

Veröffentlichung im Amtsblatt	<del>Ja</del> /Nein
Publication in the Official Journal	<del>Yes</del> /No
Publication au Journal Officiel	<del>Oui</del> /Non

Aktenzeichen / Case Number / N° du recours : T 400/88 - 3.3.2

Anmeldenummer / Filing No / N° de la demande : 83 303 338.4

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 098 065

Bezeichnung der Erfindung: **Production of catalysts**

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : B01J 37/00

**ENTSCHEIDUNG / DECISION**

vom / of / du 22 July 1990

Anmelder / Applicant / Demandeur : Imperial Chemical Industries PLC

Patentinhaber / Proprietor of the patent /

Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ/EPC/CBE Article 54

Schlagwort / Keyword / Mot clé : "Product-by-process claim - novelty (no)"

Leitsatz / Headnote / Sommaire



Case Number : T 400/88 - 3.3.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.2  
of 22 July 1990

**Appellant :** Imperial Chemical Industries  
Imperial Chemical House  
Millbank  
London SW1P 3JF  
GB

**Representative :** Locke, Timothy John  
Imperial Chemical Industries PLC  
Legal Department: Patents  
Bessemer Road  
PO Box 6  
Welwyn Garden City  
Hertfordshire, AL7 1HD  
GB

**Decision under appeal :** Decision of Examining Division 033  
of the European Patent Office  
dated 7 June 1988 refusing European  
patent application No. 83 303 338.4  
pursuant to Article 97(1) EPC

**Composition of the Board :**

**Chairman :** P. Lançon  
**Members :** U. Kinkeldey  
M. Lewenton

## Summary of Facts and Submissions

- I. European patent application No. 83 303 338.4 with publication No. 98065 was refused by a decision of the Examining Division. The decision was based on Claims 1-7, filed on 22 September 1987. Claim 7 reads as follows:

"Catalysts whenever produced by a process as claimed in any preceding claim."

The process in question relates to the production of a vanadium/phosphorus mixed oxide catalyst for the oxidation of C<sub>4</sub> hydrocarbons to maleic anhydride by milling a mixed oxide oxidation catalyst precursor in the substantial absence of liquid until its mean crystallite size is at most 1000 Å and is then formed into catalyst pellets.

- II. The ground for refusal was that the subject-matter of Claim 7 lacked novelty with regard to prior art document GB-A-2 019 839 (document (1)). Claims for products defined in terms of a process of manufacture were admissible only if the products as such fulfilled the requirements for patentability. From page 3, lines 4 to 6 of the description of the published patent application it was clear that catalysts as claimed in Claim 7 were already known from document (1).
- III. The Appellants filed a notice of appeal against this decision together with the payment of fees and a statement of grounds.
- IV. With the notice of appeal, a main request and two auxiliary requests were submitted. The set of claims for the main request is the one rejected by the Examining Division in its impugned decision; the first auxiliary

request is based on Claims 1 to 6 being identical to the claims of the main request, whereas Claim 7 reads as follows:

"7. The use of a catalyst produced by a process as claimed in any preceding claim in the oxidation of hydrocarbons to carboxylic acid anhydrides."

The second auxiliary request is a set of Claims 1 to 6 being identical with Claims 1 to 6 of the main request.

The arguments put forward by the Appellants during the appeal procedure can be summarised as follows:

The statement of the Examining Division in its decision and the preliminary opinion of the Rapporteur summarised in a communication, were contested because the product as claimed in Claim 7 was novel over the prior art document (1). The specification of the refused patent application showed in its examples the product of the process to have had an improvement in efficiency compared with the products of document (1) and thus the products should have been taken as being different in nature. A valid comparison of selectivities between the dry-milled catalyst of the refused patent application and the wet-milled catalyst of document (1) was not possible. Selectivities had to be quoted at constant conversion to make them comparable. The apparently high selectivity values showed in the examples of document (1) were due to the low conversion figures used. Since selectivity was related negatively to conversion, it was clear that lower conversion figures would result in high selectivities. Although a strict quantitative comparison was not possible, and in any event ratios of hydrocarbon/oxygen in the feedstocks in the refused patent application and the

document (1) process were different, it is immediately apparent that the combination of a high conversion and a high selectivity in the case of the present invention provided at least qualitative evidence for the superior activity of catalysts prepared by dry-milling. This must indicate that the wet-milled and dry-milled catalysts were different in kind.

Further, arguments were submitted with regard to novelty and inventive step of process Claim 1.

