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D E C I S I O N
of 5 November 2002

Case Number: T 0458/99 - 3.3.1

Application Number: 94200263.5

Publication Number: 0612739

IPC: C07D 305/12

Language of the proceedings: EN

Title of invention:

A process for the production of ketene dimers

Patentee:

Eka Chemicals AB

Opponent:

Hercules Incorporated

Headword:

Ketene dimers/EKA

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes) - non obvious solution"

Decisions cited:

-

Catchword:

-



Case Number: T 0458/99 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 5 November 2002

Appellant: Hercules Incorporated
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Representative: Hansen, Bernd, Dr. Dipl.-Chem.
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Respondent: Eka Chemicals AB
(Proprietor of the patent) S-44580 Bohus (SE)

Representative: Tauchner, Paul, Dr.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 12 March 1999
rejecting the opposition filed against European
patent No. 0 612 739 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: A. J. Nuss
Members: P. P. Bracke
S. C. Perryman

Summary of facts and submissions

I. The appeal lies from the Opposition Division's decision to reject the opposition against European patent No. 0 612 739.

II. At the oral proceedings before the Board, which took place on 5 November 2002 and on which the Appellant (Opponent) was not represented, as announced with letter dated 13 June 2002, the Respondent (Proprietor of the patent) filed a set of 10 claims and an amended page 2 of the description. The only independent claim read:

"1. A process for the production of ketene dimers from fatty acid halides by reaction with tertiary amines, characterised in that at least 1.15 moles of tertiary amine that is liquid at the reaction conditions is used per mole of fatty acid halide and the process is carried out in the presence of not more than 10% by weight, based on the amount of fatty acid halide, of an additional solvent, whereby the produced ketene dimer is obtained by stripping of tertiary amine followed by separation of formed crystals of tertiary amine hydrogen halide by acid extraction."

III. In its written submissions, the Appellant essentially argued that document

(1): US-A-2 369 919

represented the closest state of the art. Starting therefrom, the problem underlying the invention was the provision of a process wherein undesirable solvents are replaced with environmentally friendly ones while being

able to readily separate the alkyl ketene dimer (AKD) from the reaction mixture. The claimed process was obviously derivable from the combined teaching of documents (1) and

(2): DE-A-2 335 488,

because the use of an excess tertiary amine as solvent was known from document (1) and the removal of tertiary amine hydrogen halide by acidic extraction and the removal of solvent by stripping were known from document (2).

IV. The Respondent submitted, that document (1) did not give any hint to use an excess of tertiary amine instead of organic solvent in case the tertiary amine hydrogen halide is to be removed from the AKD. Document (1) did also not suggest to remove the tertiary amine hydrogen halide by acid extraction. As document (2) only mentioned the use of organic solvents, the claimed process was not obviously derivable from the combined teaching of documents (1) and (2).

V. The Appellant had requested in writing that the decision under appeal be set aside and that the European patent No. 0 612 739 be revoked.

The Respondents requested that the decision under appeal be set aside and that the patent be maintained on the following basis:

Claims: 1 to 10 as submitted at oral proceedings on 5 November 2002;

Description: page 2 as submitted at oral proceedings on 5 November 2002; and pages 3-6 as granted.

VI. At the end of the oral proceedings the decision of the Board was given orally.

Reasons for the decision

1. The appeal is admissible.

2. *Article 123(2) and (3) EPC*

The claims and amended page 2 of the description differ from the claims as granted only by the specification in the claimed process that the tertiary amine is liquid at the reaction conditions. As such feature was disclosed on page 3, lines 9 to 11, of the application as filed and as the claimed scope is restricted by such feature, this amendment does not contravene Article 123(2) and (3) EPC.

3. *Novelty*

After examination of the cited prior art documents, the Board has reached the conclusion that none of those documents describes all features of the process as defined in Claim 1 and, consequently, that Claims 1 to 10 are novel over the cited prior art. Since this was not disputed, it is not necessary to give detailed reasons for this finding.

4. *Inventive step*

- 4.1 It was not contested that document (1) represents the closest state of the art.

Document (1) describes a process of reacting tertiary amines with acid halides under anhydrous conditions and isolating, also under anhydrous conditions, the AKD (page 1, left-hand column, lines 23 to 32). Although it is the essential disclosure of document (1) that such reaction is carried out in the presence of sufficient inert solvent to dissolve the AKD, thus facilitating the separation of the insoluble tertiary amine hydrogen halide by filtration (see page 1, left-hand column, lines 36 to 44, page 2, right-hand column, line 61 to page 3, left-hand column, line 14, and all examples), it also mentions on page 3, left-hand column, lines 14 to 21, the possibility to use an excess of the tertiary amine as solvent or to carry out the dehydrohalogenation in the absence of a solvent.

