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Datasheet for the decision of 8 October 2020

Case Number: T 1711/17 - 3.3.10

Application Number: 10170500.2

Publication Number: 2243763

IPC: C07C35/21

Language of the proceedings: EN

Title of invention:
A selective synthesis of organophosphites

Patent Proprietor:
INVISTA Textiles (U.K.) Limited

Opponent:
Evonik Operations GmbH

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
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Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1711/17 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 8 October 2020

Appellant: (Patent Proprietor)	INVISTA Textiles (U.K.) Limited One St. Peter's Square Manchester M2 3DE (GB)
Representative:	Cockerton, Bruce Roger Carpmaels & Ransford LLP One Southampton Row London WC1B 5HA (GB)
Respondent: (Opponent)	Evonik Operations GmbH Rellinghauserstrasse 1-11 45128 Essen (DE)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Postfach 10 60 78 28060 Bremen (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 16 May 2017 concerning maintenance of the European Patent No. 2243763 in amended form.**

Composition of the Board:

Chair	M. Kollmannsberger
Members:	R. Pérez Carlón
	W. Van der Eijk

Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal against the decision of the opposition division on the maintenance of European patent No. 2 243 763 in the form of the third auxiliary request then pending.

II. Notice of opposition had been filed on the grounds of added subject-matter (Article 100(c) EPC), insufficiency of disclosure (Article 100(b) EPC), and lack of novelty and inventive step (Article 100(a) EPC).

III. The documents filed during the opposition proceedings include the following:

D3: US 4,120,917
D6: US 5,235,086

Experimental evidence was filed during these appeal proceedings as Annex 1 to the grounds of appeal.

IV. The opposition division concluded that the main request before it contained added subject-matter. The invention was sufficiently disclosed for it to be carried out by a person skilled in the art and the method of claim 1 of the first auxiliary request was novel. Document D3 was the closest prior art for the method of claim 1 of the first auxiliary request and the problem underlying the claimed invention to provide an alternative method of producing $(R^1O)PX_2$. The claimed solution, characterised by the mode of addition of amine and alcohol to the phosphorous trihalide solution, would have been obvious for a person skilled in the art and

was thus not inventive. The opposition division did not admit the second auxiliary request into the proceedings. With respect to the method of claim 1 of the third auxiliary request, which required adding amine and alcohol in a separate but concurrent fashion, the data in the patent in suit credibly showed that it provided better results than adding them as a mixture. There was no hint in the prior art towards this solution, which was thus inventive.

V. The board informed the parties in a communication dated 22 September 2020, that it was of the view that the appellant's second auxiliary request, filed with a letter dated 4 February 2020, was allowable.

VI. With a letter dated 22 September 2020, the appellant filed a new main request corresponding to the second auxiliary request previously on file, and withdrew any other pending request.

Claim 1 of the main request reads as follows:

"A method of producing $(R^1O)PX_2$ by the reaction of PX_3, alcohol R^1OH and a triorganoamine (R')(R")(R"')N at a temperature greater than -25°C, such that the additions of the triorganoamine and the alcohol R^1OH are done in a separate but concurrent fashion or in a separate and in alternating portions of the triorganoamine and the respective alcohol, wherein X is selected from the group consisting of Cl, Br and I, R^1 is selected from the group consisting of C_{1-18} alkyl, C_{6-18} aryl and C_3-C_{18} cycloalkyl radicals; and R'R"R'" are independently selected from the group consisting of C_1 to C_{18} alkyl, C_6 to C_{18} aryl and C_4 to C_{18} heteroaryl radicals;

wherein the amount of alcohol OH groups per phosphorous

bound X groups is 1.00 to 1.2 molar equivalents of alcohol OH groups per molar equivalent of phosphorous bound X groups to be substituted;

wherein said method comprises contacting a first solution comprising a predetermined amount of PX_3 dissolved in an aprotic solvent with (i) a second solution comprising a predetermined amount of alcohol R^1OH and (ii) a third solution comprising a predetermined amount of triorganoamine (R')(R")(R"')N to produce a composition comprising the compound $(R^1O)PX_2$;

wherein the second solution contains no triorganoamine and the third solution contains no alcohol."

VII. The appellant agreed with the conclusion of the opposition division that document D3 was the closest prior art. Example II of D3 disclosed a method which differed from that of claim 1 by virtue of the relative amount of PCl_3 to t-amyl alcohol and the mode of addition of the alcohol and tertiary amine. The problem of providing a process for producing phosphorodihaloidites having, like that of D3, good selectivity was solved by the claimed method, characterised by a defined stoichiometry and mode of addition. D3 achieved a good selectivity by using an excess of PCl_3. The claimed process achieved also good selectivity by using quasi-stoichiometric amounts of reagents and a specific mode of addition. There was no hint in the art towards that solution, which was thus inventive.

VIII. The respondent (opponent) made no substantive submissions in these appeal proceedings and withdrew any request for oral proceedings with a letter dated

14 September 2020.

IX. The board cancelled the oral proceedings already summoned.

X. The final requests of the parties, in writing, were as follows:

- The appellant requested that the decision under appeal be set aside and the patent maintained in the form of the main request, filed with a letter dated 22 September 2020.

- The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. **Amendments**

2.1 Claim 1 of the main request finds a basis on the combination of claims 1, 3 and 4 as originally filed, the required temperature disclosed on page 13, line 31 and the relative amount of reagents on page 10, lines 10-12.

Dependent claims 2 to 3 find a basis on claims 11 and 12 as filed, respectively.

2.2 The claimed subject-matter does not go beyond that of the claims of the patent as granted.

2.3 The requirements of Articles 123(2) and (3) EPC are thus fulfilled.

2.4 Claim 1 of the main request finds a basis on page 3, lines 20-22 and 27-32; page 4, lines 10-17; page 1, line 16; page 10, lines 10-12; page 12, lines 24-26, and page 13, line 31 of the earlier application.

