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**Datasheet for the decision
of 21 October 2014**

Case Number: T 0608/12 - 3.3.05

Application Number: 03798172.7

Publication Number: 1546035

IPC: C01B15/023, B01J29/04,
C07D301/12, C07D303/04,
C01B15/037

Language of the proceedings: EN

Title of invention:
NOVEL AQUEOUS HYDROGEN PEROXIDE SOLUTIONS

Patent Proprietor:
Evonik Degussa GmbH

Opponents:
THE DOW CHEMICAL COMPANY
Solvay (Société Anonyme)
BASF SE

Headword:
H₂O₂/EVONIK

Relevant legal provisions:
EPC Art. 83

Keyword:
Sufficiency of disclosure - main request (yes)
Sufficiency of disclosure - reproducibility of example 1 (yes)

Decisions cited:

T 0182/89, T 0382/93, T 0409/91, T 0435/91, T 1062/98,
T 0396/02, T 1033/02, T 0764/04, T 1743/06, T 1761/08,
T 0347/10

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

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Case Number: T 0608/12 - 3.3.05

**D E C I S I O N
of Technical Board of Appeal 3.3.05
of 21 October 2014**

Appellant:
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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 13 January 2012**

revoking European patent No. 1546035 pursuant to
Article 101(3)(b) EPC.

Composition of the Board:

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

Summary of Facts and Submissions

- I. The present appeal lies from the decision of the opposition division to revoke European patent No. 1 546 035 under Article 83 EPC.

Independent claims 1 and 9 as granted read as follows:

"1. An aqueous hydrogen peroxide solution comprising:

- i) less than 50 wppm alkali metals, alkaline earth metals or combinations thereof in total, irrespective whether the alkali or alkaline earth metals are present in cationic or complex form;*
- ii) less than 50 wppm of amines having a pK_B of less than 4.5 or the corresponding protonated compounds in total; and*
- iii) at least 100 wppm anions or compounds that can dissociate to form anions in total, whereby the wppm are based on the weight of hydrogen peroxide."*

"9. A process for the preparation of the hydrogen peroxide solution of any of claims 1-8 according to the anthraquinone loop process comprising:

- a) hydrogenation of a working solution comprising an organic solvent or mixture of organic solvents and one or more active anthraquinone compounds,*
- b) oxidation of the hydrogenated working solution to form hydrogen peroxide,*
- c) extraction of hydrogen peroxide with water,*
- d) stabilizing of the extracted aqueous hydrogen peroxide solution,*
- e) concentrating the aqueous hydrogen peroxide solution to a concentration of hydrogen peroxide of at least 50% by weight based on the weight of the hydrogen peroxide solution,*

f) drying of the working solution after extraction,
and

g) regeneration and purification of the working
solution,

whereby during the entire process neither alkali or
alkaline earth metals nor amines having a pK_B of less
than 4.5 or compounds forming such amines during the
process are introduced in amounts that result in
amounts of

i) 50 wppm or more of alkali metals, alkaline earth
metals or combinations thereof in total, irrespective
whether the alkali or alkaline earth metals are present
in cationic or complex form; or

ii) 50 wppm or more of amines having a pK_B of less
than 4.5 or the corresponding protonated compounds in
total; in the resulting aqueous hydrogen peroxide
solution, whereby the wppm are based on the weight of
hydrogen peroxide."

II. The following documents cited during the proceedings
are relevant for the present decision:

D20: SEMI C 30-1101 "*Specifications and Guidelines for
Hydrogen Peroxide*", available at www.semi.org in
September 2001, pages 1 to 12

D28: J.-M. Collard et al.; "*Implementing enhanced ICP-
MS technology to attain SEMI Grade 5 purity
levels*", MICRO, January 2002

D29: Solvay Chemicals, Brochure "*High Purity Grade
Hydrogen Peroxide*"

D33: J. Kerth et al., "*Bestimmung kationischer Verunreinigungen in Wasserstoffperoxid*", GIT Labor-Fachzeitschrift 11/2000, pages 1324, 1326 and 1327

D37: Ullmann's Encyclopedia of Industrial Chemistry, Wiley-VCH Verlag GmbH, Weinheim, 2012, pages 393 to 427.

III. In its decision, the opposition division held the patent to be in breach of the requirements of Article 83 EPC, in particular for the following reasons:

The patent disclosing no method for determining the amount of amines having a pK_B of less than 4.5 in an H_2O_2 solution, and the documents in the proceedings showing that such a determination was only possible when the amine was known, the skilled person could not determine the amount of an unknown amine. It followed that the skilled person did not know whether or not he was working within the forbidden area.

