D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 23 April 1996

Appellant: UNILEVER N.V.
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Respondent 1:   Hüls Aktiengesellschaft
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Representative: -

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Summary of Facts and Submissions

I.   European patent No. 0 092 878 based on application
      No. 83 200 575. 5, filed on 21 April 1983 and claiming a
      priority date of 23 April 1982, was granted on 16 August
      1989, on the basis of 8 claims.

II.   The Respondents (Opponents 1, 2, 3 and 4) filed notices of
      opposition on the respective dates of 9 March, 28 April,
      16 May and 15 May 1990, requesting the revocation of the
      patent on the grounds of lack of novelty and inventive
      step, insufficiency of disclosure and extension of the
      patent beyond the application as originally filed
      (Articles 100(a), 100(b) and 100(c) EPC). Of the documents
      cited by the parties during the opposition procedure, only
      D3, Journal of catalysis, volume 67, 1981, pages 186 to
      206, D. G. Mustard, C. H. Bartholomew, "Determination of
      Metal Crystallite Size and Morphology in Supported Nickel
      Catalysts", and D8, GB-A-1 318 528, remain relevant for the
      present decision.

      In the course of the opposition procedure, on 1 May 1992,
      the Appellants (Patentees) submitted an amended set of
      claims. Claim 1 thereof reads as follows:

      "1. A nickel upon transition alumina catalyst, containing
      5 to 40% (w/w) of nickel with an active nickel surface
      between 152 and 250 m^2/g Ni and characterized in that the
      degree of reduction of nickel is between 58 and 89% and the
      nickel crystallites have an average diameter of 1.5 to 2.5
      nanometers, the transition alumina surface area being
      between 90 and 115 m^2/g."

III.   With its decision of 2 June 1992, posted on 29 June 1992,
       the Opposition Division revoked the patent on the ground
       that the catalyst defined in the said amended Claim 1 of
       1 May 1992 lacked an inventive step. The Opposition
       Division took the view that Claim 1 met the requirements of
       Article 123(2) and (3) EPC, concentrating its reasoning on
       the lower limit of 152 m^2/g for the active nickel surface
       and the upper limit of 2.5 nm for the average crystallite
       diameter. As regards sufficiency of disclosure, the benefit
       of the doubt was given to the Patentees. It was accepted
       that the hydrogen adsorption method had been used in the
       patent in suit to determine the average crystallite size
       and that the Coenen method would have been the method
       chosen by the skilled man for the calculation of the degree
       of reduction.

IV.   On 24 August 1992, the Appellants lodged an appeal against
       this decision. They submitted an auxiliary request (now
       auxiliary request 1) together with their statement of
       grounds of appeal, on 23 October 1992. Claim 1 of auxiliary
       request was essentially the same as that of 1 May 1992.

       The Appellants argued in favour of an inventive step and
       contended that there had been a substantial procedural
       violation since the inventive step of the process claims
       was denied in the appealed decision although it had not
       been discussed at all during the oral proceedings.

       In reply to a communication of the Board questioning the
       allowability of certain amendments in the claims of the
       main request and of the auxiliary request 1, the Appellants
       on 12 August 1995 submitted two further auxiliary requests

(auxiliary requests 2 and 3) and on 28 March 1996 by way of evidence referred to two additional documents, namely Applied Catalysis, 75, 1991, pages 193 to 223, J. W. E. Coenen, Characterization of the standard nickel/silica catalyst EuroNi-1 (hereinafter D25) and Hydrogen Effects in Catalysis, Z. Paal, P. G. Menon, New York 1988, pages 100 to 113, (D26). The independent product claims and process claims of the auxiliary requests 1, 2 and 3 each contain the upper value 89% for the degree of nickel reduction.

Oral proceedings were held on 23 April 1996, in the absence of Respondent 1 who had informed the Board on 25 October 1995 of his intention not to attend the hearing.

