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Datasheet for the decision of 19 January 2016

Case Number: T 2048/12 - 3.3.06

Application Number: 07013630.4

Publication Number: 1878492

IPC: B01J31/02, C08G18/18

Language of the proceedings: EN

Title of invention:
N,N,N'-Trimethyl-bis-(aminoethyl) ether and its derivatives as catalysts for polyurethanes

Patent Proprietor:
Air Products and Chemicals, Inc.

Opponent:
Huntsman International LLC

Headword:
PU catalysts / AIR PRODUCTS

Relevant legal provisions:
EPC Art. 52(1), 54, 56, 83

Keyword:
Novelty (yes - main request) commercial availability of a chemical product not necessarily a disclosure of all impurities contained therein
Inventive step: (no - main request) product claim embraces obvious modifications of the prior art (yes - auxiliary request) non-obvious improved preparation method
Sufficiency of disclosure - auxiliary request (yes)

Decisions cited:
G 0001/92, T 0952/92

Catchword:

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Case Number: T 2048/12 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 19 January 2016

Appellant: (Opponent)	Huntsman International LLC 500 Huntsman Way Salt Lake City, Utah 84108 (US)
Representative:	Held, Stephan Meissner, Bolte & Partner GbR Widenmayerstraße 47 80538 München (DE)
Respondent: (Patent Proprietor)	Air Products and Chemicals, Inc. 7201 Hamilton Boulevard Allentown, PA 18195-1501 (US)
Representative:	Kador & Partner Corneliusstraße 15 80469 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 24 July 2012 rejecting the opposition filed against European patent No. 1878492 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	B. Czech
Members:	P. Ammendola
	C. Vallet

Summary of Facts and Submissions

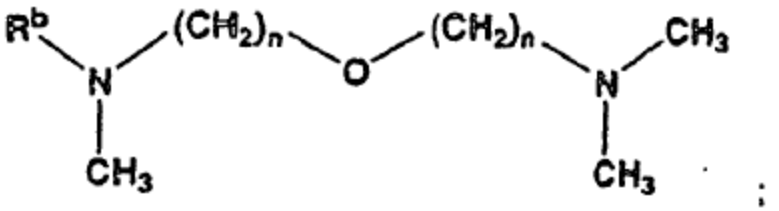
I. This appeal is against the decision of the Opposition Division rejecting the opposition filed against European patent No. 1 878 492 (claiming priority from application US 485724 of 13 July 2006).

II. Claims 1 and 5 of the patent **as granted** read as follows:

"*1. A composition comprising the contact product of:*

(i) at least one active hydrogen-containing compound; and which is at least one polyether polyol, at least one polyester polyol, at least one polymer polyol, or any combination thereof

(ii) at least one compound having the formula:



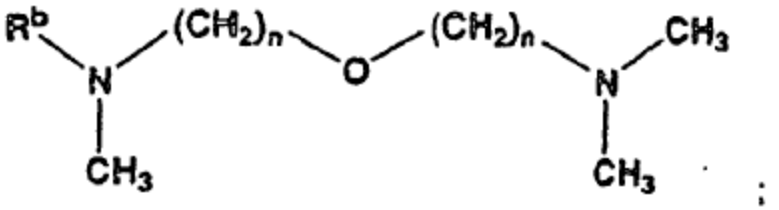
wherein:

n in each occurrence is selected independently from 1, 2, or 3;

R^b is a hydrogen atom."

"*5. A method of making a polyurethane comprising contacting at least one polyisocyanate with at least one active hydrogen-containing compound which is at least one polyether polyol, at least one polyester polyol, at*

least one polymer polyol, or any combination thereof in the presence of a catalytically effective amount of a catalyst composition under conditions sufficient to produce the polyurethane, the catalyst composition comprising at least one compound having the formula:



wherein:

n in each occurrence is selected independently from 1, 2, or 3;

R^b is a hydrogen atom."

Claims 6 to 12 as granted defined preferred embodiments of the method of claim 5.

Herein below the polyols listed in both claims 1 and 5 are also referred to as **the specified polyols** and the formula also identically recited in both claims is referred to as **the specified formula**.