IV. With its grounds of appeal of 14 May 2012 and its letter of 14 January 2013, the patentee contested the above decision.

V. With letters of 5 September 2012 and 23 July 2014, opponent II (hereinafter "respondent II") cited a couple of board of appeal decisions and argued that the absence of a method for measuring the unusual parameter "*less than 50 wpm of amines having a pK_B of less than 4.5*" led to an insufficient disclosure of the invention. It also argued that example 1 was insufficiently disclosed and thus not reproducible.

- VI. Opponent I (hereinafter "respondent I") argued (see letters of 28 September 2012 and 11 September 2014) that the use in example 1 of the unclear product terminology "C₉/C₁₀ alkyl substituted aryl compounds" made it impossible to reproduce the invention. Furthermore, the use of 200 ppm of sodium pyrophosphate (Na₄P₂O₇) to stabilise the hydrogen peroxide produced in example 1 led to a sodium concentration (69.17 mg/kg H₂O₂) which was outside the scope of protection of claim 1 at issue.
- VII. Opponent III (hereinafter "respondent III") cited (see letter of 8 October 2014) two documents, among them D37, which supposedly confirmed that sodium pyrophosphate was of the formula Na₄P₂O₇.
- VIII. In a letter of 29 September 2014, the appellant argued that the sodium pyrophosphate used was of the formula Na₂H₂P₂O₇·6H₂O; this resulted in an amount of 27.9 mg Na/kg H₂O₂ in example 1 of the patent.
- IX. With letter of 17 October 2014, the appellant filed an auxiliary request.
- X. At the oral proceedings, which took place on 21 October 2014, the discussion focused on the main request and on the Article 83 EPC issue.
- XI. After closure of the debate, the chairman established the parties' requests as follows:

The appellant requested that the decision under appeal be set aside and that the case be remitted to the department of first instance for further prosecution on the basis of the claims as granted or, alternatively,

the claims according to the auxiliary request dated 17 October 2014.

The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. Main request - Sufficiency of disclosure of the invention
 - 1.1 It is established jurisprudence that the requirements for sufficiency of disclosure are met if the invention could be performed in the whole area claimed at the filing date of the application by a person skilled in the art without undue burden, using common general knowledge and having regard to further information given in the patent in suit (see e.g. T 0409/91, OJ 1994, 653, point 3.5 of the reasons; T 0435/91, OJ 1995, 188, point 2.2.1 of the reasons; T 1743/06, point 1.1 of the reasons).
 - 1.2 In the case at issue, the invention concerns an aqueous hydrogen peroxide solution (claim 1) and its preparation (claim 9). Regarding the question as to whether this invention could be performed at the filing date of the application by a person skilled in the art, the board observes that paragraphs [0036] and [0037] and example 1 of the patent specification disclose ample details regarding the preparation of the claimed solution and in particular, in example 1, the detailed preparation of one specific hydrogen peroxide solution.
 - 1.3 The board notes that the burden of proof to show that a skilled person would be unable to reproduce the invention is upon the opponents (here the respondents) (see e.g. T 764/04, T 382/93, T 16/87, OJ 1992, 212;

T 182/89 OJ 1991, 391), but in the present none of them tried to rework example 1 of the contested patent to identify any gap of information. It follows that, in the absence of any evidence to the contrary, the board has no reason to put into question the reproducibility of the process disclosed in example 1 and the fact that it leads to the claimed solution.

- 1.4 Concerning the doubt expressed by the respondents on the formula of sodium pyrophosphate and the question whether the amount of sodium in example 1 of the patent fell within or outside the scope of protection of the claims, the board does not accept this allegation because it is well within the competence of a skilled person to choose among the potential compounds the one with the adequate formula, or alternatively to modify the amount of stabiliser needed, in order to arrive at an alkali metal concentration falling within the terms of independent claims 1 or 9 at issue.

- 1.5 Regarding the alleged lack of reproducibility of example 1 due to the use of the generic formula "C₉/C₁₀ alkyl substituted aryl compounds" in the preparation of H₂O₂, the board does not share the appellant's conclusions in this respect, because said formula is certainly broad, but not unclear, since the skilled person knows which compounds fall under the definition of C₉/C₁₀-alkyl substituted aryl compounds. Moreover, the respondents have the burden of proof of their allegations and none of them did show in the present case that it was impossible to reproduce example 1 with at least one particular compound falling under the above generic formula.