Dependent claim 2 finds a basis on page 10, lines 27-31 and claim 3 on page 11, lines 27-30.

The requirements of Article 76(1) EPC are thus also fulfilled.

3. **Sufficiency of disclosure**

3.1 The opposition division, in the context of the first auxiliary request then pending, concluded that the claimed invention was sufficiently disclosed for it to be carried out by a person skilled in the art (point 5 of the decision under appeal). This reasoning applies analogously to the method of claim 1 of the main request in appeal.

The respondent has not filed any argument in this respect, and the board sees no reason to depart from the opposition division's conclusion.

4. **Novelty**

4.1 The opposition division concluded that neither D3 nor D6 disclosed the required mode of addition of triorganoamine and alcohol required by claim 1 and thus that the method of claim 1 of the first auxiliary request then pending was novel (points 7 and 8 of the decision under appeal). The reasoning applies

analogously to claim 1 of the main request in appeal.

4.2 The respondent has not made any submissions in this respect. The board sees no reason to depart from the opposition division's conclusion.

5. **Inventive step**

5.1 Claim 1 of the main request relates to a method of producing $(R^1O)PX_2$ by contacting a first solution comprising a phosphorous trihalide PX_3 with a second solution comprising a triorganoamine and a third comprising an alcohol R^1OH. The second solution does not contain alcohol, and the third does not contain triorganoamine.

The second and third solutions are added to the first in a separate but concurrent fashion or in separate alternating portions.

The amount of alcohol OH groups per phosphorous bound X groups is 1.00 to 1.2 molar equivalents of alcohol OH per molar equivalents of phosphorous bound X groups to be substituted.

5.2 Closest prior art

The appellant considered, like the opposition division in the decision under appeal, that document D3 was the closest prior art. The board sees no reason to differ.

Example II of D3 discloses the synthesis of t-amyl phosphorodichloridite $(Me_2EtO)PCl_2$ by reacting 941 mmol (129.3 g) of PCl_3 and 318 mmol (28.0 g) of 2-methyl-2-butanol (3:1 excess of PCl_3, i.e. 0.33 equivalents of alcohol per equivalent of P-Cl groups to be

substituted) in the presence of 187 mmol (28.0 g) of diethylaniline, at -5°C in dry petroleum ether.

D3 achieves high selectivity towards mono-alkoxylation by using an excess of PCl_3. It allows obtaining the required product with 72% yield, relative to the alcohol, and 98% purity, measured by ^{31}P-NMR. Amine and alcohol are added to PCl_3 in petroleum ether dropwise, as a mixture.

The process of of claim 1 differs from that of D3 by virtue of the relative amount of PCl_3 to t-amyl alcohol, and by the mode of addition of alcohol and tertiary amine to the PCl_3 solution.

5.3 Technical problem underlying the invention

The appellant formulates the problem underlying the claimed invention as to provide a process for producing phosphorodihaloidites having, like that of D3, good selectivity.

5.4 Solution

The solution to this technical problem is the method comprising contacting a solution of PX_3 with an alcohol and triorganoamine of claim 1, characterised in that

- the amount of alcohol groups OH per phosphorous bound X group is 1.00 to 1.2 molar equivalents of alcohol OH groups per molar equivalent of phosphorous bound X to be substituted,
- said contacting is made using a second solution containing alcohol and no triorganoamine and a third solution containing triorganoamine and no alcohol, and
- the second and third solutions are added

- in a separate but concurrent fashion or
- in a separate and in alternating portions.

5.5 Success

None of the examples reproduces the experimental conditions used in the closest prior art. However, the problem as formulated by the appellant does not require an improvement over that of D3, only good selectivity towards monoalkoxylation.

The examples of the patent in suit show a high selectivity towards phosphorodihaloite R^1OPX_2 by adding amine and alcohol in a separate but concurrent fashion, even without an excess of PX_3.

The appellant has filed with the statement of grounds of appeal experimental evidence (Annex 1) which shows that adding amine and alcohol separately in alternating portions also leads to good selectivity, without requiring an excess of PX_3.

It is thus credible that the problem as formulated by the appellant (point 5.3) is solved by the method of claim 1.

5.6 It remains to be decided whether the proposed solution to the problem defined above would have been obvious for the skilled person in view of the prior art.

Comparative examples A and B of the patent in suit, carried out by adding a mixture of alcohol and amine to a solution of phosphorous trichloride, led, as expected, to low selectivity due to formation of di- and tri- alkoxylated products.

The method of D3 achieves a good selectivity by using an excess of PCl_3, which is a standard strategy to avoid polyalkoxylation.

The solution proposed in the patent in suit allows to achieve also a good selectivity with quasi-stoichiometric amounts of phosphorous halide and alcohol, which reduces reagents waste, by specific modes of addition of alcohol and triorganoamine. These modes of addition are not mentioned in D3 or in any other document on file, and a skilled person would have had no reason to expect them to lead to good selectivity without having to use an excess of PX_3.

The claimed method is thus inventive.

6. **Remittal**

The description of the patent as granted contains subject-matter no longer encompassed by the claims of the main request (see for example [0015]) and thus requires amendment (Article 84 EPC). The board decided to make use of its discretion to remit the case to the opposition division for the description to be adapted (Article 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The file is remitted to the opposition division with the order to maintain a patent on the basis of claims 1-3 of the main request, filed with a letter dated

22 September 2020, and a description yet to be adapted to these claims.

The Registrar: The Chair:

C. Rodríguez Rodríguez M. Kollmannsberger

Decision electronically authenticated