III. With the notice of opposition the Opponent had requested revocation of this patent on the grounds of insufficient disclosure (Article 100(b)/83 EPC), lack of novelty and lack of inventive step (Article 100(a) EPC).

During the opposition proceedings the Opponent referred, *inter alia*, to the following prior art documents:

D1 = EP 1 505 059 A1;

D2 = THE ICI POLYURETHANES BOOK, Second Edition, 1990, pages 7 to 9;

D8 = Huntsman bulletin "CHEMICAL PRODUCTS", 2000, p. 22 "JEFFCAT(R) CATALYSTS" for the Polyurethane Industry;

D9 = JP 59-134754 A and translation into English;

D11 = Technical Bulletin of Huntsmann "JEFFCAT™ ZF-20 CATALYST", 1995; and

D16 = Chromatographic analysis of a batch of JEFFCAT™ ZF-20 of 15 November 2005.

The documents D8 and D11 had been cited as evidence of the "prior use" of the chemical product **BDMAEE** (bis(2-dimethylaminoethyl)ether) commercialised under the trade name **JEFFCAT™ ZF-20** as a blowing catalyst for producing **p**oly**u**rethane (below **PU**) foams. To corroborate this "prior use" the Opponent had also filed document D16 (analytical data) supposed to demonstrate that a batch of JEFFCAT™ ZF-20 (allegedly) sold in **2005** also contained minor amounts of **TMAEE** (N,N,N'-trimethyl-bis-(aminoethyl)ether), i.e. a compound according to the specified formula, detectable by chemical analysis.

IV. The Opposition Division rejected the opposition, *inter alia*, because:

- the patent was found to be sufficient,

- the alleged "prior use" of JEFFCAT™ ZF-20 in 2005 did not anticipate the subject-matter of granted

claims 1 and 5, and

- neither the composition of claim 1 nor the method of claim 5 were obvious when starting from the closest prior art as disclosed in D1.

V. In the statement of grounds of appeal the **Appellant** (Opponent) disputed all these findings. In support of its novelty objection(s), it additionally filed therewith an affidavit by Mr Borsi dated 10 November 2012 mentioning the regular presence of minor amounts of TMAEE in the BDMAEE sold as JEFFCAT™ ZF-20 since 2002 as well as several other documents allegedly proving the "prior use" of a urethane catalyst commercialised as JEFFCAT™ ZF-234 that:

- had been sold in 2006,

- comprised a polyether polyol and JEFFCAT™ ZF-20 and, thus,

- also contained minor amounts of TMAEE.

VI. In its letter of 6 June 2013 the **Respondent** (Patent proprietor) rebutted all the Appellant's objections and, in particular, disputed the admissibility into the appeal proceedings of the affidavit filed with that statement and of the belated submissions also filed therewith relating to a (second) public "prior use" of JEFFCAT™ ZF-234 in 2006. Nevertheless, it also filed, with said reply, three sets of amended claims as 1st to 3rd Auxiliary Request.

VII. With letter of 11 December 2013 the Appellant filed, a further document referring to the sale of JEFFCAT™ ZF-20 in 2005.

VIII. The Parties were summoned to oral proceedings.

With letter of 6 October 2015 the Appellant then filed

D31 = US 6,305,143 B1,

referring to JEFFCAT™ ZF-20 in its "Example 1". This disclosure in D31 was presented in the accompanying letter as (implying) another (third) "prior use" of this commercial product.

Finally, with letter of 13 October 2015 the Appellant filed a further affidavit relating to the "prior use" supposed to be substantiated by D31.

Herein below documents D8, D11 and all the other documents cited by the Appellant as to the three alleged "prior uses" of JEFFCAT™ ZF-20 (i.e. those - partially already filed before the Opposition Division - that referred to the alleged sale in 2005 of JEFFCAT™ ZF-20, those only filed during the appeal proceedings in relation to the alleged sale in 2006 of JEFFCAT™ ZF-234 as well as to D31) are also collectively referred to as **the three "prior uses" of JEFFCAT™ ZF-20**.

