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**DECISION**  
of 22 April 2002

**Case Number:** T 1049/97 - 3.3.7

**Application Number:** 85200971.1

**Publication Number:** 0168091

**IPC:** B01J 23/74

**Language of the proceedings:** EN

**Title of invention:**  
Nickel/alumina catalyst, its preparation and use

**Patentee:**  
UNICHEMA CHEMIE B.V.

**Opponents:**  
(I) Hoechst Aktiengesellschaft  
(II) Engelhard De Meern B.V.  
(III) Süd-Chemie AG

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56, 84, 108, 123  
EPC R. 65

**Keyword:**  
"Missing Statement of Grounds"  
"Amendments - added subject-matter (no) - clarity (yes)"  
"Inventive step - closest prior art, problem and solution"

**Decisions cited:**  
T 0550/91

**Catchword:**  
-



Case Number: T 1049/97 - 3.3.7

(VAF)

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.7  
of 22 April 2002

**Appellant:**  
(Opponent II)

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Decision under appeal:

Interlocutory decision of the Opposition Division  
of the European Patent Office posted  
5 August 1997 concerning maintenance of European  
patent No. 0 168 091 in amended form.

Composition of the Board:

Chairman: R. Teschemacher  
Members: G. Santavicca  
B. L. ter Laan

## Summary of Facts and Submissions

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I. The mention of the grant of European patent 0 168 091, in respect of European patent application 85 200 971.1 filed on 19 June 1985 and claiming a priority in the Netherlands of 21 June 1984 (NL 8 401 965), was published on 3 August 1988. The patent as granted comprised 14 claims, independent claims 1, 6 and 14 reading as follows:

"1. A nickel/alumina catalyst satisfying the following combination of features

- 1) a nickel/aluminium atomic ratio between 2 and 10;
- 2) an average pore size between 4 and 20 nanometers;
- 3) an active nickel surface between 90 and 150 m<sup>2</sup>/g nickel;
- 4) nickel crystallites with an average diameter between 1 and 5 nanometers."

"6. A process for the preparation of a nickel/alumina catalyst as defined by claim 1, in which an insoluble nickel compound is precipitated from an aqueous solution of a nickel salt with an excess alkaline precipitating agent, which precipitate is subsequently allowed to mature in suspended form and is then collected, dried and reduced, characterized in that, after the nickel ions have been precipitated, a soluble aluminium compound is added to the suspended nickel precipitate as a solution or undissolved crystals."

"14. A process for the hydrogenation of unsaturated organic compounds, characterized in that a catalyst according to any of the preceding claims is used."

Dependent claims 2 to 5 and 7 to 13 concerned preferred embodiments of the catalyst and of the process of preparation, respectively.

- II. Three notices of opposition were filed on 2 May 1989 (Opponents I and II) and on 3 May 1989 (Opponent III), respectively.

Opponents I and III requested revocation of the patent as a whole and opponent II only to the extent of granted claims 1 to 5, on the grounds of Articles 100 EPC, paragraphs (a) and (b), that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art and that the claimed subject-matter lacked novelty and an inventive step, having regard *inter alia* to the following documents:

H2: DE-A-2 228 332

H5: EP-A-0 092 878

E1: M.S. Borisova et al, "Effect of Chemical Composition and Preparation Conditions on Properties of Nickel Catalysts", *Kinetika i Kataliz*, vol. 15, No. 2, pages 488 to 496

- III. By a decision announced at the end of the oral proceedings held before the Opposition Division and posted on 4 July 1991, the patent was revoked.

According to that decision, which was based on a set of amended claims submitted as the sole request during the oral proceedings, amended claim 1 lacked clarity, such that the claimed catalyst could not be distinguished from the catalysts disclosed by E1.

IV. On 19 July 1991, the proprietor lodged an appeal against that decision, the prescribed appeal fee being paid on the same day. With the statement of grounds of appeal, received on 1 November 1991, three sets of amended claims were enclosed, identified as first to third auxiliary requests, respectively. (180)

V. By decision T 0550/91 of 4 April 1995, the Board of Appeal set aside the impugned decision and remitted the case to the Opposition Division for further prosecution on the basis of the main request. The Board held that the claims were clear, that the patent disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art and that the claimed catalysts were novel.

