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**Datasheet for the decision
of 12 November 2014**

Case Number: T 0044/13 - 3.3.01

Application Number: 07119656.2

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A01N31/02, A01N43/54, A01P1/00

Language of the proceedings: EN

Title of invention:
Synergistic microbicidal compositions comprising N-alkyl-1,2-
benzothiazolin-3-one

Applicant:
Rohm and Haas Company

Headword:
Microbicides/ROHM AND HAAS

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step (yes): non-
obvious further synergistic microbicidal compositions

Decisions cited:

T 0393/01



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Chambres de recours**

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Case Number: T 0044/13 - 3.3.01

D E C I S I O N
of Technical Board of Appeal 3.3.01
of 12 November 2014

Appellant: Rohm and Haas Company
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 31 August 2012
refusing European patent application No.
07119656.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman A. Lindner
Members: L. Seymour
O. Loizou

Summary of Facts and Submissions

I. The present appeal lies from the decision of the examining division refusing the European patent application No. 07 119 656.2, published as EP-A-1 925 202, as a divisional application of the parent application number 06 255 041.3, published as EP-A-1 772 056.

II. The following documents were cited during the examination and/or appeal proceedings:

- (1) WO 02/17716
- (2) EP-A-1 462 003
- (3) EP-A-1 245 153
- (4) EP-A-0 787 430
- (5) J O Morley et al., Org. Biomol. Chem., 2005, 3, 3713 - 3719
- (6) P J Collier et al., J. Appl. Bacteriol., 1990, 69(4), 569 - 577
- (7) JP-A-10 298012, machine-generated English language translation, and EPODOC abstract
- (8) US-B-6 361 788 (numbered as D6 in appellant's letter of 29 May 2012)

III. The following abbreviations are used below:

MBIT *N*-methyl-1,2-benzisothiazolin-3-one
BBIT *N*-(*n*-butyl)-1,2-benzisothiazolin-3-one

BIT benzothiazolinone
MIT 2-methyl-4-isothiazolin-3-one

IV. The decision under appeal was based on the main and sole request filed with letter dated 10 June 2010. The three independent claims of this request read as follows:

"1. A microbicidal composition comprising:
 (a) N-(n-butyl)-1,2-benzothiazolin-3-one; and
 (b) benzothiazolinone, wherein the weight ratio of N-(n-butyl)-1,2-benzothiazolin-3-one to benzothiazolinone is from 1:0.02 to 1:20.

...

3. A microbicidal composition comprising:
 (a) N-methyl-1,2-benzothiazolin-3-one; and
 (b) N-(n-butyl)-1,2-benzothiazolin-3-one, wherein the weight ratio of N-methyl-1,2-benzothiazolin-3-one to N-(n-butyl)-1,2-benzothiazolin-3-one is from 1:0.1 to 1:30.

...

5. A microbicidal composition comprising:
 (a) N-methyl-1,2-benzothiazolin-3-one; and
 (b) benzothiazolinone, wherein the weight ratio of N-methyl-1,2-benzothiazolin-3-one to benzothiazolinone is from 1:0.1 to 1:25."

V. The examining division considered that the subject-matter claimed lacked an inventive step. The closest prior art document was identified as being document (1) for claims 1 to 4, and document (2) for claims 5 and 6. These documents disclosed biocides comprising MIT and BBIT, and MIT and BIT, respectively. The problem was defined as lying in the provision of a more effective biocide, and this was assumed to have been solved in view of document (5), which demonstrated that MBIT and

BIT were over 13 and 22 times more effective than MIT, respectively, in inhibiting the growth of *E. coli*; even allowing for the possibility of antagonism, this assumption was safe. However, the disclosure of document (5) was also found to render the claimed solution obvious since the skilled person would be motivated to replace MIT with MBIT or BIT in order to solve the problem posed. Moreover, it was well within the normal competence of the skilled person to optimise the compositions comprising the active ingredients, thus arriving at the ratios claimed. The examining division considered its arguments to be in line with decision T 393/01.

- VI. The appellant (applicant) lodged an appeal against this decision, and filed a statement of grounds of appeal.
- VII. In a communication dated 29 August 2014, the board referred to document (7) as being of possible relevance to the discussion of inventive step.
- VIII. With its letter of response of 10 October 2014, the appellant filed a machine-generated English language translation of document (7).
- IX. On 15 October 2014, third-party observations were received referring to document (7).
- X. Oral proceedings were held before the board on 12 November 2014.

In its analysis of inventive step, the appellant agreed with the examining division's choice of closest prior art, but argued the problem-solution approach had been incorrectly applied, particularly in the reformulation of the problem from that disclosed in the application

in suit. The skilled person would be aware of the fact that synergism was inherently unpredictable. There was no clear signpost in the prior art directing the skilled person to the claimed combinations as a solution to the problem of providing further synergistic microbicidal compositions. The reasoning of decision T 393/01 was not applicable to the facts of the present case.

