalis* to obtain an unsaturated dicarboxylic acid which was subsequently reacted with an oxidizing agent to produce one or more saturated dicarboxylic acids.

The examining division considered this to be an obvious solution to the formulated problem because (see page 2 of the written reasons for the decision under appeal):

"D4 differs from the process of the present invention in that the biooxidation of unsaturated aliphatic compounds to produce unsaturated dicarboxylic acid compounds is not disclosed.

D6 discloses a biochemical process to produce unsaturated dicarboxylic acids (e.g. 9-octadecenedioic acid from oleic acid).

D1, D2 and D7 also disclose the biooxidation of unsaturated aliphatic compounds to obtain unsaturated dicarboxylic acids under the same conditions as in the present invention.

A skilled person willing to reproduce the invention and facing the disclosures of the cited documents would combine the process disclosed in D4 with the process disclosed in D6 (or D1, D2 and D7) in order to arrive at the proposed process.

In addition the oxidation of unsaturated compounds (oleic acid) in order to produce azelaic acid in the presence of ozone as oxidizing agent is also well

documented in D5 and D9. D9 discloses the particular transformation of oleic acid to azelaic acid as in the present invention.

The mere fact that a **known** biochemical step has been added to a **known** chemical process of oxidation cannot be considered in itself inventive in the absence of a special feature or advantage of the combined use of biochemical and chemical processes. The claimed subject matter is therefore, obvious and cannot be regarded as involving an inventive step." (Emphasis in original)

- V. With its statement of the grounds of appeal the appellant submitted arguments explaining why the examining division was wrong in arriving at the decision that the subject-matter of the claim request before them lacked an inventive step. The appellant refiled a copy of the main request and a new auxiliary request.
- VI. In a submission dated 5 June 2012 the appellant withdrew its request for oral proceedings on the condition that the board found that the claims of the main request met the requirements of the EPC
- VII. In a communication dated 23 April 2012 the board informed the appellant that claims 6 and 10 of the main request apparently related to the same subject-matter. In response the appellant filed a letter dated 20 June 2012 with a new main request which corresponded to the previous main request except that dependent claim 10 was deleted.

VIII. The appellant's arguments may be summarized as follows:

Document D4 was the closest prior art document.

The objective problem to be solved was "to provide an improved process to make saturated dicarboxylic acids, whereby the improvement is the absence of by-products, namely the perlagonic [sic] acid" (see page 4 of the statement).

Document D4 disclosed in particular the conversion with ozone and oxygene of the unsaturated monocarboxylic acid oleic acid into the saturated dicarboxylic acid azelaic acid. A by-product of this reaction was pelargonic acid. Although this treatment involved two different chemical reactions - ozonization and oxydation - there was no incentive for the skilled person to consider a change of one of these two chemical steps by another reaction, especially not the biooxidation disclosed in document D6 or in any of documents D1, D2, D7.

But even assuming that the skilled person would consider such an exchange, he or she would replace the step after, and not, as claimed, before, the ozonization by the biooxidation step. Thus, even if the teachings of documents D4 and D6 were combined, they would not result in the claimed process.

Moreover, none of the other documents, in particular documents D5 and D9, gave the skilled person any further information which would lead him in an obvious manner to the claimed process.

IX. The appellant requested that the decision of the examining division be set aside and that the case be remitted to the first instance with the order to grant a patent on the basis of claims 1 to 9 of the main request filed with its letter of 20 June 2012 or on the basis of claims 1 to 8 of the auxiliary request filed with its letter of 22 March 2007.

## **Reasons for the decision**

### Main Request

1. The nine claims of the present main request are identical with claims 1 to 9 of the request dealt with in the decision under appeal. The only issue considered in the decision under appeal is inventive step. Therefore, since the appellant's main request is that the decision of the examining division be set aside, the first issue the board will deal with is whether or not the reasons in the decision under appeal for finding that the claimed subject-matter lacked an inventive step are persuasive.
2. The invention as claimed pertains to a process for producing saturated dicarboxylic acids from unsaturated aliphatic compounds, such as for example triglyceride oil (Example 4) or mono-carboxylic fatty acids, such as for example oleic acid (Examples 1 to 3). The starting compound is converted first in a fermentation reaction with a mutated strain of the fungus *Candida tropicalis* to an unsaturated dicarboxylic acid. This product is in a second step reacted with an oxidizing agent to produce the saturated dicarboxylic acid. A specific



example of this process is the conversion of oleic acid via 9-octadecenedioic acid to azelaic acid (Examples 1 to 3; claim 3).