VI. During the further prosecution before the Opposition Division, three further documents were cited, namely:

U7: Bailey's Industrial Oil and Fat Products, vol. 2, 4th ed., John Wiley & Sons, 1982, pages 20 to 23

E6: H. Patterson, Hydrogenation of Fats and Oils, Applied Science Publ., 1983, pages 30 to 33

H9: Ullmann's Enzyklopädie der Techn. Chemie, vol. 13, 1984, page 562

By a decision of 5 August 1997, the Opposition Division decided that the patent could be maintained in amended form based on the set of claims submitted during the oral proceedings held on 17 January 1997 as the proprietor's sole request and on the amended description filed by letter dated 11 April 1997.

Independent claims 1, 5 and 12 upon which that decision was based read as follows:

"1. A nickel/alumina catalyst satisfying the following combination of features:

- 1) a nickel/aluminium atomic ratio between 4 and 10;
- 2) an average pore size between 4 and 20 nanometres;
- 3) an active nickel surface between 90 and 150 m<sup>2</sup>/g nickel;
- 4) nickel crystallites with an average diameter between 1 and 5 nanometres;

characterized in that the catalyst is obtainable by a process for the preparation of a nickel/alumina catalyst, in which process an insoluble nickel compound is precipitated from an aqueous solution of a nickel salt with an excess alkaline precipitating agent, which precipitate is subsequently allowed to mature in suspended form and is then collected, spray-dried and reduced, and where after the nickel ions have been precipitated, a soluble aluminium compound is added to the suspended nickel precipitate as a solution or undissolved crystals."

"5. A process for the preparation of a nickel/alumina catalyst satisfying the following combination of features:

- 1) a nickel/aluminium atomic ratio between 4 and 10;
- 2) an average pore size between 4 and 20 nanometres;
- 3) an active nickel surface between 90 and 150 m<sup>2</sup>/g nickel;
- 4) nickel crystallites with an average diameter between 1 and 5 nanometres,

in which process an insoluble nickel compound is precipitated from an aqueous solution of a nickel salt with an excess alkaline precipitating agent, which precipitate is subsequently allowed to mature in suspended form and is then collected, spray-dried and

reduced, wherein after the nickel ions have been precipitated, a soluble aluminium compound is added to the suspended nickel precipitate as a solution or undissolved crystals." (181)

"12. A process for the hydrogenation of unsaturated organic compounds, characterized in that a catalyst is used according any of claims 1-4."

The Opposition Division held in particular that:

- (a) the amendments to the claims complied with Article 123(2) EPC;
- (b) the amendments to bring the description in line with the claims complied with Article 84 EPC. The term "spray-dried" clearly identified the examples within the scope of claim 1;
- (c) The objections raised by opponent I under Articles 83 and 84 EPC that were not related to the amendments made to the description and had not been raised in due time could not be considered;
- (d) the claimed catalysts were novel over those described in E1, because the sequential precipitation of the compounds of nickel and aluminium imparted a different microstructure to the catalyst obtained therefrom;
- (e) E1 represented the closest prior art. The patent in suit effectively solved the problem of providing a nickel/alumina catalyst that exhibited equivalent selectivity and increased fish oil hydrogenation activity compared to the catalysts of E1.



VII. On 3 October 1997, opponent II (appellant) lodged an appeal against that decision, the prescribed appeal fee being paid on the same day. With the statement of grounds of appeal submitted on 12 December 1997, a further document was submitted, namely:

U8: "Technologie der Katalysatoren", VEB Deutscher Verlag für Grundstoffindustrie, Leipzig 1976, pages 224 and 225,

in order to show that spray-drying was known in the preparation of catalysts with improved porosity.

Opponent I likewise lodged an appeal against the above decision. The notice of appeal was received on 11 October 1997 and the prescribed appeal fee was paid on the same day. However, no statement of grounds of appeal was received. This was brought to the attention of opponent I in a communication dated 2 January 1998.

Opponent III did not lodge an appeal and thus is party to the appeal proceedings as of right pursuant to Article 107 EPC, second sentence.

VIII. In reply, the proprietor (respondent) filed an amended main request as well as two auxiliary requests "A" and "B", respectively (letter dated 30 June 1998).

IX. By letter dated 5 July 2001, the Board was informed that the appellant would not express any further opinion on the matter of these appeal proceedings.