IX. In its letter of 18 November 2015 the Respondent disputed the admissibility into the appeal proceedings of the third objection of "prior use" of JEFFCAT™ ZF-20 based on D31 in view of its late filing. With this letter, if filed, *inter alia*, new versions of its 1st and 2nd Auxiliary claim Requests and a new 4th Auxiliary claim Request.

The set of claims according to the **1st Auxiliary Request** filed with letter of 18 November 2015 comprises claims 1 to 8 corresponding to (renumbered) reclaims 5 to 12 as

granted (see II, *supra*).

X. Finally, with letter of 12 January 2016 the Respondent filed a further set of amended claims as 5th Auxiliary Request.

XI. At the oral proceedings of 19 January 2016 the Parties were heard regarding the construction of claims 1 and 5 as granted, *inter alia* in respect of the disputed issue of whether these claims implied or not the presence or the use of the compound defined by the specified formula in "a catalytically effective amount". The Board deliberated on this point and indicated its conclusion that whereas the composition defined in claim 1 as granted did require a certain minimum content of the compound of the specified formula, the method of making a PU defined in claim 5 necessarily implied that this compound had to be used in an amount sufficient to measurably contribute to the catalysis of the PU formation.

As to the novelty of the subject-matter of the granted claims the Appellant stated expressly to no longer dispute it in view of document D1.

The debate then focused on an essential aspect of the novelty objection based on the first "prior use" in 2005 of JEFFCAT^{TM} ZF-20 (the "prior use" that had already been considered by the Opposition Division).

The Appellant relied on the (allegedly demonstrated) facts that TMAEE was present as an impurity in the already commercially available urethane catalyst JEFFCAT^{TM} ZF-20 and that the structure of this impurity could be determined. Urethane catalysts comprising TMAEE thus belonged to the state of the art to be

considered.

The Parties agreed that this line of argument was manifestly also essential in the other two objections of "prior uses" (those only submitted during the appeal proceedings and whose admissibility had been disputed).
The Board deliberated on this point and announced its conclusion that the subject-matter of, *inter alia*, claims 1 and 5 as granted was not possibly anticipated by any of the three alleged "prior uses" of JEFFCAT™ ZF-20.

The Parties also debated the disclosure provided by document D1 and its relevance in view of the assessment of inventive step for the subject-matter of claim 1.The Appellant initially argued that the closest prior art would be represented by the alleged disclosure, in paragraph [0003] of D1, that TMAEE was already known as a typical catalyst for the production of PUs.
The Board, after deliberation, indicated its conclusion that such disclosure was not provided by D1.
Thereupon, the Appellant presented a second line of argument in support of its inventive step objection, starting from undisputed common general knowledge - also reflected in paragraph [0004] of D1, i.e. that BDMAEE was an industry standard blowing catalyst for PU foams.
This second line of argument applied to claim 1 as granted as well as to claim 5 as granted.

At the hearing, the Appellant expressly indicated that it no longer objected to the admissibility of the 1st Auxiliary Request into the proceedings and had no formal objections against it under Articles 84 or 123(2) or (3) EPC.
The Appellant's novelty and inventive step objections relevant for claim 1 of this request were the same as

the ones already discussed in respect of the identically worded claim 5 as granted.

Hence, the Parties then debated the Appellant's remaining objection under Article 100(b)/83 EPC regarding claim 1 of the 1st Auxiliary Request.

XII. Final requests

The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the appeal be dismissed (Main Request) or, in the alternative, that the patent be maintained in amended form on the basis of the 1st or 2nd Auxiliary Request, both filed with letter of 18 November 2015, or the 3rd Auxiliary Request filed with letter of 6 June 2013, or the 4th Auxiliary Request, filed with letter of 18 November 2015, or the 5th Auxiliary Request, filed with letter of 12 January 2016.

