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D E C I S I O N
of 10 April 2001

Case Number: T 0277/98 - 3.3.1

Application Number: 86101916.4

Publication Number: 0191502

IPC: C07F 7/16

Language of the proceedings: EN

Title of invention:

Tin containing activated silicon for the direct reaction

Patentee:

UNION CARBIDE CORPORATION

Opponent:

GE Bayer Silicones GmbH & Co. KG

Headword:

Silicon catalyst/UNION CARBIDE

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (no) - arbitrary selection of parameters"

Decisions cited:

T 0197/86, T 0956/92, T 0355/97

Catchword:

-



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Boards of Appeal

Chambres de recours

Case Number: T 0277/98 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 10 April 2001

Appellant:
(Opponent)

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Representative:

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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

**Interlocutory decision of the Opposition Division
of the European Patent Office posted 22 January
1998 concerning maintenance of European patent
No. 0 191 502 in amended form.**

Composition of the Board:

Chairman: A. J. Nuss
Members: P. P. Bracke
J. P. B. Seitz

Summary of Facts and Submissions

I. The appeal lies from the Opposition Division's interlocutory decision, dispatched on 22 January 1998, that, account being taken of the amendments made by the Patentee during the opposition proceedings, European patent No. 0 191 502 was found to meet the requirements of inventive step over the only cited document (1), DE-A-3 425 424.

The independent Claims 1 and 2 underlying the contested decision read:

"1. An activated silicon composition for use in the direct reaction of methyl chloride to produce dimethylchlorosilane comprising silicon and, based on the amount of silicon,

(a) 0.05 - 1.0 wt % Cu;

(b) 0.05 - 0.20 wt % Zn; and

(c) 0.001 - 0.01 wt % Sn;

wherein the Zn to Sn ratio is 10 - 100 or preferably 20 - 50."

"2. Use of the activated silicon composition of claim 1 for a direct reaction with an organohalide gas."

Claim 3 was dependent on Claim 2.

In particular, the Opposition Division was of the opinion that it could not be deduced from document (1) that by using the claimed activated silicon

compositions in the direct reaction of methyl chloride to produce dimethylchlorosilane the proportion of the disilane species in the heavies which can be converted with HCl into dimethylchlorosilane could be improved.

II. During the oral proceedings before the Board of Appeal, which took place on 10 April 2001, the Respondent (Proprietor of the patent) filed, as an auxiliary request, a set of three claims, with Claim 1 reading:

"1. An activated silicon composition for use in the direct reaction of methyl chloride to produce dimethylchlorosilane comprising silicon and, based on the amount of silicon,

(a) 0.05 - 1.0 wt % Cu;

(b) 0.05 - 0.20 wt % Zn; and

(c) 0.001 - 0.01 wt % Sn;

wherein the Zn to Sn ratio is 20 - 50."

The wording of Claims 2 and 3 was identical to the wording of Claims 2 and 3 underlying the contested decision.

III. The Appellant (Opponent) contested that the main request met the requirements of Articles 83, 84 and 123(3) EPC. As far as inventive step was concerned, the Appellant essentially argued, that, as a surprising effect had not been shown, the problem underlying the present invention could only be seen in providing further catalyst compositions. Since there was an overlap of the scope of the activated silicon

compositions according to the set of claims underlying the contested decision with the scope of activated silicon compositions known from document (1), the claimed activated silicon compositions were directly derivable from document (1). Moreover, the Appellant submitted that nowhere in the patent in suit could an indication be found that the Zn to Sn ratio would be critical. Therefore the composition of Claim 1 of the set of claims underlying the invention and Claim 1 according to the auxiliary request was not inventive over document (1).

- IV. The Respondent essentially argued that according to the prior art it was necessary to use high copper levels in order to get a good reaction-rate and selectivity in the direct reaction for converting methyl chloride into dimethylchlorosilane and that, consequently, the claimed activated silicon compositions containing low copper levels could not be deduced from the prior art. Moreover, the Respondent submitted that the induction time was shortened with the claimed activated silicon compositions.
- V. The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 191 502 be revoked.

The Respondent requested that the appeal be dismissed and that the patent be maintained as upheld by the Opposition Division (main request), or on the basis of Claims 1 to 3 of the auxiliary request filed during the oral proceedings before the Board.

Reasons for the Decision

1. The appeal is admissible.
2. In connection with the present patent in suit the Board came to the conclusion in the previous decision T 956/92 that the claims according to the present main request meet the requirements of Article 123(2) and (3) EPC and that they are novel over the teaching of document (1). Those findings are *res judicata*, thus binding and therefore not open for reconsideration.

Furthermore, if the patent in suit is amended during the opposition procedure, the Board has the power to consider whether all requirements under the EPC are fulfilled, **as long as they arise from the amendment made**. Since, in the present case, the objections made by the Appellant under Articles 83 and 84 EPC do not arise from the amendments made during the opposition procedure, the Board does not have the power to consider those objections. Moreover, these objections were not raised during the first appeal proceedings and are therefore not admissible at the present state of the proceedings.