X. In response to a communication of the Board indicating the points to be discussed at the oral proceedings, the respondent amended claim 5 of the main request, to replace the value of 24 by the value of 4, and filed two further auxiliary requests identified as "new auxiliary requests "A" and "B"", respectively, to

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replace old auxiliary request "A" on file (see point VIII *supra*). Amended pages of the description were also submitted. Additionally, a declaration of one of the inventors (Dr Lok) was filed in order to explain how the terms in the examples were to be understood as well as their technical effects (letter of 14 March 2002).

XI. By letter received on 4 April 2002, the appellant withdrew the request for oral proceedings and announced that they would not be present.

XII. The oral proceedings were held on 22 April 2002 in the absence of the opponents, in compliance with Rule 71(2) EPC.

During the oral proceedings, the respondent submitted a further amended set of claims as the main request, to replace the main request then on file. Independent claims 1, 5 and 12 of that new main request read as follows:

"1. A nickel/alumina catalyst satisfying the following combination of features

- 1) a nickel/aluminium atomic ratio between 4 and 10;
- 2) an average pore size between 4 and 20 nanometers;
- 3) an active nickel surface is between 90 and 150 m<sup>2</sup>/g nickel;
- 4) nickel crystallites with an average diameter between 1 and 5 nanometers;

characterized in that the catalyst is obtainable by a process for the preparation of a nickel/alumina catalyst, in which process an insoluble nickel compound is precipitated from an aqueous solution of a nickel salt with an excess alkaline precipitating agent, which precipitate is subsequently allowed to mature in suspended form and is then collected, spray-dried and

reduced, and where after the nickel ions have been precipitated, a soluble aluminium compound is added to the suspended nickel precipitate as a solution or undissolved crystals."

"5. A process for the preparation of a nickel/alumina catalyst satisfying the following combination of features

- 1) a nickel/aluminium atomic ratio between 4 and 10;
- 2) an average pore size between 4 and 20 nanometers;
- 3) an active nickel surface is between 90 and 150 m<sup>2</sup>/g nickel;
- 4) nickel crystallites with an average diameter between 1 and 5 nanometers.

in which process an insoluble nickel compound is precipitated from an aqueous solution of a nickel salt with an excess alkaline precipitating agent, which precipitate is subsequently allowed to mature in suspended form and is then collected, spray-dried and reduced, wherein after the nickel ions have been precipitated, a soluble aluminium compound is added to the suspended nickel precipitate as a solution or undissolved crystals."

"12. A process for the hydrogenation of unsaturated organic compounds, characterized in that a catalyst is used according to any of claims 1-4."

An adapted description was also submitted in which, in particular, the examples and the steps that did not fall under the scope of claim 1 were identified as comparative.

XIII. The arguments given by the appellant in writing, in as far as they are still relevant to the present main request, can be summarised as follows:

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- (a) Since "spray-drying" had never been an issue in the opposition proceedings until the oral proceedings before the Opposition Division, and since none of the opposing parties had had a reasonable opportunity to comment on this issue during said oral proceedings, there had been a violation of Article 113(1) EPC that warranted a refund of the appeal fee.
  
- (b) As regards inventive step, the reformulation of the technical problem in the impugned decision could not be derived directly and unambiguously from the original application and thus violated the requirements of Article 123(2) EPC.

In the proposed solution, the spray-drying step had no surprising effect and, in any case, the use of spray-drying for preparing powdery catalysts with improved porosity was known from any of H9 and U8. Since it was well known that porosity was linked to catalytic activity, it would have been obvious to apply this type of drying. Hence, the subject-matter of claim 1 was obvious.

XIV. The respondent argued, in essence, as follows:

- (a) Concerning inventive step, the closest prior art was represented by E1, which disclosed an embodiment with the parametric features defined in the preamble of claim 1, including the pore size range that resulted from the comparative experiments submitted by the opponent.

The technical problem was to maintain adequate activity and selectivity of the catalysts while increasing the amount of Ni in the pellets, such that the productivity of the catalyst, namely the activity of the catalyst in relation to its

volume, was increased, and while maintaining filterability at an acceptable level. To do that, one had to find first of all a suitable procedure for preparing the catalysts.

That problem had been solved by the catalysts as claimed, which were obtainable by the route as defined in the process claim.