- 1.6 As to the question whether the invention could be performed in the whole area claimed, the board is

convinced that the claimed compositions can be prepared without undue burden simply by mixing the necessary amounts of i), ii) and iii) as defined in claims 1 and 9 above with an H₂O₂ aqueous solution which would be substantially free of alkali- and alkaline earth metal ions and of amines having a pK_B of less than 4.5.

The board asked the parties in this respect whether they contest the existence of such a "pure" aqueous hydrogen peroxide solution. The appellant confirmed the existence of such a product and referred to documents D20, D28 and D29. The respondents did not contest that this product was state of the art. The appellant further stated that it was common general knowledge to prepare such a "pure" aqueous hydrogen peroxide solution using highly acid ion exchangers in the H-form. This was also not contested by the respondents. The respondents merely argued that there was no evidence in the patent that the preparation of the claimed product over the whole claimed area was possible at an industrial scale.

For the board, in the absence of evidence for this allegation, this argument cannot be accepted. Furthermore, the sole requirement of Article 83 EPC is that a skilled person is able to prepare the claimed invention either by using the information found in the patent or by common general knowledge. For the board, the mixing of existing compounds is basic knowledge of any laboratory technician, and the preparation of the claimed solution from a "pure" hydrogen peroxide aqueous solution is trivial.

1.7 The board also does not accept the following arguments of the respondents:

- 1.7.1 The feature "*less than 50 wppm of amines having a pK_B of less than 4.5 or the corresponding protonated compounds in total*" is not an unusual parameter, as alleged by the respondent, since the pK_B represents the well-known base dissociation constant of a chemical compound and, as explained in point 1.7.3 below, the measurement of an amount of amines as defined in claims 1 and 9 is not an undue burden.
- 1.7.2 Regarding the controversial issue that the skilled person should be aware of whether or not he is working within the scope of the claims, this is not a matter of sufficiency of disclosure but rather a matter of Article 84 EPC, since it concerns the limits of protection of a claim (see also in this respect decisions T 396/02, point 4.8.2 of the reasons, T 1033/02, point 11.4 of the reasons and T 0347/10 point 2.3.5 of the reasons).
- 1.7.3 The absence in the contested patent of a method for determining the amount of amines having a $pK_B < 4.5$ is also not an Article 83 EPC issue, because - as explained hereinafter - the skilled person knew at the priority date how to separate, identify and quantify amines in an aqueous hydrogen peroxide solution, even in very low amounts.

D20 (Table, page 10) describes in particular that the total amount of nitrogen in a VLSI grade hydrogen peroxide solution must be 2 ppm max (the appellant pointed in this respect to the determination of nitrogen by the well-known Kjeldahl method). D33 (Figure 3) moreover discloses that ion chromatography allows to separate and identify very low amounts of individual amines in an hydrogen peroxide solution. For the board, it follows that there is no reason to

believe that the determination in a hydrogen peroxide solution of an amount of up to 50 wppm of amines having a $pK_B < 4.5$ would be an undue burden for the person skilled in the art.

- 1.7.4 The alleged impossibility to verify whether an unknown hydrogen peroxide solution would fall within or outside the scope of protection of the claims is not a matter of sufficiency of disclosure as required by Article 83 EPC, but a matter to be decided by the national courts (see in particular T 1062/98, point 2.1.4 of the reasons), since this issue concerns the boundaries of the claimed invention.
- 1.7.5 For the board, none of the decisions that the respondents cited in support of their arguments is relevant for the present case, because they concern in essence the reproducibility of a specific compound defined by a parameter, but they do not concern the determination of a certain amount of a specific known compound in a composition.
- 1.8 From the above considerations the board holds the disclosure of the contested patent to be sufficiently clear and complete for the invention to be carried out in the whole claimed area by a person skilled in the art, so that the requirements of Article 83 EPC are met. It is observed that board 3.3.01 concluded in the same way in decision T 1761/08, which related to a process for the epoxidation of olefins in the presence of an aqueous reaction mixture comprising the hydrogen peroxide solution defined in claim 1 of the main request at issue.

2. Remittal

As the contested decision concerned only the question of whether or not the invention defined in the main request was sufficiently disclosed, the board exercises its discretion under Article 111(1) EPC and remits the case to the department of first instance for further examination of the relevant grounds of opposition in respect of this request.

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 for further prosecution on the basis of the claims as granted.

The Registrar:

The Chairman:



C. Vodz

G. Rath

Decision electronically authenticated