XIII. The submissions of the Appellant may be summarized as follows:

Construction of claims 1 and 5 as granted

Claim 1 was clear, but extremely broad. The Respondent's attempt to suggest that the compound of the specified formula had, implicitly, to be present in "a catalytic effective amount" should be rejected already because the claim does not even mention that the composition or any of its ingredients was suitable for being used in the production of a PU. Even considering the whole patent disclosure, it was apparent from paragraph [0023] therein that the "*contact product*" present in the composition of claim 1 could be any composition possibly

prepared during the production of a PU, ranging from a premix of a part of some of the ingredients (those explicitly mentioned in claim 1) to a fully formulated mixture capable of generating a PU foam or gel. Hence, as also confirmed by claim 3, claim 1 even embraced PU catalytic compositions which comprised large amounts of conventional urethane catalysts (e.g. of BDMAEE) and only traces of a compound according to the specified formula, such as TMAEE. In any conceivable use of such claimed compositions to produce a PU, the TMAEE traces could not possibly contribute to the catalysis of the PU formation, i.e. were technically meaningless.

According to the Appellant, claim 5 as granted likewise imposed no minimum amount of the compound of the specified formula and, thus, did not require the presence of more than very small amounts of e.g. TMAEE. It stressed that the wording "*a catalytically effective amount*" did not refer to the compound of the specified formula but to the whole "*catalyst composition*". Thus, the catalytic effect could be provided by the presence of other conventional urethane catalysts, whose optional presence was even explicitly referred to in claim 12.

Lack of novelty of claim 1 and 5 as granted

The Appellant based its objections on, *inter alia*, the following facts:

a) The commercially available JEFFCAT™ ZF-20 that had been used in the prior art as urethane catalysts contained TMAEE impurities.

b) These TMAEE impurities were detectable by chemical analysis of the sold products.

The Appellant drew the conclusion that it was also prior art to use compositions comprising TMAEE as urethane catalysts.

It also stressed that for a person skilled in the art of the production of PU foams (i.e. being aware of the common general knowledge summarised in D2) the following was self-evident:

- The polyols listed in claims 1 and 5 encompassed practically any realistic option for such ingredient in processes for the industrial production of PU foams.

- During such processes the urethane catalyst(s) were normally contacted with the polyol(s) prior of the addition of the polyisocyanate.

Accordingly, in the Appellant's opinion the subject-matter of claim 1 and that of claim 5 were already state of the art because according to each of the three "prior uses", JEFFCAT™ ZF-20 had been commercialised as urethane catalyst.

The Appellant also referred to conclusion 1 of opinion G 1/92 (OJ 1993, 277) and to decision T 0952/92 (OJ 1995, 755, in particular the passage ending point 2.2 of the reasons).

Lack of inventive step - claims 1 and 5 as granted

In the Appellant's opinion, paragraph [0003] of document D1, when read in the context of the whole document, disclosed TMAEE among the conventional urethane catalysts. Thus, the Appellant initially presented a line of argument on inventive step starting from such

disclosure (see statement of grounds of appeal point 4.1).

Since the Board concluded at the hearing that D1 did not provide such disclosure, the Appellant's final line of argument on inventive step started from common general knowledge, as also reflected in [0004] of D1, that BDMAEE was a typical blowing catalyst for PU foams and, thus, a compound that had inevitably to be contacted with the polyol component at some stage.

The Appellant stressed that even the compositions encompassed by claim 1 and to be used in the method of claim 5 could contain merely technically meaningless traces of e.g. TMAEE, the catalytic activity being instead exclusively due to the presence of conventional (fugitive or non-fugitive) catalysts, such BDMAEE, in much larger amounts.

Since in such possible embodiments of the claimed subject-matter the compound of the specified formula (the only presented as the actual "*inventive catalyst*" in the patent in suit) would not contribute to the catalysis of the urethane forming reaction, the only technical problem possibly solved by these embodiments was the provision of an alternative to the prior art compositions.

It was obvious to solve this problem so as to arrive at the subject-matter of claims 1 or 5 since the disclosure in D1 rendered at least likely that some traces of TMAEE were present in the compositions of according tot the closest prior art.

