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Datasheet for the decision of 12 November 2014

Case Number:	T 0143/13 - 3.3.01
Application Number:	07119661.2
Publication Number:	1886567
IPC:	A01N43/80, A01N37/44, A01N37/36, A01P1/00
Language of the proceedings:	EN

Title of invention:
Synergistic microbicidal compositions comprising N-alkyl-1,2-benzisothiazolin-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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Case Number: T 0143/13 - 3.3.01

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

Appellant: (Applicant)	Rohm and Haas Company 100 Independence Mall West Philadelphia, PA 19106-2399 (US)
Representative:	Hoggins, Mark Andrew; Buckley, Guy Julian Patent Outsourcing Limited 1 King Street Bakewell Derbyshire DE45 1DZ (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 28 August 2012 refusing European patent application No. 07119661.2 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. 07 119 661.2, published as EP-A-1 886 567, 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) EP-A-1 332 675

(2) EP-A-0 787 430

(3) EP-A-1 245 153

(4) J O Morley et al., Org. Biomol. Chem., 2005, 3, 3713 - 3719

(5) EP-A-1 462 003

III. The following abbreviations are used below:

MBIT	*N*-methyl-1,2-benzisothiazolin-3-one
BBIT	*N*-(*n*-butyl)-1,2-benzisothiazolin-3-one
EDTA	ethylenediamine tetraacetic acid
MIT	2-methyl-4-isothiazolin-3-one
BIT	benzisothiazolinone
TITZ	4,5-trimethylene-2-methylisothiazolin-3-one
OIT	2-*n*-octyl-4-isothiazolin-3-one

IV. The decision under appeal was based on the main and sole request filed with letter dated 22 July 2010.

The four independent claims of this request read as follows:

"1. A microbicidal composition comprising:
(a) N-(n-butyl)-1,2-benzisothiazolin-3-one; and
(b) ethylenediamine tetraacetic acid or its salts, wherein the weight ratio of N (n-butyl)-1,2-benzisothiazolin-3-one to ethylenediamine tetraacetic acid or its salts is from 1:1 to 1:500.

...

3. A microbicidal composition comprising:
(a) N-(n-butyl)-1,2-benzisothiazolin-3-one; and
(b) citric acid or its salts, wherein the weight ratio of N-(n-butyl)-1,2-benzisothiazolin-3-one to citric acid or its salts is from 1:50 to 1:2400.

...

4. A microbicidal composition comprising:
(a) N-methyl-1,2-benzisothiazolin-3-one; and
(b) ethylenediamine tetraacetic acid or its salts, wherein the weight ratio of N-methyl-1,2-benzisothiazolin-3-one to ethylenediamine tetraacetic acid or its salts is from 1:1 to 1:400.

...

7. A microbicidal composition comprising:
(a) N-methyl-1,2-benzisothiazolin-3-one; and
(b) citric acid or its salts, wherein the weight ratio of N-methyl-1,2-benzisothiazolin-3-one to citric acid or its salts is from 1:30 to 1:2500."

V. The examining division considered that the subject-matter of claim 7 lacked an inventive step. The closest

prior art was identified as being document (1), which disclosed biocides comprising MIT and citric acid. 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 (4), which demonstrated that MBIT was over 13 times more effective than MIT in inhibiting the growth of *E. coli*; even allowing for the possibility of antagonism, this assumption was safe. However, the disclosure of document (4) was also found to render the claimed solution obvious since the skilled person would be motivated to replace MIT with MBIT 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. 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 with respect to claim 7, 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 combination 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.

VIII. 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 1-14 filed during oral proceedings of 12 November 2014

Claims:
Nos: 1 to 9 of the main request filed with letter of 22 July 2010.

IX. 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 4, lines 27 to 30; page 6, lines 20 to 24; page 8, lines 1 to 4; and page 9, lines 26 to 30; divisional application as originally filed: page 4, lines 13 to 16; page 6, lines 1 to 4; page 7, lines 12 to 15; and page 8, line 31 to page 9, line 2).

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 compositions comprising the combinations of components in the ranges of weight ratios as 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 four independent claims 1, 3, 4 and 7 of the main request are directed to microbicidal compositions comprising BBIT/EDTA, BBIT/citric acid, MBIT/EDTA, and MBIT/citric acid, 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).

Claims 1 and 4

4.2 For the subject-matter of claims 1 and 4, which relate to combinations of BBIT and MBIT with EDTA, document (2) can be seen as representing the closest state of the art.

Document (2) relates to synergistic microbicidal compositions comprising an isothiazolinone derivative of formula (I) and a complexing agent, which are particular useful in the protection of water-containing technical products (see e.g. page 2, lines 2 to 17; page 2, line

59 to page 3, line 4). The substituents in formula (I) are defined on page 3, lines 5 to 54, and the preferred isothiazolinones on page 4, lines 17 to 25). The complexing agents are disclosed on page 4, line 37 to page 5, line 3. Example 3 relates to compositions comprising BIT and EDTA, and the remaining examples to combinations of TITZ with a number of complexing agents, including EDTA (examples 1, 2, 4 and 5).

4.3 The problem to be solved in the light of document (2), 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 claims 1 and 4 relates to compositions characterised in that the isothiazolinone component is BBIT or MBIT rather than TITZ or BIT.