- XI. The appellant (applicant) requested that the decision under appeal be set aside and that a patent be granted on the basis of the following documents:

Description:

pages 1-12 filed during oral proceedings of
12 November 2014

Claims:

Nos: 1 to 6 of the main request filed with letter of
10 June 2010

- XII. At the end of the oral proceedings, the decision of the board was announced.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments (Articles 76(1) and 123(2) EPC)*

The claims of the main request find their basis in the parent and divisional applications as originally filed (respective claims 1 and 2; parent application as originally filed: page 3, lines 28 to 31; page 6, lines 24 to 28; page 7, lines 9 to 12; divisional

application as originally filed: page 3, lines 17 to 20 and page 6, lines 5 to 8, 21 to 24).

The requirements of Articles 76(1) and 123(2) EPC are therefore met.

3. *Novelty (Articles 52(1) and 54 EPC)*

None of the cited prior art documents specifically disclose a composition comprising two of the benzisothiazolinones BBIT, MBIT and BIT in the ranges of weight ratios claimed in the main request. Consequently, novelty is acknowledged for the claimed subject-matter.

4. *Inventive step (Articles 52(1) and 56 EPC)*

4.1 The three independent claims 1, 3 and 5 of the main request are directed to microbicidal compositions each comprising two benzisothiazolinones, namely, BBIT/BIT, MBIT/BBIT, and MBIT/BIT, respectively, in specific ranges of weight ratios of the two components (cf. above point IV). These combinations are disclosed to be synergistic, and to be useful in inhibiting the growth of microorganisms in various loci (application as originally filed, page 1, lines 3, 4; page 2, lines 14 to 19; and page 10, line 15 to page 11, line 12).

4.2 The board considers, in agreement with the appellant and the examining division, that document (1) can be seen as representing the closest state of the art for independent claims 1 and 3, and document (2) for independent claim 5.

Document (1) relates to biocides comprising MIT and at least one further biocidal active ingredient, as

additive to materials capable of being attacked by harmful microorganisms (page 1, lines 7 to 11). The further components, including BBIT, act synergistically when combined with MIT (see page 2, line 25 to page 3, line 8 and examples; in particular, claim 6 and example 7).

A similar disclosure can be found in document (2) for combinations of "substituted and unsubstituted 2-(C₁-C₄)alkyl-4-isothiazolin-3-ones", most preferably MIT, with MBIT (see paragraphs [0003], [0004], [0008], [0025]; page 13, line 15 to page 16, line 30; claim 9).

4.3 The problem to be solved in the light of the closest prior art documents, as indicated in the application in suit (page 1, lines 3, 4, 15 to 17), can be seen in the provision of further synergistic microbicidal compositions.

4.4 The solution proposed in the present claims relates to compositions characterised in that the MIT component is replaced by MBIT or BIT.

The experimental results reported in Tables 4, 27 and 31 of the application as originally filed render it credible that synergy can be achieved for the claimed combinations within the range of weight ratios claimed. Having regard to this data, the board is satisfied that the problem has been solved.

4.5 It remains to be investigated whether the proposed solution would have been obvious to the skilled person in the light of the prior art.

4.5.1 As outlined above in point 4.2, document (1) itself discloses MIT to be a mandatory component of the

compositions. In document (2), although some structural variation is envisaged in the MIT component, ring fusion to form benzisothiazolinones is not suggested (see paragraph [0008]), and all the examples relate to MIT-based compositions. Therefore, these documents, taken alone, do not point to the solutions proposed.

- 4.5.2 A number of further documents were cited relating to synergistic microbicidal compositions comprising an isothiazolinone and a second component (see document (3), paragraphs [0001], [0008] to [0010]; document (4), page 3, lines 1 to 54; document (7), EPODOC abstract, and paragraphs [0007] to [0010], [0025], last sentence, and Tables 1 to 13; document (8), column 1, lines 5 to 10; column 2, lines 3 to 9). However, none of these documents are considered to render the present modifications to the closest prior art compositions obvious:

In documents (3) and (4), the second component is structurally remote from the present (see document (3), paragraph [0014]; document (4), page 4, line 29 to page 5, line 15). Therefore, the skilled person would not be able to extract any valuable teaching from these documents with respect to possible modifications in the present context.