3. The examining division considered document D4 as the closest prior art document in relation to the claimed invention. The appellant agrees with this view and also the board has no reason to differ.
4. Document D4 discloses in particular a process for the manufacture of the saturated fatty acid azelaic acid from the unsaturated fatty acid oleic acid. The process relies on the use of ozone and oxygen in order to cleave the double bond of oleic acid and convert it into two carboxyl end groups. The end products of this reaction are (i) the saturated dicarboxylic acid azelaic acid and (ii) the saturated mono-carboxylic acid pelargonic acid.
5. The appellant formulated the problem to be solved in view of the closest prior art document as the provision of "an improved process to make saturated dicarboxylic acids, whereby the improvement is the absence of by-products, namely the perlagonic acid" (see section V above).

However, given that claim 1 is not restricted to the manufacture of azelaic acid from oleic acid, the absence of pelargonic acid is an improvement that is not shared by all embodiments of claim 1. Therefore, the problem formulated by the appellant cannot be considered as the objective technical problem (see Case Law of the Boards of Appeal, 6th edition 2010, I.D.4.4, 8th paragraph).

6. In the board's view, the objective technical problem, i.e. a problem which is derivable from the application as filed and which is solved by substantially all embodiments of the claims, may be formulated as the provision of an improved process to make saturated dicarboxylic acids, whereby the improvement is the absence of mono-carboxylic by-products.
  
7. When considering whether or not claimed subject-matter constitutes an obvious solution to an objective technical problem, according to established case law the question to be answered is whether or not the skilled person, in the expectation of solving the problem, would have modified the teaching in the closest prior art document in the light of other teachings in the prior art so as to arrive at the claimed invention (see Case Law of the Boards of Appeal, 6th edition 2010, I.D.5, 4th paragraph).
  
8. Since this question involves determining whether or not the skilled person would - and not could - have made a particular modification, it is necessary for answering the question to identify conclusive reasons on the basis of tangible evidence that would have prompted the skilled person to act in one way or the other.
  
9. In the decision under appeal the examining division holds that the subject-matter of claim 1 is obvious on the basis of the reasoning quoted in the present decision (see section IV, paragraphs 1 to 4). In brief, the examining division identifies the difference between the relevant disclosure in the closest prior art document D4 and the claimed invention, finds that

prior art documents D1, D2, D6 and D7 disclose the "missing" features and then states that "[a] skilled person willing to reproduce the invention and facing the disclosures of the cited documents would combine the process disclosed in D4 with the process disclosed in D6 (or D1, D2 and D7) in order to arrive at the proposed process".

10. Thus, essentially, the examining division considers the subject-matter of claim 1 as obvious for the reason that each of the claimed features has been disclosed in the prior art. However, the mere existence of teachings in the prior art is not a conclusive reason for explaining that the skilled person would have combined these teachings in order to solve the problem that he or she is confronted with (see Case Law of the Boards of Appeal, 6th edition 2010, I.D.8.2.1, in relation to combination inventions).
  
11. As a further reason for denying an inventive step for the claimed subject-matter the examining division indicated that "[t]he mere fact that a **known biochemical step** has been added to a **known chemical process of oxidation** cannot be considered in itself inventive in the absence of a special feature or advantage of the combined use of biochemical and chemical processes" (see section IV, last paragraph; emphasis as in the decision under appeal).
  
12. However, as observed above in point 10 for the determination of the obviousness or non-obviousness of claimed subject-matter, it is not decisive that teachings are known - it must be decided whether or not the skilled person would have combined the known

teachings such as to arrive at the claimed subject-matter when attempting to solve the underlying technical problem. Thus, in contrast to the examining division's view, the combination of known teachings may result in non-obvious subject-matter, namely when the skilled person is not motivated, for example by promptings in the prior art, to make such a combination. Under these circumstances the presence of any special effect arising from the combination is not necessary to establish an inventive step.

13. It follows from the observations in points 9 to 12 above that the reasons given in the decision under appeal do not persuade the board that the subject-matter of the present main request lacks an inventive step.
14. Hence, the appellant's request to set aside the decision under appeal (see section IX above) is granted.
15. The appellant further requests that the case be remitted to the first instance with the order to grant a patent on the basis of claims 1 to 9 of the main request (see section IX above). This request could only be granted if the board was convinced that the request fulfils all the requirements of the EPC necessary for the grant of a patent.
16. The decision under appeal does not give an opinion on the requirements of Articles 123(2), 84, 83 and 54 EPC. Moreover, that the reasons in the decision under appeal do not support the examining division's decision that the claimed subject-matter lacks an inventive step (see the board's observations above in points 4 to 13), does

not necessarily mean that the claimed subject-matter has to be considered to involve an inventive step since there may be other reasons for which the claimed subject-matter lacks an inventive step.

The board has therefore considered remitting the case to the first instance for further prosecution in accordance with Article 111(1) EPC, last half sentence, but decided not to do so for reasons of procedural efficiency.