3. Therefore, the only point at issue in the present case is whether the claimed activated silicon compositions meet the requirement of inventive step.

3.1 Main request

- 3.1.1 The Board considers document (1), which is discussed on page 6, lines 10 to 14, of the patent in suit, to represent the closest state of the art, which was never

contested by the parties.

Document (1) teaches that in the conversion of methylchloride into methylchlorosilanes high reaction rates combined with a high selectivity for Me_2SiCl_2 to MeSiCl_3 are obtained, without increasing the amount of heavies, by using silicon in the presence of a Cu-Zn-Sn catalyst containing 0.5 to 10 wt % Cu, based on the amount of silicon, 0.01 to 0.5 part Zn per part of Cu and 200 to 3000 ppm Sn, relative to Cu (see the paragraph bridging pages 10 and 11). Based on the amount of silicon, the Cu-Zn-Sn catalyst thus contains 0.5 to 10 wt % Cu, 0.005 to 5 wt % Zn and 0.0001 to 0.03 wt % Sn and the Zn/Sn weight ratio varies from 0.16 to 50000.

The specifically described Cu-Zn-Sn catalysts with the lowest amount of Cu contain 1.5 wt % of Cu, as described in Table I of document (1).

- 3.1.2 The Respondent submitted that, in view of document (1), the problem underlying the patent in suit was the provision of activated silicon compositions which, in the direct reaction of methyl chloride to produce dimethylchlorosilane, resulted in a higher reaction rate, an improved selectivity for Me_2SiCl_2 to MeSiCl_3 , fewer heavies and an increased proportion of disilanes in the heavies which can be converted with HCl into dimethylchlorosilane, whereby the induction period is substantially reduced, as said on page 6, lines 19 to 24, of the patent in suit.

The patent in suit claims to solve this problem by providing the activated silicon compositions according to Claim 1.

3.1.3 The first point to be considered in assessing inventive step is whether it has been convincingly shown that by selecting the amounts of Cu, Zn and Sn and a Zn/Sn ratio as defined in present Claim 1 the problems underlying the patent in suit have effectively been solved.

In an attempt to show that the above mentioned problems are effectively solved by the claimed activated silicon compositions, the Respondent referred to Tables 13 and 14 of the patent in suit, which provide selectivity data, reaction rate data and induction period data respectively for the direct reaction of methyl chloride to produce dimethylchlorosilane.

However, since the data in Table 13 only concerns selectivity and reaction rate data of the direct reaction of methyl chloride to produce dimethylchlorosilane for the use of activated silicon compositions according to present Claim 1, these data are not suitable for showing that by using the activated silicon compositions according to Claim 1 advantageous properties, such as improved selectivity for Me_2SiCl_2 to MeSiCl_3 , are obtained. Moreover, as it follows from the data provided in Table 14 that in the direct reaction of methylchloride to produce dimethylchlorosilane the induction period is 2 hours when an activated silicon composition containing more than 1.0 wt % Cu is used (example 4H) as it is the case when an activated silicon composition containing less than 1.0 wt % Cu is used (example 13), the data provided in Table 14 are also not suitable for showing a reduced induction period for the activated silicon compositions according to present Claim 1.

The Respondent submitted that it was stated in several passages in the patent in suit that the claimed activated silicon compositions provided improved selectivity for Me_2SiCl_2 to MeSiCl_3 , fewer heavies and heavies having a more desirable disilane distribution, whereby the induction period is substantially reduced. In such a case, the Patentee would not be the one who carries the burden of proof that such results are effectively obtained by the claimed activated silicon compositions but the burden of proof, on the contrary, would be upon the Opponent.

However, according to the jurisprudence of the Boards of Appeal, each of the Parties to the proceedings carries the separate burden of proof for any fact they allege (see T 355/97 of 5 July 2000, not published in OJ EPO, point 2.5.1 of the reasons). Therefore, in the present case, the burden of proof for showing that the use of the claimed activated silicon compositions in the direct reaction of methyl chloride to produce dimethylchlorosilane leads to the advantageous effects mentioned in the patent in suit, rests upon the Respondent-Patentee. In the absence of any corroborating evidence that said advantageous effects are obtained, the allegations in the patent in suit are unsubstantiated and, consequently, such alleged advantageous effects are not to be taken into account in assessing inventive step.

- 3.1.4 Consequently, in view of the teaching of document (1) the problem underlying the invention can only be seen in providing further activated silicon compositions suitable as catalyst in the direct reaction of methyl chloride to produce dimethylchlorosilane.

That this problem is successfully solved by the activated silicon compositions according to Claim 1 was never challenged, neither by the Appellant nor by the Board.