As to claim 5 the Appellant additionally submitted that even considering *arguendo* that the amount of compound of

the specified formula had, implicitly, to be "*a catalytically effective amount*", still the patent in suit contained no comparison between the catalytic activity of BDMAEE and that of TMAEE. Hence the Respondent had not proved that the method of claim 5 was improved vis-à-vis this prior art. Thus, also the embodiments of the claimed method in which the amount of TMAEE was substantial only represented an alternative to the prior art according to the common general knowledge, also reflected in [0004] of D1. This alternative was also obvious in view of the teaching of D1 in combination with common general knowledge (summarised e.g. on page 3 of document D2), because the ability of TMAEE to catalyse the PU formation was at least to be expected by the skilled person, given the similarity of its structure with the structure of BDMAEE.

1st Auxiliary Request - Sufficiency of disclosure - claim 1

The assessment of sufficiency of disclosure required to establish whether the patent disclosed examples of how to carry out the alleged invention. In the present case, the disclosure of the patent examples was so generic and incomplete that a person skilled in the art could not even rework the examples. In particular, the patent examples did not identify in a sufficiently precise manner most of the ingredients and the reaction conditions used in the PU forming step.

Nor was it possible to attribute a clear meaning to the requirement of claim 5 that the TMAEE had to be present in a "*catalytically effective amount*". For instance, the person skilled in the art would not know how to determine such amount when another urethane catalyst,

e.g BDMAEE, was also present in the composition in a much larger amount.

XIV. The submissions of the Respondent may be summarized as follows:

Construction of claims 1 and 5 as granted

As apparent from the whole disclosure of the patent in suit, the invention based on the surprising finding that the compound of the specified formula was an excellent gelling catalysts. Accordingly, several passages therein clearly stated that the composition of the invention was a "*catalyst composition*". Also the examples referred to TMAEE as the "*inventive catalyst*". Thus, the whole disclosure justified reading in claim 1 an implicit limitation to "a catalytically effective amount" of the compound of the specified formula.

This was even more clearly the only technically sound construction of claim 5, since this claim explicitly required the "*catalyst composition*" - and, thus, necessarily also the only specified component of such "*catalyst composition*" - to be present in "*a catalytically effective amount*". It was unreasonable for a skilled reader to arrive at a different conclusion simply because the wording used did not expressly state that such required amount applied to the compound of the specified formula as well.

Novelty - claim 1 and 5 as granted

The Respondent argued that none of the alleged "prior uses" of JEFFCAT^{TM} ZF-20 could possibly anticipate the subject-matter of claim 1 or 5 as granted already because a skilled person had no reason to investigate

the nature of all the impurities possibly present in such allegedly commercially available products. G 1/92 could not be considered to acknowledge as part of the implicit technical disclosure of a chemical product also some hidden information that could only result from (possibly extremely complex and vast) chemical analysis carried out for idle curiosity. This applied in particular to the case of JEFFCAT™ ZF-20 which had been identified as being BDMAEE at very high purity (see e.g. document D11), thereby giving to the skilled person no reason at all to investigate the chemical structure of all the other products possibly present therein as insignificant traces.

Inventive step - claims 1 and 5 as granted

Paragraph [0003] of document D1 did not disclose that TMAEE was a urethane catalyst, let alone a gelling catalyst. Only BDMAEE and its derivatives were acknowledged in this citation as urethane catalysts, and only as being able to promote blowing. In any case, D1 explicitly identified TMAEE just as an "unwanted by-product". Already this fact would lead a skilled person away from the idea of adding even just traces of TMAEE to any urethane catalyst composition.

In addition, some simple structural similarity of structure between the BDMAEE and TMAEE could not sufficiently justify any prediction as to the level of catalytic activity of the compound, let alone as to its particularly high activity as gelling catalyst.

Hence, even if combined with document D2, which did not mention TMAEE or other compounds of the specified formula, the teaching in D1 as to the prior art based on BDMAEE rendered obvious neither the subject-matter of

claim 1 nor that of claim 5.