Finally, reimbursement of the appeal fees was requested on the grounds of a substantial procedural violation by the Examining Division by refusing the patent application already after the first communication. The Examiner violated Article 96(2) EPC, which required the Examining Division to "invite the applicant, in accordance with the Implementing Regulations and as often as necessary to file his observations ..." and the Guidelines, Part C-VI, 7.6, which stated the obligation of the Examining Division to communicate to the applicant that possibly the Examining Division is of the opinion that the application should be refused on certain grounds unless satisfactory amendments were submitted within the stated period. It was clear that a suitable amendment was readily available and that the mentioned procedure should have been followed.

- V. The Appellants request that the decision under appeal be set aside and that the patent be granted on the basis of the main request or on the basis of the first and second auxiliary request respectively. Further reimbursement of the appeal fee is requested.

## Reasons for the Decision

1. The appeal is admissible.

2. **Main request**

The subject-matter of rejected Claim 7 of the refused patent application are catalysts whenever produced by a process as claimed in any claims preceding Claim 7. This claim is thus a "product-by-process" claim which is allowable with regard to Article 84 EPC according to the established case law of the Boards of Appeals, if the patent application does not contain information making it possible for the applicant to define the product by its composition, its structure or other testable parameters (T 150/82, OJ EPO 1984, 309; T 251/85 of 19 May 1987; T 248/85, OJ EPO 1986, 261).

3. The product-by-process claim here in question implicitly, by being referred back to any of the process Claims 1 to 6, is defined by testable parameters contained in the process claims to which the product-by-process claim refers, i.e. the vanadium/phosphorus mixture and a mean crystallite size of at most 1000 Å (according to Claim 1); a ratio of vanadium to phosphorus in the range of 0.7:1 to 1.2:1 (according to Claim 2); a vanadium/phosphorus mixed oxide in which the valency of the vanadium is in the range 4 to 5 (according to Claim 3); a vanadium/phosphorus mixed oxide of which at least 30% is present at phase A, phase X and/or phase B (according to Claim 4); at least 50% of the vanadium/phosphorus mixed oxide being present as phase A, phase X and/or phase B (according to Claim 5); and its mean crystallite size being at most 500 Å (according to Claim 6).

4. The Appellants submitted that the only feature of the catalysts which may distinguish the claimed catalyst from those of document (1) cannot be described in physical or structural parameters, but only in terms of the decisive process step, namely milling a mixed oxide oxidation catalyst precursor in the substantial absence of liquid as said in process Claim 1, because a different structure of the dry-milled catalysts had not been investigated. The process feature in Claim 7, therefore, serves the purpose of distinguishing the product of Claim 7 from the product described in document (1). The question of the admissibility of the product-by-process Claim 1 in the present circumstances, however, can be left undecided because of the following reasons:
5. As repeatedly decided by Boards of Appeal (see decisions above, paragraph 2), "product-by-process" claims have to be interpreted in an absolute sense, i.e. independently of the process. They have, thus, to be examined as any other product claim, namely whether or not the claimed product fulfills the basic requirements of novelty (Article 54 EPC) and inventive step (Article 56 EPC).
6. The Appellants submitted that the catalysts prepared by the method according to document (1), which is wet-milling, must be different in structure from the catalysts claimed in Claim 7, which are defined by the method of their production, namely dry-milling. Differences in structure may be recognisable by, for example, measurable parameters; information of that kind is not available in the present case. Differences in structure may further be recognisable by different effects of products to be compared. The Appellants rely on this argument. Questioned by the Board in a communication, they submitted that examples 1 and 2 in the description of the refused patent application provide a valid comparison between the wet-milled and the dry-milled catalysts. A comparison of

the values of selectivity of the catalysts between the examples contained in document (1) and the examples of the refused patent application, as carried out by the Rapporteur in the communication, were said not to be proper.

It is, however, clear that the Appellants have to make it plausible that the products claimed in their patent application are novel in comparison with the products disclosed in the prior art, i.e. in document (1). If, indeed, a comparison of the selectivity values as such is not proper, but rather other features such as conversion have to be taken into account also, it is up to the Appellants to provide the Board with data which compares products of the prior art with those claimed also with respect to the further features.

7. Document (1) describes wet-milled vanadium/phosphorous catalysts and contains seventeen examples which describe the preparation, some physical parameters and the use of the catalyst, as the crystallite size of the catalyst, the conversion conditions, like the duration of the process, the temperature and the pressure at which the conversion process is carried out, and the efficiency, expressed by the conversion and the selectivity for the special reaction to be catalysed. The mentioned parameters and values vary in so many ways in the examples of document (1) that it is not apparent to the Board which of the numerous parameters and values given may provide any evidence about a structure of the particles of the catalysts prepared according to these examples which may be different from that of the products of Claim 7. None of the numerous examples of document (1) show the same parameters and values as example 1 of the patent application, in which the catalysts are dry-milled instead of wet-milled.

