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**Datasheet for the decision
of 8 February 2008**

Case Number: T 1075/05 - 3.3.05

Application Number: 00309483.6

Publication Number: 1095908

IPC: C01G 23/053

Language of the proceedings: EN

Title of invention:

Titanium oxide, and photocatalyst and photocatalyst coating composition using the same

Applicant:

Sumitomo Chemical Company, Limited

Opponent:

-

Headword:

TiO₂ spin concentration/SUMITOMO

Relevant legal provisions:

EPC Art. 84

EPC R. 43(1)(3)

Relevant legal provisions (EPC 1973):

EPC R. 29(1)(3)

Keyword:

"Parameter in a product claim: (not clear)"

"Relevant process features in a product claim: (missing)"

Decisions cited:

T 1156/01

Catchword:

-



Case Number: T 1075/05 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 8 February 2008

Appellant: Sumitomo Chemical Company, Limited
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Chuo-ku
Tokyo 104-8260 (JP)

Representative: Cresswell, Thomas Anthony
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 9 March 2005
refusing European application No. 00309483.6
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: G. Raths
Members: J.-M. Schwaller
C. Vallet

Summary of Facts and Submissions

I. This appeal is from the decision of the examining division refusing European patent application No. 00309483.6. The decision was based on the set of amended claims submitted with a letter dated 4 March 2003, claim 1 of which reads as follows:

"1. A titanium oxide having a spin concentration X of 3.10×10^{16} spins/g or more, determined from the electron spin resonance spectrum of the titanium oxide measured after irradiation by visible light."

II. In the contested decision, the examining division held that the subject-matter of claim 1 then on file made use of an unusual parameter, which additionally was not clearly defined, so that the requirements of Article 84 EPC were not satisfied.

III. Along with the grounds of appeal dated 13 July 2005, the appellant filed an additional set of claims as auxiliary request. Claim 1 thereof reads as follows:

"1. A titanium oxide having a spin concentration X of 3.10×10^{16} spins/g or more, determined from the area in the electron spin resonance spectrum of the titanium oxide between g values of 2.002 and 2.008 after irradiation by visible light."

IV. With the summons to oral proceedings, the board drew the appellant's attention *inter alia* to the fact that in order to meet in particular the requirements of Article 84 EPC it appeared necessary, on the one hand, to draft independent claim 1 in terms of a "product-by-

- process" and, on the other hand, to identify therein the method used for the determination of the parameter "spin concentration X".
- V. At the oral proceedings, which took place on 8 February 2008, in addition to the discussion of the points raised in the summons, the board objected to the clarity of the feature "*after irradiation by visible light*" defined in claim 1 of both requests.
- VI. The appellant's arguments can be summarised as follows:
- (a) The feature "*spin concentration X*" was not a parameter, but an "inherent characteristic" (the appellant also called it "absolute constant" or "property") of the new kind of titanium oxide found by the inventors. There was no need to specify in claim 1 the method for determining the above feature, as on the one hand, its meaning was clear for the skilled person and, on the other hand, the specification provided full instructions on how to determine it.
 - (b) The high photocatalytic activity of the inventive product claimed had its origin in the high spin concentration X of the titanium oxide, not in the preparation process thereof.
- VII. On the question whether the spin concentration would be the same if the "irradiation under visible light" was made differently as indicated in the description, the appellant's representative answered that he had no information on this issue.

VIII. The appellant requested that the decision under appeal be set aside and that the board issue a decision that the claims according to the main or alternatively, according to the 1st auxiliary request filed with the grounds of appeal dated 13 July 2005, satisfy the requirements of Article 84 EPC. It also requested remittal of the application to the examining division for further prosecution.

Reasons for the Decision

Main request

1. Clarity of the feature "*spin concentration X*"
 - 1.1 Both the examining division (contested decision; Reasons, point 6.) and the board (summons to oral proceedings, point 1.) informed the appellant of a lack of clarity arising from the absence of an indication in claim 1 of the method used for the determination of the parameter "*spin concentration X*".
 - 1.2 The appellant's arguments in item VI.(a) *supra* cannot be accepted because the "*spin concentration X*" is a feature which necessitates a specific apparatus and methodology (namely those disclosed at page 6, line 7 to page 9, line 8 of the application as filed) for being determined. As this feature is furthermore used for characterising a specific product (a titanium oxide in the present case), in the absence of evidence to the contrary, it is nothing other than a "parameter", i.e. a quantifiable characteristic value of directly measurable properties.

Since the "*spin concentration X*" furthermore is a parameter that the appellant has freely chosen and that it considered essential for the characterisation of the titanium oxide defined in claim 1, the latter has *inter alia* to meet the requirements of Article 84 EPC. In order to ensure legal certainty, this implies that the claim has to be clear for the person skilled in the art without the need to resort to information derived from the description of the present patent application (see also T 1156/01, Reasons, point 2.2).