- (b) E1 was a scientific article that did not disclose any possible use of the catalysts, nor did it address any technical problem related to the technical problem of the opposed patent. In particular, E1 taught that the Ni content had to be lowered in order to arrive at the highest Ni surface area. Nothing in E1 indicated that the catalytic performance would improve with higher Ni content, which was the object of the patent in suit, nor that those catalysts would be easily filterable after hydrogenation. Finally, the production method described in E1 had no commercial applicability in view of the very small amounts of catalyst produced. Hence, the catalysts as claimed were not obvious over E1.

- (c) The other documents on file did not prejudice the inventiveness of the claimed catalysts either. In particular:

H5 disclosed the use of a particular complex of Ni to be precipitated or impregnated on alumina, whereby the Ni/Al ratio however was at most 0.6. These catalysts had activities and selectivities comparable to the claimed ones, but they did not contain a high enough amount of Ni as required by the industry for the hydrogenation of edible oils. Increasing the Ni content led to decreased filterability and decreased pore size, with the

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consequence that the catalyst was no more acceptable to the industry.

H2 suggested the use of a particular mineral structure, whereby the Ni/Al atomic ratio was 3. Other minerals were not suggested. The production method was co-precipitation.

E6 stressed the relationship between selectivity and pore diameter for conventional nickel catalysts supported on siliceous material. So did U7.

As to H9, it only had to do with spray-drying.

Therefore, the claimed subject-matter involved an inventive step.

XV. The appellant requested in writing that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed and that the patent be maintained on the basis of the main request as submitted during the oral proceedings or, alternatively, on the basis of any of the auxiliary requests "A" or "B" as submitted in the letter dated 14 March 2002, or of the (old) auxiliary request "B" as submitted in the letter dated 30 June 1998 and amended in the letter dated 12 February 2002.

## **Reasons for the Decision**

### **1. *Admissibility of the appeals***

1.1 The appeal lodged by opponent II (appellant) is admissible.

1.2 Concerning the appeal lodged by opponent I, no statement of grounds was filed. The notice of appeal contains nothing that could be regarded as a statement of grounds pursuant to Article 108 EPC. Opponent I was informed by a letter dated 2 January 1998 that the appeal was likely to be rejected as inadmissible. The possibility of filing a request for re-establishment of rights under Article 122 EPC was also brought to attention, together with the invitation to file observations within two months. No such request was however filed.

By a letter dated 5 July 2001, the Board was informed that they would not express any further opinion on the matter of these appeal proceedings.

As no written statement setting out the grounds of appeal has been filed, the appeal has to be rejected as inadmissible (Article 108 EPC in conjunction with Rule 65(1) EPC) and opponent I is a party to the appeal proceedings as of right (Article 107 EPC, second sentence).

### **Main request**

### **2. *Amendments***

Compared with the set of claims as granted, the set of claims forming the present main request contains the following amendments:

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(a) *Claim 1*

The claim has been drawn up as a product-by-process claim by inclusion of the additional features of granted claim 6, the Ni/Al atomic ratio has been amended to read "between 4 and 10" by insertion of the additional features of granted claim 2 and the limitation "spray-dried" has been introduced into the characterizing portion.

These amendments have a basis in the original application: claims 1 to 3 and 8; description: page 6, line 5; page 7, line 27; examples.

(b) *Claim 3*

The term "pore radius" has been amended to read "pore size". Basis for this amendment can be found in the original application: page 1, lines 29 to 30; page 2, line 3; examples.

(c) *Claim 5*

The combination of features forming the subject-matter of claim 1 as granted has been included into granted claim 6 together with the following further modifications: The Ni/Al atomic ratio has been amended to read "between 4 and 10"; after collection, the precipitate is "spray-dried".

These amendments have a basis in the original application, respectively: claims 1 to 3 and 8; description: page 6, line 5; page 7, line 27; examples.

(d) The other amendments are of an editorial nature.



2.1 Since all the above amendments have a basis in the original application, the requirements of Article 123(2) EPC are fulfilled. Furthermore, since these amendments restrict the scope of the claims as granted, the requirements of Article 123(3) EPC are also met.

2.2 The claims of the main request and the amended description do not give rise to any objection under Article 84 EPC.

Moreover, in view of the amendments filed during the oral proceedings, wherein the examples and the process steps which do not fall under the claims have been identified, it is possible to establish the examples which fall within the definition of claim 1.