- 3.1.5 Therefore, it remains to be decided whether a skilled person would have expected that the claimed activated silicon compositions would be suitable catalysts in the direct reaction of methyl chloride to produce dimethylchlorosilane.

The Respondent argued that, although a range of 0.5 to 10 wt % Cu, based on the amount of silicon, was described in document (1), from Table I of document (1) it could be deduced that by lowering the amount of Cu in the active silicon composition the reaction rate was decreased. Moreover, the Respondent submitted that nowhere in document (1) could any indication be found of the importance of the Zn/Sn ratio.

However, in the present case, it is irrelevant in view of the above stated technical problem what effect could have been deduced from document (1) by varying any or all of the amounts of Cu, Zn and Sn. The only relevant question is whether it could have been deduced from document (1) that the claimed activated silicon compositions would be **suitable catalysts in the direct reaction of methyl chloride for producing dimethylchlorosilane**, independently of whether an effect on the reaction rate, the selectivity, the amount and the nature of heavies and the induction period could be expected. Document (1) teaches in general terms that, based on the amount of silicon, the amount of Cu may be varied from 0.5 to 10 wt %, the amount of Zn may be varied from 0.005 to 5 wt % and the

amount of Sn may be varied from 0.16 to 50000 and nowhere in document (1) could any indication be found that by selecting particular amounts of Cu, Zn and Sn a composition could be obtained, which would not be suitable as catalyst in the direct reaction of methyl chloride for producing dimethylchlorosilane. Therefore, a skilled person would have expected that compositions such as the claimed activated silicon compositions are suitable catalysts in the direct reaction of methyl chloride to produced dimethylchlorosilane.

From those considerations it follows that the combination of the amounts of Cu, Zn and Sn with the ratio of Zn/Sn as defined in Claim 1 results from an **arbitrary selection** within the teaching of document (1). As the Respondent has not put forward a credible case that the features of Claim 1 interact with each other in a particular way, the Board comes to the conclusion that the selection of the features of Claim 1 have the sole aim of providing a further activated silicon catalyst composition as stated in point 3.1.4.

3.1.6 Consequently, the subject-matter of Claim 1 does not involve an inventive step and therefore the claims according to the main request do not meet the requirement of inventive step.

3.2 Auxiliary request

3.2.1 Amendments, novelty

Since for the reasons given below the patent in suit is revoked due to lack of inventive step, it is not necessary to give a detailed reasoning in this respect.

3.2.2 Inventive step

The claimed activated silicon compositions differ from those according to the main request in that the Zn to Sn ratio is 20 to 50 instead of 10 to 100.

The Respondent essentially submitted that by using activated silicon compositions having a Zn to Sn ratio of 20 to 50 the induction period was reduced. In support of this submission the Respondent referred to Table 14 of the patent in suit, from which it follows that by using an activated silicon composition with a Zn to Sn ratio of 33.8 the induction period is 2 hours (example 13) whereas the induction period is 4 hours when an activated silicon composition with a Zn to Sn ratio of 83.55 is used (example 4L).

However, according to the jurisprudence of the Boards of Appeal in order to show an advantageous effect the nature of the comparison must be such that such effect is convincingly shown to have its origin in the distinguishing feature of the invention (see T 197/86 OJ EPO 1989, 371, point 6.1.3 of the reasons). In the present case, the direct reaction of methyl chloride to produce dimethylchlorosilane according to Examples 13 and 4L not only differs by the Zn to Sn ratio, but it also differs *inter alia* by the initial amount of Sn (example 13: 62.0 ppm; example 4L: 12.82 ppm). Consequently, it may not be concluded from the induction period data of examples 13 and 4L in Table 14 that a reduction of the induction period has its origin in the Zn to Sn ratio of the active silicon composition.

As the Respondent thus did not put forward a credible

case that the induction period is reduced by using an activated silicon composition wherein the Zn to Sn ratio is 20 to 50, in view of the teaching of document (1) the problem underlying the invention can only be seen in providing a further activated silicon compositions suitable as catalyst in the direct reaction of methyl chloride to produce dimethylchlorosilane.

Consequently, for the reasons cited in point 3.1.5, in respect of the main request, the Board comes to the conclusion that the selection of the features of Claim 1 have the sole aim of providing a further embodiment within the teaching of document (1), which does not necessitate inventive skill.

The Respondent argued that document (1) was completely silent about the induction period of the direct reaction of methyl chloride to produce dimethylchlorosilane and, consequently, that a skilled person could not get any information there about it.

The Board, however, cannot accept this argument, because in the absence of any corroborating evidence that said advantageous effect is achieved by the Zn to Sn ratio of 20 to 50 indicated in Claim 1, the allegations in the patent in suit are unsubstantiated and, consequently, not to be taken into account in assessing inventive step.

Consequently, the subject-matter of Claim 1 does not involve an inventive step and therefore the claims according to the main request do not meet the requirement of inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

N. Maslin

A. Nuss