- 4.2 Starting from the disclosure of document (1), the least ambitious problem solved by the claimed process is the provision of a **further** process of preparing AKD.

Since it was indisputably made plausible by comparative Example 1 and the Examples 2 to 4 of the patent in suit that this problem was effectively solved and since the Board comes to the conclusion that the claimed process is not an obvious solution to that problem in view of the cited prior art, it is not necessary to consider whether a more ambitious problem, as formulated by the Appellant (see point III), has been solved.

- 4.3 The Appellant argued that document (1) discloses the use of an excess of tertiary amine as solvent and the stripping step for removing the solvent. As

document (2) teaches that the hydrolysis of AKD, occurring when contacting it with water, can be overcome by working under acidic circumstances when extracting the tertiary amine hydrogen halide, the Appellant was of the opinion, that all reaction features were known from documents (1) and (2) and, consequently, that the claimed process was obviously derivable from both documents.

4.4 Document (1), however, teaches on page 1, left-hand column, lines 36 to 42, to use a **chemically equivalent** amount of tertiary amine, based on the amount of fatty acid halide.

Furthermore, on page 3, left-hand column, lines 14 to 22, of document (1) it is stated (a) that it is also feasible to use an excess of the tertiary amine as solvent in cases where the AKD can be readily separated from the amine and its hydrogen halide and (b) that the dehydrohalogenation can be carried out in the absence of solvent when the presence of the amine hydrogen halide in the product is not objectionable in the use to which the AKD is to be put.

That statement (a), which does not give any guidance in which cases the AKD might be readily separated from the amine and its hydrogen halide, is to be considered in the context of the complete content of document (1). As this document teaches on page 3, right-hand column, lines 36 to 39, that an excess of one of the reactants may introduce some difficulty in isolating the AKD, a skilled reader would conclude from the statement a) that by using an excess of tertiary amine, in the absence of any additional inert solvent, difficulties in isolating the AKD could be expected. Since it could,

furthermore, be concluded from statement b) that in the absence of any solvent the AKD may not be completely separated from the tertiary amine hydrogen halide, a skilled reader would conclude that, in order to be able to separate the amine and its hydrogen halide from the AKD without getting involved in serious separation problems, besides an excess of tertiary amine a considerable amount of additional inert solvent should be present.

Therefore, document (1) cannot be considered to suggest the use of an excess of tertiary amine, let alone, the use of an excess of tertiary amine in the presence of not more than 10% by weight, based on the amount of fatty acid halide, of an additional solvent.

- 4.5 Document (2), which is concerned with the problem of stabilising AKD, describes a process for preparing AKDs by reacting fatty acid halides with tertiary amines in inert organic solvents, adding an aliphatic saturated carboxylic acid having a pK_B of at least 3.5 once the dehydrohalogenation has been completed, washing with water and isolating the AKDs by distillation of the solvent (see the first and second paragraph on page 2, the last complete paragraph on page 3, the paragraph bridging pages 3 and 4 and the second full paragraph on page 4).

As it is stated in the last two sentences of the first full paragraph of page 3 that the amount of solvent must be at least four times the amount of fatty acid halide in order that the reaction mixture remains stirrable and the quality of the AKD is not reduced, document (2) cannot be considered to suggest the use of not more than 10% by weight, based on the amount of

fatty acid halide, of an additional solvent.

4.6 As, thus, neither document (1) nor document (2) proposes the use of an excess of tertiary amine in the presence of not more than 10% by weight, based on the amount of fatty acid halide, of an additional solvent, then already for that reason alone, the claimed process is not rendered obvious by the cited prior art documents.

4.7 Therefore, the Board comes to the conclusion that the process according to Claim 1 is not obviously derivable from the cited prior art according to Article 54(2) EPC.

Claims 2 to 10, which represent preferred embodiments of Claim 1, derive their lack of obviousness from the same inventive concept.

Order

For these reasons it is decided:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the following basis:

Claims: 1 to 10 as submitted at oral proceedings on 5 November 2002;

Description: page 2 as submitted at oral proceedings on 5 November 2002 and pages 3 to 5 as

granted.

The Registrar:

The Chairman:

N. Maslin

A. Nuss