### 3. Novelty

The novelty of the subject-matter of claim 1 was not contested and the Board sees no reason to take a different position.

### 4. Inventive step

4.1 The opposed patent concerns nickel/alumina catalysts, their preparation and use.

Such catalysts were known, eg from E1, which the Opposition Division and the respondent considered to be the closest prior art, as well as from H5, which was indicated as another possible starting point by the Board.

4.1.1 E1 describes the results of a study on the formation of the nickel surface, its dispersity and its thermal stability as functions of the nature of the support and the Ni/Al ratio in catalysts prepared by

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co-precipitation with sodium carbonate. The effects of the reduction temperature on the dispersity of nickel-aluminum catalysts containing 20 to 100% nickel have also been studied. Particular aspects of that study include:

- (a) The total surface of the samples in relation to the nickel content (Figures 1 and 2 and relevant comments).
- (b) The effect of the temperature of reduction on the mean particle size of metallic nickel and on the degree of reduction ( $\alpha$ ) of nickel (Figures 3a, 3b and 4a, and table 1).
- (c) The effect of the degree of reduction on the magnitude of the metallic nickel surface in catalysts which differ in nickel content and reduction temperature (Figure 4b).
- (d) The dependence of metallic nickel surface per gram of nickel introduced on content of nickel (Figure 5, curve 3).

The nickel-aluminum catalysts described in E1 are said to be typical examples of coprecipitated hydrogenation catalysts (page 430, first paragraph, first sentence).

The most relevant physical properties of the catalysts are shown in Table 1, where, inter alia, a nickel-alumina catalyst containing 90% by weight Ni, with a Ni/Al atomic ratio of 7.85, reduced at a temperature of 400°C, with a nickel surface of 84 m<sup>2</sup>/g of catalyst, a degree of reduction of 70% and a dispersity of metallic nickel of 44 Å, is described.

4.1.2 H5 relates to nickel upon alumina catalysts, their preparation and their use in various hydrogenation reactions.

It discloses a nickel upon transition alumina catalyst, containing 5 to 40% (w/w) of nickel, characterized in that the catalyst has an active nickel surface area between 80 and 300 m<sup>2</sup>/g Ni and in which the nickel crystallites have an average diameter of 1 to 5 nanometers (claim 1).

Preferably, the active nickel surface face area ranges between 100 and 250 m<sup>2</sup>/g Ni and the average nickel crystallite size is of 1.5-3 nanometers (claim 2).

The transition alumina has a total surface area between 45 and 350 m<sup>2</sup>/g (claim 3) and a pore volume of 0.3 to 0.7 l/kg, the particle size being from 10<sup>-5</sup> to 10<sup>-2</sup> m (page 1, lines 28 to 29).

The catalysts are manufactured by a process in which a mixture of transition alumina in an aqueous solution of a nickel ammine complex is heated to a temperature of 60-100°C, preferably 75-95°C, as a result of which the precipitation of nickel hydroxide is caused, whereafter the catalyst suspension is separated and dried, if need be calcined and reduced (claim 4).

These catalysts contain metallic nickel (after reduction) distributed over the internal and external surfaces of the carrier particles (page 6, lines 6 to 9). In particular, the nickel is dispersed for at least 95% in the pores of the alumina (i.e. on the internal surface) and the degree of reduction of nickel oxide to nickel is normally at least 50% (reduction for 30 minutes at 500°C with 15 m<sup>3</sup> H<sub>2</sub> (STP) per kg nickel) (page 3, lines 1 to 5).

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These catalysts are very useful for the hydrogenation of *inter alia* fatty materials, such as fatty acids and their esters (page 6, lines 17 to 20). For slurry hydrogenation powders are preferred (page 1, line 34).

The catalysts may be used in the fixed bed hydrogenation of fatty materials such as acids, nitriles, alcohols and esters, in particular triglycerides. The activity and poison resistance of the catalysts are improved as a result of their high active nickel surface area. In the case of fatty acid hydrogenation a dramatic improvement in colour of the fatty acids was noted (page 7, lines 8 to 17).

In the case of fatty acid ester hydrogenation, a good selectivity, i.e. low linolenic acid content and a low content of fully saturated esters, could be achieved. This is especially important in the hydrogenation of triglycerides such as soybean oil and fish oil (page 7, lines 19 to 23).