The experimental results reported in Tables 11 and 38 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 (2) specifically discloses synergistic combinations of BIT and TITZ with EDTA. Starting from these exemplified compositions, the skilled person, seeking a solution to the problem defined above, would turn to the general disclosure of this document. Here, he would be faced with very broad definitions of both the isothiazolinone

component and the complexing agent (cf. page 3, lines 5 to 54; page 4, line 37 to page 5, line 3). In view of the breadth of this disclosure compared to the specific nature of the examples, the skilled person would not regard said general teaching as providing a reliable guide as to which further combinations could be expected to display synergistic behaviour.

The more specific disclosure with respect to the isothiazolinone component (cf. page 4, lines 17 to 25) also does not direct the skilled person to the claimed combinations, since MBIT and BBIT do not appear amongst the preferred compounds listed.

In this context, reference is made to the declaration of E F Warwick dated 26 January 2011, submitted by the appellant with letter of 24 March 2011, which confirms that isothiazolinones falling with the scope of formula (I) according to document (2) do not necessarily display equivalent synergistic behaviour with other biocides. Thus, it can be seen from Tables 1 and 2 of the declaration that MIT and OIT, which are structurally similar 2-alkyl-4-isothiazolin-3-ones, and designated as being most preferred in document (2) (see page 4, lines 22 to 25), differ markedly in their patterns of synergy.

Consequently, document (2), taken alone, does 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 (1), paragraph [0001]; document (3), paragraphs [0001], [0008] to [0010]; document (5), paragraph [0004]). However, these documents do not come closer to

the claimed subject-matter than that addressed above in point 4.5.1:

In document (1), MIT is a mandatory component of the compositions, and the list of second components does not include EDTA (see claim 1). Therefore, this document does not point to the solutions proposed.

In document (3), the second component is structurally remote from EDTA (see paragraph [0014]). Consequently, the skilled person would not be able to extract any valuable teaching from this document with respect to possible modifications of the isothiazolinone component in combinations with EDTA.

Document (5) discloses compositions comprising MBIT. However, this is combined with a further isothiazolinone, preferably MIT (see paragraphs [0003], [0004], [0008]). These combinations of two isothiazolinones are remote from the claimed subject-matter.

4.5.3 The remaining cited document (4) also does not suggest the present solutions:

Document (4) is a scientific article reporting a study aimed at developing a quantitative structure-activity relationship for a series of isothiazolinones, including MIT and MBIT, based on an evaluation of the minimum inhibitory concentration for *E. Coli* (see abstract and Scheme 1).

However, the relative biological efficacies of individual isothiazolinones, as disclosed in document (4), do not allow the skilled person to draw any conclusions as to whether they would act

synergistically when combined with further biocides. Therefore, no incentive is provided that would lead the skilled person to modify the compositions disclosed in document (2) in the expectation that synergy would be maintained.

Claims 3 and 7

4.6 For the subject-matter of claims 3 and 7, which relate to combinations of BBIT and MBIT with citric acid, document (1) can be seen as representing the closest state of the art.

Document (1) relates to synergistic microbicidal combinations of MIT with one or more selected commercial microbicides, with areas of application similar to those disclosed in the present application (paragraphs [0001], [0011], [0018] and [0019]). Citric acid is listed as one of the possible second components, and combinations thereof with MIT are specifically claimed and exemplified (see e.g. paragraph [0006], Table 2, and claim 9).

4.7 The problem to be solved in the light of document (1), 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.

4.8 The solution proposed in claims 3 and 7 relates to compositions characterised in that the MIT component is replaced by BBIT or MBIT.

The experimental results reported in Tables 26 and 53 of the application as originally filed 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.

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

4.9.1 As outlined above in point 4.6, document (1) itself discloses MIT to be a mandatory component of the compositions. Therefore, this document, taken alone, does not point to the solutions proposed.

4.9.2 A number of further documents were cited relating to synergistic microbicidal compositions comprising an isothiazolinone and a second component (see document (2), page 3, lines 1 to 54; document (3), paragraphs [0001], [0008] to [0010]; document (5), paragraph [0004]). However, none of these documents are considered to render the present modifications to the closest prior art compositions obvious:

In documents (2) and (3), the second component is structurally remote from citric acid (see document (2), page 4, line 29 to page 5, line 15; document (3), paragraph [0014]). Therefore, the skilled person would not be able to extract any valuable teaching from these documents with respect to possible modifications of the isothiazolinone component in combinations with citric acid.

Document (5) discloses compositions comprising MBIT. However, this is combined with a further isothiazolinone, preferably MIT (see paragraphs [0003], [0004], [0008]). These combinations of two isothiazolinones are remote from the claimed subject-matter.

4.9.3 With respect to the cited prior art document (4), the same considerations apply as outlined above in point 4.5.3.

4.10 The board cannot follow the analysis of inventive step with respect to claim 7 set out in the decision under appeal:

Therein (cf. above point V), it was accepted that document (1), 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 (4), 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 and 22).

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, 4.5.2, 4.6 and 4.9.2).

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 document (1), 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.

4.11 In view of the above considerations, the board concludes that the subject-matter of claims 1, 3, 4 and 7, and of claims 2, 5, 6, 8 and 9 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 1-14 filed during oral proceedings of 12 November 2014

Claims:
Nos: 1 to 9 of the main request filed with letter of 22 July 2010

The Registrar: The Chairman:

M. Schalow A. Lindner

Decision electronically authenticated