The prior art based on BDMAEE did not at all represent a suitable starting point for the assessment of inventive step. Such prior art did certainly not address the technical problem that was addressed in the patent in suit, which - as apparent from the whole disclosure of the patent in suit and in particular from the examples - consisted in the provision of an improved urethane catalyst for promoting gelling that could also be immobilized in the PU matrix.

The closest prior art was rather represented by known non-fugitive gelling catalysts as also used in the comparative examples 1 to 3 reported in the patent in suit. The Appellant had provided no experimental evidence demonstrating that the catalytic activity of the compound of the specified formula was comparable or inferior to the one of these prior art catalysts. Hence, there was no reason for doubting of the surprising technical advantage of the claimed compositions and methods clearly indicated in the patent in suit.

Reasons for the Decision

Respondent's Main Request (claims as granted)

1. Construction of claims 1 and 5

1.1 Amount of the compound of the specified formula contained in the composition defined in claim 1

1.1.1 The Appellant argued that claim 1 (wording under II, *supra*) imposed no conditions regarding the amounts of the ingredients of the claimed composition. In

particular, claim 1 did not prescribe that a certain minimum amount of the compound of the specified formula had to be contained therein. This compound could thus also just be present therein in some (although detectable) trace amounts.

The Respondent argued that the person skilled in the art would understand that claim 1, in the context of the patent as whole, implied that the compound of the specified formula had to be present therein in "a catalytically effective amount".

1.1.2 Claim 1 as granted imposes no express quantitative limitation as to the minimum amount or concentration of the compound of the specified formula that has to be present in the claimed composition. Moreover, claim 1 itself neither comprises any of the terms "catalyst", "urethane" or "polyisocyanate", nor any other expression that could be considered as implying the use of the claimed composition for catalysing a PU forming reaction.

Hence, the Board holds that the skilled person reading claim 1 *per* se has no reason to consider that the compound having the specified formula must necessarily be present in the claimed polyol-comprising composition in an amount (or concentration) sufficient for providing or contributing to the catalysis of PU foam or gel formation (i.e. to act as a urethane catalyst) when the composition is used as a component in the production of PU. Rather, the literal meaning of claim 1 is clear and does not, therefore, require interpretation in the light of the description.

For the Board, the ambit of claim 1 encompasses, therefore, any composition containing a detectable

amount of the compound of the specified formula and any detectable amount of the specified polyol.

1.1.3 Taking nevertheless into account the entire disclosure of the patent in suit, the Board comes to no other conclusion.

i) On the one hand, the following is to be noted in this respect:

- The patent in suit belongs to the technical field of the production of PU foams and gels and contains passages (paragraphs [0007], [0015] and [0027]) describing the composition according to claim 1 as "*a catalyst composition which can be employed to produce polyurethane gels and foams*" .

- In the examples of the patent, TMAEE is also qualified as "*inventive catalyst*" (paragraphs [0056] and [0059]), and in paragraph [0030] it is stated that the "*catalyst composition*" encompasses "*the **total** amount of all catalyst*" (emphasis added by the Board).

- Moreover, the expression "*a catalytically effective amount*" is also used in the patent in suit, but only to describe the amount of "*catalyst **composition***" (emphasis added by the Board) also comprising a polyol component and being used in the PU making method according to the invention (i.e. as defined in claim 5).

ii) On the other hand, the Board, in construing claim 1, also considers the following:

- Firstly, the fact that the patent in suit belongs

to the technical field of the production of PU foams and gels implies only that the claimed compositions must be applicable in one of the conceivable methods for preparing a PU. Even taking into account this implicit limitation, the subject-matter of claim 1 is still not limited to conceivable precursor materials suitable for being used as a component in a PU forming mixture without the addition of further catalyst and, thus, encompasses also compositions which do not yet contain compounds actually acting as urethane catalysts in the final PU forming mixture. Moreover, claim 1 thus also encompasses, for instance, complete catalyst compositions - in the sense of compositions that contain all the catalyst(s) needed in given PU forming methods - in which the compounds that actually catalyse the PU formation are the conventional urethane catalysts mentioned in claim 3. Claim 1 thus also encompasses compositions in which the compound of the specified formula is not present in an amount which would make it, by itself, suitable for acting as catalyst in a particular PU formation method.