The hydrogenation of fish oil is illustrated in example XIV. A catalyst was ground and sieved and the fraction having a particle size below 30 micrometers was used for the hardening of fish oil. The catalyst was highly active and selective and it formed relatively low amounts of saturated triglycerides.

4.2 Although E1 describes a catalyst that has the highest number of structural features in common with the claimed subject-matter, it does not mention the same purpose and effect as the opposed patent, nor does it relate to the same or a similar technical problem. In fact, E1 does not mention any use of the catalysts for hydrogenation of fatty materials such as edible oils. The properties associated with that hydrogenation, such as filterability, activity and selectivity, are not addressed in E1. Also, pore volume and pore size are

not specified in E1, although rate and selectivity of fatty material hydrogenation are affected by these properties (see E6 or U7 in this respect).

H5 not only relates to the same technical field of hydrogenation catalysts, to their use for the hydrogenation of fatty materials such as edible oils like soybean oil and fish oil, to good selectivity and activity, to low linolenic content and a low content of fully saturated esters, but also discloses a solution to the technical problem of manufacturing hydrogenation catalysts with a high active nickel surface area and improved activity and poison resistance. Furthermore, the catalysts described in H5 also have a number of structural features in common with the catalysts making the subject-matter of the patent in suit.

Therefore, H5 rather than E1 qualifies as the closest prior art document.

- 4.3 Although the catalysts described in H5 have adequate properties such as good activity and selectivity in the hydrogenation of unsaturated triglycerides oils, their activity in relation to the volume of catalyst still leaves room for improvement.

Thus, the technical problem underlying the patent in suit can be seen as the preparation of catalysts with adequate catalytic and filtration properties in the hydrogenation of unsaturated triglycerides oils as well as a high Ni/Al ratio, in line with the original formulation of the problem (page 1, lines 15 to 38, of the original application).

- 4.4 According to the patent in suit, the above defined problem is solved by a catalyst as defined in claim 1, having a Ni/Al atomic ratio of 4 to 10 and being

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obtainable by the sequential-precipitation and spray-drying steps as defined.

The examples in the patent in suit show that the claimed catalysts have a Ni/Al ratio that is higher than that of the catalysts described in H5, so that less weight or volume of catalyst may be used per weight of feedstock in order to reach a certain effect.

Example XIV of H5, the only example which describes slurry hydrogenation of fish oil under conditions comparable to those given in the patent in suit, gives details about the preparation of the catalyst used as well as its properties such as a time of 93 minutes to reach a iodine value of 82 and a melting point of 31°C for the hardened oil, which values are a yardstick for the selectivity (patent in suit, page 4, lines 16 to 18).

The corresponding values for the melting points of the hydrogenated oils and the time to reach the given iodine value as given in examples 2 and 4 to 6 in the patent in suit are: 33, 32, 33 and 33°C; 120, 130, 97 and 80 minutes, respectively. From these values it can be seen that the claimed catalysts, in spite of having a higher Ni/Al ratio, have a selectivity which is comparable to or even improved over the catalyst of example XIV of H5, in line with the statement in the patent in suit on page 2, lines 27 to 30.

Furthermore, from the properties of the catalysts of comparative examples 1 and 2 in the patent in suit, which are prepared by co-precipitation rather than by sequential precipitation as the claimed catalysts, it can be seen that green cake filterability (32 minutes in the comparative experiments vs. 9, 2.5, 2 and 2 minutes in examples 2 and 4 to 6) as well as the fish oil activity (110 vs. 128, 125, 140 and 150%) are

improved despite the fact that the claimed catalyst has a higher or equal Ni/Al ratio (5 vs. 10.0, 10, 6 and 5).

In view of the above, the Board comes to the conclusion that the catalysts according to the patent in suit have adequate catalytic properties and filterability as well as a higher Ni/Al ratio compared to the catalysts prepared by co-precipitation or those of H5, so that the above-defined technical problem has been effectively solved.

4.5 It remains to be decided whether the claimed subject-matter was obvious having regard to the documents on file.

4.5.1 Although H5 discloses catalysts with adequate catalytic properties for hardening edible oils, these catalysts have a nickel content of 40% at most, preferably of 25% at most (page 6, second paragraph, last three sentences). H5 neither hints at increasing the amount of nickel loaded on the alumina, nor does it suggest how this could be achieved without detrimental effects on the catalytic properties and on the filterability.