8. For a convincing and valid comparison that merely because of the difference of the procedures of wet-milling and dry-milling there is a difference in structure of the particles, which can be shown by differences in their effects, - as in the present case the efficiency of the reaction expressed by conversion and selectivity values - there should be available comparative examples which are carried out under exactly the same conditions, with the exception of the process of wet-milling and dry-milling. For that purpose, the Appellants rely on examples 1 and 2 of the refused patent application. These examples, however, differ, inter alia, in the crystallite size of the catalysts particle which is, in example 1, 250 Å (page 3, line 25 of the published European patent application) and 750 Å in the comparative example 2 (page 4, line 6 of the published European patent application). In the Board's opinion, the crystallite size of the catalyst is a very important feature with regard to the efficiency of a catalyst in terms of conversion and selectivity because the efficiency is certainly dependent on the total surface of the pelleted catalysts. The smaller the crystallite size of the particles the larger the total surface and thus the more effective the reaction to be catalysed. The Board, therefore, is not convinced that the higher selectivity value of 73%, achievable by the use of catalysts prepared according to example 1, i.e. dry-milled, compared with the selectivity of 70.5% selectivity, achievable by the use of catalysts, prepared according to the comparative example 2, i.e. wet-milled, is caused only by the different milling process being the only feature which distinguishes the products of document (1) and those of Claim 7 from each other.
9. The Board notes that the comparative examples 1 and 2 in the refused patent application show that dry-milling produces in a shorter time catalysts particle of a smaller

crystallite size than wet-milling. This seems to be the advantage of the dry-milling process. They do, however, not demonstrate that there are structural differences between the products which are decisive for any improvement of the dry-milled product with regard to its conversion and selectivity abilities.

10. For these reasons, the Board is of the opinion that if, according to the Appellant's opinion, the selectivity values of example 1 of the present patent application are not comparable to the values given in document (1) - which are the same in some examples of this document - the values of example 1 and comparative example 2 of the refused patent application are not comparable as well; if, however, according to the Appellant's opinion, examples 1 and 2 of the present patent application are comparable, example 1 of the present patent application is in turn comparable to the examples of the prior art document (1) as well. Neither way leads to the plausible conclusion that the product of Claim 7 is novel with regard to the products disclosed in document (1).

Therefore, the main request is rejected.

#### 11. First Auxiliary Request

The first auxiliary request does no longer contain the product-by-process, but rather a claim directed to the use of a catalyst produced by a process as claimed in any of Claims 1 to 6 in the oxidation of hydrocarbons to carboxylic acid anhydrides.

Even if a product is not novel, as decided with regard to the catalysts in question above, its use may nevertheless be novel and inventive and thus patentable. There is, however, no question in the present case, that the use of

the catalysts for the oxidation of hydrocarbons to carboxylic acid anhydrides is described identically in document (1).

Thus, the first auxiliary request is also rejected.

12. **Second Auxiliary Request**

In their second auxiliary request, the Appellants deleted Claim 7. The basis for this second auxiliary request, therefore, is Claims 1 to 6 which are process claims solely. Patentability of this set of claims is dependent on novelty and inventive step of Claim 1. This has not yet been examined by the first instance because of the refusal based on non-novelty of product-by-process Claim 7; the Board, therefore, makes use of the possibility to remit the case to the first instance according to Article 111(1) EPC for further prosecution of novelty and inventive step of Claim 1.

13. **Reimbursement of appeal fees**

According to Rule 67 EPC, one of two necessary prerequisites for a reimbursement of appeal fees is that the Board of Appeal deems the appeal to be allowable. In the present case, the main request is rejected, which contains the same claims as rejected by the first instance. With respect to the main request, the appeal is, therefore, not allowable and, consequently, Rule 67 does not apply. In these circumstances, it is not necessary to investigate further whether or not there was a substantial procedural violation during the examination procedure.

**Order**

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

1. The decision of the Examining Division is set aside.
2. The main request and the first auxiliary request are rejected.
3. The case is remitted to the first instance for further examination of Claims 1 to 6, submitted by the Appellants with letter of 18 September 1987.
4. The request for reimbursement of the appeal fee is rejected.

The Registrar:

The Chairman:

M. Beer

P. Lançon