- Secondly, the passages of the patent specifications referred to in the preceding paragraph i), *supra*, define compositions (i.e. "***catalyst*** *compositions*") that are embraced by, and not in contradiction with, the clear literal meaning of claim 1 at issue (see 1.1.2, *supra*). Hence, the passages cannot justify a narrower understanding of claim 1, in the sense of an implicit limitation to more specific subject-matter only defined in the description.

- Thirdly, as also noted by the Appellant, the

allegedly implicit requirement invoked by the Respondent, i.e. that the compound of the specified formula must be present in the claimed composition in "a catalytically effective amount", would not be read into claim 1 by the skilled person, if only because this expression has no clear technical meaning in the context of product claim 1, which gives no indication as to the conditions of the reaction and/or the nature and the amounts of the other compounds in the presence of which the compound of the specified formula should act as catalysts. Indeed, whether or not a certain amount of e.g. TMAEE present in a composition as claimed (going to be used for producing a PU) may be considered "a catalytically effective amount" depends on the conditions actually used during the PU synthesis (e.g. the nature and the amounts of the polyisocyanate and polyol reagents, the possible addition of further contact product(s) of polyol(s) with other, possibly much more abundant and/or effective urethane catalyst(s), on the temperature of reaction, etc.).

- Fourthly, the term "*contact product*" is very broadly defined in paragraph [0023] of the patent reading

"*The term 'contact product' is used herein to describe compositions wherein the components are contacted together in any order, in any manner, and for any length of time. ... Further, contacting of any component can occur in the presence or absence of any other component of the compositions or foam formulations described herein*".

This definition appears to implicitly further confirm that the subject-matter of claim 1 at issue may intentionally be defined very broadly so as to embrace not only complete catalyst formulations (containing "*the total amount of all catalysts*", as apparently referred to in e.g. paragraph [0030] of the patent in suit), but also any precursor compositions of these latter, including those comprising the compound(s) of the specified formula in a concentration which would result in only an extremely small concentration of said compound(s) in the complete catalyst composition.

- Fifthly, claim 3 as granted, which defines a preferred embodiment of the composition of claim 1, and is the **only** product claim which explicitly refers to urethane catalysts, expressly refers to the "***further***" presence, in the composition of claim 1, of (undefined amounts of) "*at least one gelling urethane catalyst, at least one blowing urethane catalyst, or a combination thereof*". For the Board, considering the wording of this dependent claim, it appears that the compound of the specified formula, a mandatory ingredient of the composition according to claim 1 (which comprises no indication of the compound's intended function), needs not be present in the claimed composition as (by itself) urethane catalyst.

iii) Hence, for the Board, the contents of the granted patent as a whole, including the description and the other claims, only justifies to read into claim 1 the implicit limitation that the claimed composition must be useful in at least one conceivable stage of a PU forming method. The total disclosure does not, however, justify

considering claim 1 as granted as being implicitly restricted to catalyst compositions in which the compound of the specified formula must be present in some "catalytically effective amount" which is not further defined and, hence, obscure. Thus, the Respondent's restrictive construction appears to be unjustified even when considering claim 1 in the context of the whole content of the patent.

1.1.4 Accordingly, the Board concludes that the appropriate construction of claim 1 is substantially the literal one, i.e. that it encompasses any composition which is
- suitable for being used in (whatever stage of) the preparation of a PU and
- contains detectable amounts of at least one of the listed polyols and of at least one of the compounds of the specified formula.

1.2 Amount of compound of the specified formula required according to method claim 5

1.2.1 The Appellant argued that claim 5 as granted (wording under II, *supra*) also embraced methods for making a PU wherein the compound of the specified formula could just be present in traces amounts, i.e. was not necessarily present in a catalytically affective amount. This was disputed by the Respondent.

1.2.2 The Board notes that claim 5 **explicitly** requires the presence of "*a catalytically effective amount of a* ***catalyst composition***" (emphasis added by the Board) and then only specifies that this "*catalyst composition*" had to comprise at least one compound of the specified formula.