The compositions according to document (7) comprise an *N*-substituted 1,2-benzisothiazolin-3-one of formula (1) (NBIT) and a second microbicide component (non-NBIT). In formula (1), the *N*-substituent R is broadly defined as being an optionally substituted hydrocarbyl group (see paragraphs [0013] to [0018]); BBIT is particularly preferred (see penultimate sentence of paragraph [0018]). The non-NBIT component can be selected from a long list, subdivided into twelve very broadly defined

categories (see paragraphs [0020] to [0024]). According to document (7), the disclosed compositions exhibit high microbicidal activity, even when applied in small amounts; however, it cannot be derived that these compositions are necessarily synergistic (see EPODOC abstract, and paragraph [0025], in particular, last sentence). Indeed, faced with the long lists of structurally heterogeneous NBIT and non-NBIT components, the skilled person would not regard it as credible that a synergistic effect could be obtained for each and every permutation of said classes. Therefore, in seeking to solve the problem posed, the skilled person would turn to the specific examples disclosed in Tables 1 to 13, which relate to thirteen combinations of BBIT with various non-NBIT components (see paragraphs [0039] and [0052]). However, the latter are all structurally far removed from the present benzisothiazolinones. Therefore, document (7) cannot be said to direct the skilled person to the solutions proposed.

Finally, document (8) discloses MIT and BIT as mandatory components in the compositions claimed, and does not provide any pointer towards the present modifications.

4.5.3 The remaining cited documents (5) and (6) also do not suggest the present solutions:

Document (5) is a scientific article reporting a study aimed at developing a quantitative structure-activity relationship for a series of isothiazolinones, including MIT, BIT and MBIT, based on an evaluation of the minimum inhibitory concentration for *E. Coli* (see abstract and Scheme 1). Similarly, in document (6), the

differences in activity of BIT and MIT against *E. Coli* and *S. pombe* are examined (see abstract).

However, the relative biological efficacies of individual isothiazolinones, as disclosed in documents (5) and (6), do not allow the skilled person to draw any conclusions as to whether they would act synergistically when combined with each other, or with other biocides. Therefore, no incentive is provided that would lead the skilled person to modify the compositions disclosed in documents (1) or (2) in the expectation that synergy would be maintained.

4.6 The board cannot follow the analysis of inventive step set out in the decision under appeal:

Therein (cf. above point V), it was accepted that documents (1) and (2), which disclosed synergistic biocidal mixtures, constituted the closest prior art, in line with the prior art identified in the application as originally filed (see page 1, lines 8 to 12). However, the problem indicated, namely, the provision of further synergistic microbicidal compositions (page 1, lines 3, 4, 15 to 17), was considered to be artificial in light of the closest prior art. The problem was therefore reformulated as the provision of a more effective biocide. Based on the disclosure of document (5), the reformulated problem was assumed to have been successfully solved, and the claimed solution considered to be obvious (cf. decision under appeal, points 16, 17, 19, 20, 22, 23, 28 and 31).

However, according to the problem-solution approach (see "Case Law of the Boards of Appeal of the EPO", 7th edition 2013, chapter I, section D, points 4.3.2,

4.4.1, 4.4.2), it is the problem described in the patent application that is normally used as the starting point for assessing inventive step. The problem may have to be reformulated under specific circumstances, for example, if examination shows that an inappropriate prior art had been used to define the problem. As outlined above, this is not the case here. Alternatively, a reformulation may be required, in particular, in less ambitious terms, if it emerges that the problem originally formulated had not been solved over the whole area claimed. In the decision under appeal, the step of assessing whether the problem defined in the application had been solved was omitted. Nevertheless, the problem was reformulated in terms that had not been invoked by the appellant.

The justification provided for the reformulation of the problem was that the originally defined problem was artificial. However, the board cannot see why the provision of synergistic mixtures of known biocides, which allow the use of lower concentrations thereof, should not be seen as a legitimate and desirable objective, in view of the environmental and economic benefits achievable (see application, page 1, lines 15 and 16). This is corroborated by the fact that several of the cited prior art documents also strive to achieve this effect (see above points 4.2 and 4.5.2).

Consequently, the reformulation of the problem in the decision under appeal is not considered to be appropriate.

The cited decision T 393/01 differs from the present case in several aspects. For example, in contrast to present documents (1) and (2), the closest prior art in decision T 393/01 is silent about any synergistic

effect, but discloses that the compositions in question are "the most efficient means of protection against microbiological spoilage"; in the light thereof, the problem to be solved was formulated accordingly (points 2.1 and 2.2 of Reasons). Moreover, in said decision, the issue of whether the problem posed had been plausibly solved was based on the data available (point 2.3 of Reasons), and the obviousness of the solution was assessed in view of further prior art (point 2.4 of Reasons). In contrast, in the decision under appeal, a circular argument was employed whereby the problem was assumed to be solved and the solution rendered obvious based on the same disclosure of a single document.

4.7 In view of the above considerations, the board concludes that the subject-matter of claims 1, 3 and 5, and of claims 2, 4 and 6 dependent thereon, involves an inventive step. Therefore, the subject-matter of the main request fulfills the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

Description:

pages 1-12 filed during oral proceedings of
12 November 2014

Claims:

Nos: 1 to 6 of the main request filed with letter of
10 June 2010

The Registrar:

The Chairman:



M. Schalow

A. Lindner

Decision electronically authenticated