V.   The Appellants' arguments insofar as they concern the allowability of the 89% figure in the amended claims can be summarized as follows:

The average crystallite diameter was calculated using the Coenen formula, based on the assumption of a hemispherical model. It was clear from documents D25 and D26 that only three models existed and that Examples 1 to 4 of the original application perfectly fitted with the hemispherical model. As the data supplied in the Examples 5 and 6 did not fit with any recognized model, the skilled person would have recognized reading these examples that they contained mistakes and had to be disregarded. The fact that D25 and other documents cited in this context were concerned with nickel/silica catalysts and not with nickel/alumina catalysts was not relevant since the nature of the support had no influence on the measurement itself. D25 was a post-published document, however any review of

the various methods existing up to a certain date had necessarily a later date. Other methods for determining the crystallite size, such as the magnetic measurements or the electron microscopy, were indeed known, however the former method did not constitute a standard method and the latter was not used by the Appellants as they did not have the required apparatus at that time. Furthermore, Prof. Coenen was a recognized expert in this technical field, his publications and his method were well-known and generally accepted, and it was known in the profession that he was working for Unilever at that time, so that one would have assumed that his method had been used. There was also no doubt that "Applied Catalysis" formed part of the common general knowledge. In these circumstances, the skilled person who noticed that the data in the Examples 1 to 4 of the application were in line with the Coenen method, though not those of Examples 5 and 6, would have concluded that the data in the latter examples were wrong and that the Coenen method had been used throughout the application.

VI. The Respondents contended that the auxiliary requests 1, 2 and 3 were not admissible as the independent process claims did not contain certain limitations introduced during the opposition procedure although the Appellants had previously renounced to a broader scope of protection during the said procedure.

Concerning the upper limit of 89% in Claim 1 of the main request and in the claims of the auxiliary requests, it was argued that the application did not disclose that the Coenen method was appropriate for calculating the degrees of reduction. This method did not fit with the data of at

least Example 5. The skilled person reading this example would have thought that methods other than the hydrogen adsorption had been used for determining the average crystallite size, for example the magnetic measurements or the electron microscopy mentioned in D8, which was a patent specification of Unilever. The 89% value rested only on the assumption that the Coenen method was used. The fact that models led only to approximate values not fully in agreement with the reality could explain that in some examples the measured values did not fit with a model. Furthermore D25 and D26 could not be taken into consideration since, on the one hand, they were post-published and, on the other hand, they related to Ni/silica and not to Ni/alumina. The nature of the support was relevant since the model to be chosen depended on the support.

VII.   The Appellants requested that the decision under appeal be set aside, that a patent be maintained on the basis of the claims submitted on 1 May 1992 (main request) or on the basis of one of the auxiliary requests 1, 2 or 3 submitted on 23 October 1992 (auxiliary request 1) and 12 August 1995 (auxiliary requests 2 and 3), and that the appeal fee be reimbursed. The Respondents requested that the appeal be dismissed.

Reasons for the Decision

1.   The appeal is admissible.

2.   *Main request*

2.1   The upper limit of 89% indicated in Claim 1 of the main
        request for the degree of nickel reduction is not expressly
        mentioned in the application as filed. The question arises
        whether the incorporation of this value in Claim 1 extends
        the subject-matter of the said claim beyond the content of
        the application as filed (Articles 100(c) and 123(2) EPC).

        An amendment extends beyond the content of the application
        as filed if the amended subject-matter is not directly and
        unambiguously derivable from the content of the original
        application, even when taking into account matter which is
        implicit to a skilled person. This requirement clearly
        precludes allowing an amendment if there is any doubt as to
        whether or not it is derivable from the original
        application (cf. T 0383/88 of 1 December 1992, not
        published in OJ EPO).

2.2   According to the Appellants the nickel surface area S_{Ni} was
        determined by hydrogen adsorption, the degree of reduction
        DR was measured by a known method, and the nickel
        crystallite diameter D_{Ni} was calculated from the nickel
        surface area and the measured degree of reduction using the
        Coenen formula, based on the assumption of a hemispherical
        model for the shape of the nickel crystallites (D_{Ni} = DR ×
        4310/100 × S_{Ni}, with D_{Ni} expressed in Å). The Appellants
        argued that, as both the active nickel surface area and the
        average Ni crystallite size were given in Table 3 of the
        original application, the degree of reduction could be
        calculated back using the Coenen formula stated above, and
        this calculation led to the value of 89% for the second
        example of Table 3.

It should be noted in this context that, on the one hand, the Coenen method was not the sole known method used before the priority date to determine the average nickel crystallite size in nickel supported catalysts and, on the other hand, the various known methods do not lead to identical results (see for example D8 and D3). It follows therefrom that the allowability of the value 89% depends on whether or not it is directly and unambiguously derivable from the application as filed that the average crystallite diameter was calculated from the nickel surface area and the measured degree of reduction, using the Coenen method.