- 1.3 The board notes in this respect that the appellant has neither shown that the skilled person would know from the outset which method and conditions it would have to employ for determining the above parameter, nor that the complex methodology depicted at page 6, line 7 to page 9, line 8 of the description is the one commonly used in the technical field, or that all the methodologies known in the relevant technical field for determining this feature yield the same result within the appropriate limit of measurement accuracy.

Under these circumstances, i.e. in the absence of indication in claim 1 of the methodology mentioned hereinabove, the board considers that the features characterizing the titanium oxide defined in claim 1 are not clear for the person skilled in the art from the wording of the claim alone. It is therefore concluded that claim 1 does not fulfil the requirements of Article 84 EPC.

2. Relevance of the preparation process

2.1 To the board's inquiry that it appeared necessary to draft independent claim 1 in terms of a "product-by-process", the appellant answered that the high photocatalytic activity of the allegedly inventive titanium oxide had its origin in its high spin concentration X, not in its preparation process.

2.2 The board is not convinced by this explanation for the following reasons.

The data relative to the parameters characterizing the three titanium oxides according to the invention (Examples 1 to 3) disclosed in the application as filed (page 16, lines 2 and 3; page 17, Table 1; page 17, line 20; page 18, line 13) are summarised in the following table:

	Example 1 (now Ref. Ex.1)	Example 2	Example 3 (now Comp. Ex.2)
Spin concentration X (spins/g)	not available	4.26×10^{16}	2.46×10^{16}
Spin concentration Y (spins/g)	not available	3.53×10^{16}	1.64×10^{16}
Spin concentration ratio X/Y	not available	1.21	1.50
Spin concentration Z (spins/g)	not available	0.00×10^{16}	1.96×10^{16}
Number of peaks appearing between 1.930 and 2.030 in g value	not available	4	2
CO ₂ producing rate (μ mol/h) per gram of photocatalyst	5.86	8.37	1.41

Following an objection of lack of novelty raised by the examining division, the subject-matter of claim 1 was restricted to the one according to claim 1 of the main request and the content of the description harmonized thereto, so that former Examples 1 and 3 became "Reference Example 1" and "Comparative Example 2",

respectively. Comparative Example 2 is thus not included in the scope of protection of present claim 1.

As can be seen from the above table, the titanium oxide of Example 2 differs from the one of Comparative Example 2 not only by a higher spin concentration X, but also by:

- a higher spin concentration Y,
- a lower spin concentration Z,
- a lower spin concentration ratio X/Y, and
- a different number of peaks appearing between 1.930 and 2.030 in g value.

The titanium oxide from Example 2 being the one having the highest photocatalytic activity (i.e. the highest CO₂ producing rate) in comparison to the "Comparative example 2", the board observes that it is not possible from the above data to attribute the origin of the higher photocatalytic activity to the one or to the other of the above parameters, let alone that the higher photocatalytic activity has its origin in the high spin concentration X of the titanium oxide, as asserted by the appellant.

2.3 The board is convinced that the high photocatalytic activity of the allegedly inventive titanium oxide is correlated to its preparation process for the following reasons.

As indicated at page 11, lines 6-19 of the description, the titanium oxide of the present invention can be produced, for example, by

i) mixing an acid with a titanium compound, adding a base into the resulting mixture while cooling under stirring, and then carrying out washing and calcination,

or alternatively, for example, by

ii) calcining a titanium hydroxide such as a commercially available alpha-titanium hydroxide.

The titanium oxide of Example 2 was prepared via a process including the features indicated under item i) while the one of Comparative Example 2 via a process including the features indicated under item ii).

Thus, the titanium oxide of Comparative Example 2 - i.e. the one no longer covered by the claims - was prepared via another process as the allegedly inventive one of Example 2, characterized by its higher photocatalytic activity. This manifestly indicates that, in the present case, the preparation process and the product features are closely interrelated and that the photocatalytic activity was conferred to the titanium oxide by its particular process of preparation, which is therefore a technical feature essential to the proper implementation of the claimed invention and which should have been incorporated into claim 1 to comply with the requirements of Article 84 in conjunction with Rules 43(1) and (3) EPC (Rules 29(1) and (3); EPC 1973)), which are thus not met.

3. Clarity of the feature "after irradiation by visible light"

Since for the reasons indicated in items 1. and 2. *supra*, the main request has to be rejected, the question whether the above feature is clear may remain open.

Auxiliary request

4. As claim 1 of this request also does not mention the methodology defined at page 6, line 7 to page 9, line 8 of the description, nor does it indicate the process features essential for obtaining a titanium oxide with higher photocatalytic activity, the reasons indicated in items 1. and 2. *supra* apply *mutatis mutandis* to claim 1 of the present request, which has thus also to be rejected.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

S. Sánchez Chiquero

G. Rath