Consequently, H5 by itself cannot render the claimed subject-matter obvious.

4.5.2 E1 cannot supplement the disclosure of H5, because its general teaching is that the nickel-aluminum catalysts reach their optimum nickel surface at a Ni content of 40% by weight and the usefulness of the catalyst does not increase further with higher Ni contents, (Figure 5, curve 3; penultimate paragraph of page 431 of E1). Thus, E1 does not suggest to increase the Ni content to increase the usefulness of the catalyst.

Although E1 exemplifies a catalyst with a Ni/Al ratio

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of as high as 7.85, that catalyst was prepared by co-precipitation. It is not apparent that that catalyst would possess all of the physical properties as defined in claim 1, which relates to catalysts prepared by sequential precipitation and spray-drying. In fact, the claimed catalysts show an improved activity in hydrogenation of fish oil over those that have been prepared by co-precipitation (see point 4.4 *supra*).

E1 does not mention hardening of edible oils, let alone any suitability of the catalysts therefor, nor does it disclose any preparation method for suitable catalysts therefor or hint at any other preparation procedure than co-precipitation.

Since the information of E1 does not refer to the objectives of the patent in suit and the indications in E1 go against the objective as stated in H5, the skilled person would not have combined the teachings of documents E1 and H5.

Even if the skilled person had combined these two documents, in view of the specific preparation of the claimed catalysts, the relevant properties thereof would still be distinct over the co-precipitated catalysts, so that the skilled person would not have arrived at the claimed subject-matter.

4.5.3 Even if E1 were to be used as the starting point, the conclusion would not be any different:

- (a) Though the catalysts of E1 have a number of features in common with the claimed catalysts, this document does not mention a technical problem related to that of the patent in suit.

Consequently, a technical problem arising from E1 would have to be defined in so general terms that



its solution could practically never be obvious, because no chain of considerations leading in an obvious way to the claimed subject-matter could be established. Thus, the claimed subject-matter is non-obvious in the light of such art.

- (b) Even if it could be taken for granted that Ni/Al catalysts are generally suitable for hydrogenation, that the catalysts of E1 would inevitably be suitable for hydrogenation of fatty materials, and that the technical problem over E1 was the mere provision of alternative catalysts, the skilled person would find no hint at any alternative solution as defined in claim 1.

No cited document discloses a sequential precipitation procedure for the production of catalysts for hydrogenation of edible oils, as defined in the patent in suit.

Hence, also in this case, the claimed solution would not be obvious over the cited art.

- 4.5.4 None of the further documents on file, such as H2, U7, E6, H9 and U8, teaches or points to a preparation with sequential precipitation and spray-drying for preparing catalysts suitable for the hydrogenation of edible oils. Therefore, the catalysts defined in claim 1 in suit cannot be obvious over the said further documents.

- 4.6 It follows from the above that the claimed subject-matter is not obvious to a person skilled in the art having regard to the state of the art. Therefore, the subject-matter as defined in claim 1 of the main request involves an inventive step.

- 4.7 Since the main request is allowable, it is not necessary to consider the auxiliary requests.

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5. *Reimbursement of the appeal fee*

Appellant I requested reimbursement of the appeal fee, asserting that the parties had had no reasonable chance to comment on the claims submitted during the oral proceedings before the Opposition Division, which were limited having regard to the spray-drying step.

In this respect, the Board notes that there is nothing in the minutes of the oral proceedings before the Opposition Division indicating that opponent II had protested against the filing of the main request, or that they had not been in a position to comment on it. In fact, they did comment and provided arguments.

In view of this, the Board finds that opponent II has had adequate opportunity to state his position, so that no procedural violation has taken place. The request for reimbursement of the appeal fee is consequently refused.

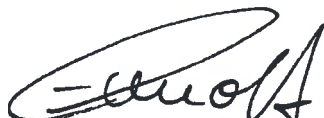
**Order**

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

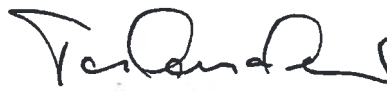
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in the following version:
  - Claims 1 to 12 | as submitted
  - Description pages 2 to 8 | during the
  - Figure 1 | oral proceedings.
3. The request for reimbursement of the appeal fee is refused.

The Registrar:

The Chairman:

  
C. Eickhoff



  
R. Teschemacher



25.10.02

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