17. Thus, in accordance with Article 111(1) EPC, first half sentence of its second sentence, the board finds, first, that the amended subject-matter of claims 1 to 9 does not extend beyond the content of the application as filed. A basis is found in claims 22 to 24, 28 to 30, 32 to 36 as filed (reference is here and below to the published version of the International application).
18. Second, the board considers that the wording of the claims is clear and that the claimed subject-matter is supported by the description as required by Article 84 EPC.
19. Third, in view of the general description of the invention, in particular page 4, line 12 to page 9, line 4, the eighteen examples and given the fact that the "UnLipase from Geotrichum candidum ATCC No. 74170" referred to in claims 8 and 9 was known at the priority date (see for example document D3), the board considers that the claimed subject-matter is disclosed in a manner sufficiently clear and complete for it to be carried out so that the requirements of Article 83 EPC are fulfilled.

20. Fourth, the subject-matter of all claims is novel. None of the documents available in the present proceedings discloses a process for making saturated dicarboxylic acids from an unsaturated aliphatic compounds by the two separate steps of (i) the addition of carboxyl groups through the activity of a micro-organism and (ii) the oxidation of the double bond by an oxidizing agent.
21. Finally, concerning the requirement of an inventive step pursuant to Article 56 EPC the board has further evaluated the evidence considered as relevant in the decision under appeal, i.e. documents D1, D2, D4 to D7 and D9, for reasons that would or would not motivate the skilled person to solve the underlying problem, i.e. the provision of an improved process to make saturated dicarboxylic acids, whereby the improvement is the absence of mono-carboxylic by-products (see point 6 above), in the claimed way.
22. It is disclosed in document D4 that the by-product of the production of azelaic acid from oleic acid, i.e. pelargonic acid, is re-used in the production circle (see column 8, lines 10 to 12):
- "The oleic acid is fed continuously to the absorber where it is diluted with 500 pounds of pelargonic acid from a previous run."
23. According to documents D5 and D9 which are also concerned with oxidation of oleic acid to produce azelaic acid (yet with oxidizing agents different from those disclosed in document D4) the generation of by-products such as pelargonic acid is mentioned and,

apparently satisfactorily, processes for their removal are disclosed.

- 23.1 It is for example stated in document D5, column 7, lines 8 to 28:

"Having then a body consisting of dibasic, monobasic and by-product acids in the commingled state substantially free of oxidizing agent or sulphonation products, the pelargonic acid is the first to be removed. This is performed preferably by a topping distillation operation. The pelargonic acid is evaporated and the vapours condensed and isolated as the first product, leaving in liquid admixture the azelaic acid and whatever higher molecular weight monobasic acids may be present as by-products of the oxidation process, or which were initially present in the material being treated.

Upon removal of the pelargonic acid, the azelaic acid and commingled by-product acids are washed with hot water a plurality of times. This step causes the azelaic acid to be dissolved in the wash water. The by-product acids are insoluble in the water and this step, therefore, enables the by-product acids to be separated and recovered by decanting."

- 23.2 Further, it is for example stated in document D9, page 613, first column, lines 3 to 9:

"The organic phase was extracted with hot water and the azelaic acid was separated in the aqueous solution. The remaining organic phase consists of pelargonic acid (70%), dehydroxy stearic, stearic, palmitic and

myristic acids. The pelargonic acid may be separated by distillation from this mixture."

24. In the light of such teachings in documents D4, D5 and D9 the board considers that none of them conveys that in the framework of a process for the production of saturated dicarboxylic acids an improvement of the process of removing mono-carboxylic by-products is worth consideration. Therefore, none of the disclosures in any of documents D4, D5 or D9 can be interpreted as giving the skilled person an incentive to replace the measures disclosed in these documents for the removal of by-products by different, in particular better, ones, and in particular not by biooxidation with a mutated strain of *Candida tropicalis*, and moreover not before the treatment with the oxidative agent.
25. Documents D1, D2, D6 and D7 are solely concerned with the de novo production of unsaturated dicarboxylic acids by fermentation with a mutated strain of *Candida tropicalis*. Thus, none of the disclosures in any of these documents can be interpreted as contemplating the use of this strain for the removal of mono-carboxylic by-products in a process for the production of saturated dicarboxylic acids.
26. Hence, the board concludes that nothing in documents D4, D5, D9 on the one hand and documents D1, D2, D6 or D7 on the other hand would prompt the skilled person to combine their teachings. Hence, the subject-matter of claim 1 and dependent claims 2 to 9 of the main request is considered not to be obvious and therefore involves an inventive step in accordance with Article 56 EPC.



27. Consequently, the appellant's request that the case be remitted to the first instance with the order to grant a patent on the basis of claims 1 to 9 of the main request (see point 15 above) is granted.

## **Order**

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

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent on the basis of claims 1 to 9 of the main request filed with the letter dated 20 June 2012 and a description to be adapted thereto.

The Registrar:

The Chairman:

T. Buschek

C. Rennie-Smith