2.3   The methods used for determining the nickel surface area, the average crystallite diameter and the degree of reduction are not mentioned in the original application, let alone the formula by which one of these parameters might have been calculated. Nor does the application contain any reference to the Coenen method or to the kind of assumption made for the shape of the nickel crystallites (spherical, hemispherical or cubic model). Therefore, the average crystallite diameter might have been determined by any one of the methods known before the priority date to be appropriate for measuring the average nickel crystallite size in supported catalysts, for example (i) by magnetic measurements, (ii) by electron microscopy, or (iii) by calculation from the nickel surface area obtained by hydrogen adsorption and from the measured degree of reduction, using either the Coenen model (i.e. the hemispherical model) or another model, in particular the spherical model (cf. D3). It was not contested by the parties that these methods formed part of the common general knowledge in this technical field before the

priority date. However, as neither the spherical model nor the cubic model fits with any of the data reported in the Examples 1 to 6 of the original application, the skilled person would conclude that in these examples the average crystallite size was not calculated from the hydrogen adsorption data assuming a spherical or a cubic model. Although it is disclosed in D3 that, in the case of those particular Ni/alumina catalysts, owing to the lack of contrast resulting of the fine pore structure of the support (cf. page 191, left-hand column), the measurement of the average crystallite size by transmission electron microscopy is limited to a certain range of nickel loadings, this does not mean that this method is not suitable for the catalysts of the patent in suit. Furthermore, it was not contested by the Appellants that both the magnetic measurements and the transmission electron microscopy are indeed suitable for determining the average nickel crystallite size in nickel/alumina catalysts having an average crystallite size up to 5 nm. The Appellants' arguments that the magnetic measurements did not represent a standard method do not preclude that this method might have been used in the patent in suit. It should be noted in this respect that in D8, a patent specification of Unilever, the average crystallite size of nickel supported catalysts was determined by either magnetic measurements or hydrogen adsorption or electron microscopy.

The Appellants' arguments that the Coenen model was generally accepted and that it was known in the profession that Prof. Coenen was working at Unilever at that time (cf. point V above) are not sufficient to convince the Board

that it is **directly and unambiguously** derivable from the
original application that the Coenen method was used
throughout the application, for the following reasons: The
values of nickel surface area, average crystallite diameter
and degree of reduction reported in examples 1 to 4 of the
original application do indeed fit with the Coenen formula,
but this does not apply to the values given in examples 5
and 6, where the application of the Coenen formula would
lead to average crystallite diameter of 3.4 nm and 3.6 nm,
respectively, as opposed to the values of 3.0 and 3.8 nm
actually shown. Taking into account that in two out of six
examples the data do not fit with the Coenen formula, the
skilled person would not necessarily infer from the
original application that the Coenen method had been used
throughout the application and that these two examples
contain mistakes. Another plausible explanation for this
discrepancy would be that the average crystallite size had
not been calculated from the hydrogen adsorption data but
measured by one of the other known methods mentioned above,
namely the magnetic measurements or the electron
microscopy, even if these methods were not as commonly used
as the hydrogen adsorption method.

D25 and D26, which were published well after the priority
date and upon which the Appellants relied to support their
arguments, do not contain any information showing that
electron microscopy and magnetisation measurements are not
suitable for the determination of the average crystallite
size of nickel supported catalysts.

It follows from the above that, in spite of a certain
probability in favour of the Appellant's position, it is

not directly and **unambiguously** derivable from the
application as filed that the average diameter of the
nickel crystallites was calculated from the hydrogen
adsorption data and the measured degree of reduction, using
the Coenen model. Therefore, the value 89% calculated back
on the basis of the Coenen formula is itself not directly
and unambiguously derivable from the original application.
For this reason Claim 1 of the main request does not meet
the requirements of Article 123(2) EPC, and this request
must be refused.

3.   *Auxiliary requests 1 to 3*

Each of the auxiliary requests contains an independent
claim including the upper limit 89% for the degree of
nickel reduction. Hence, the reasons given above apply
likewise to the auxiliary requests, which must therefore be
refused on the same ground as the main request. In these
circumstances, it was not necessary to examine the question
of admissibility of these auxiliary requests.

4.   *Reimbursement of the appeal fee*

According to Rule 67 EPC, reimbursement of the appeal fee
shall be ordered where the Board of Appeal deems an appeal
to be allowable, if such reimbursement is equitable by
reason of a substantial procedural violation. As in the
present case the appeal is not allowable, the Board would
not be in a position to order reimbursement of the appeal
fee even if a substantial procedural violation had indeed
occurred (which the Board cannot see to be the case).

Order

For these reasons it is decided that:

1.   The appeal is dismissed.

2.   The request for the reimbursement of the Appeal fee is
        refused.

The Registrar: The Chairman:

P. Martorana   F. Antony

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