For the Board, it is self-evident to the skilled person

considering the wording of claim 5 *per se* that the compound of the specified formula is required to **catalyse** the **claimed** PU-formation **method**. This necessarily also implies that the compound of the specified formula itself must be present in an amount sufficient to provide such function i.e. in "*a catalytically effective amount*".

1.2.3 The Appellant argued that the expression "*catalytically effective amount*" lacked clarity in the context of claim 5. Claim 5 did not comprise a clear definition of the necessary minimum amount of the compound of the specified formula considering that (as apparent from e.g. claim 12) the claimed method preferably comprised using, additionally, other urethane catalyst(s). Hence, the person skilled in the art would not know how to ascertain whether or not the amount of the compound of the specified formula used in combination with other urethane catalyst(s) in a given PU forming method actually provided a significant contribution to the catalysis of the PU-formation.

1.2.4 The Board holds that since claim 5 is directed to a "*method of making*" a PU, it is implicitly limited to methods using combinations of matter under reaction conditions which actually result in the formation of a PU. Hence, in the context of method claim 5, the expression "*catalytically effective amount*" does not suffer from a lack of clarity.

Moreover, as convincingly argued by the Respondent, it would be self-evident to the person skilled in the art reading claim 5 that, even in the presence of large amounts of other urethane catalyst(s), the use of a "*catalytically effective amount*" of e.g. TMAEE in the context of a given embodiment of the claimed method must

result in a significant contribution to the rate/s of gelling and/or blowing with which this PU is formed (which rate/s may also substantially influence the final properties of the formed PU).

Hence, a person skilled in the art reading claim 5 would also know how to verify whether or not the given amount of e.g. TMAEE is"*catalytically effective*" within the meaning of the claim, even in case of a method carried out using, simultaneously, other urethane catalysts: the skilled person only needs to repeat the embodiment of the claimed method under consideration under unchanged conditions, except for the omission of TMAEE, to verify whether this omission has a measurable bearing on the rate at which the PU is formed and/or on the properties of the formed PU.

1.2.5 Accordingly, the Board concludes that claim 5 is limited to methods for making PU in which the compound of the specified formula is used in an amount sufficient to contribute significantly (by itself) to the catalysing of the PU formation.

2. Novelty - claim 1

2.1 At the oral proceedings, the Appellant ultimately disputed the novelty of the subject-matter of claim 1 only in view of the three alleged "prior uses" of JEFFCAT™ ZF-20 (see III, V and VII *supra*).

2.2 The considerations underlying the Board's assessment of novelty set out *infra* with respect to the first of these alleged "prior uses" (considered by the Opposition Division) apply *mutatis mutandis* to the other two objections based on the second and third alleged "prior uses" only substantiated during the appeal proceedings.

This was common ground between the parties at the oral proceedings. Hence, there was no need for the Board to take a decision regarding the (disputed) admissibility into the proceedings of the attacks based on said second and third alleged "prior uses".

2.3 According to the Appellant, the following was proven in each of the three cases of alleged "prior use":

a) The commercial product JEFFCAT™ ZF-20 that had been sold for use as a urethane catalyst also contained TMAEE, i.e. a compound according to the specified formula.

b) Conventional chemical analysis of this commercial product allowed to identify TMAEE as a component of this product (catalyst).

2.3.1 The Appellant argued that although the TMAEE content of allegedly less than 0.3 wt% (according to D16, see the column "Norm %") was to be considered as an impurity of the almost pure BDMAEE commercialised as JEFFCAT™ ZF-20, facts "a)" and "b)" *supra* were sufficient to demonstrate that chemical products comprising TMAEE had been made available to the public as urethane catalysts by way of "prior use", i.e. also as products which were necessarily to be "*contacted with*" one of the polyols specified in claim 1 in the course of the production.

2.3.2 In this connection, the Appellant also referred to opinion G 1/92 (OJ 1993, 277) of the Enlarged Board of Appeal, in particular to the conclusion 1 thereof reading (emphasis added):

"The **chemical composition** of a product is state of the art when the product as such is available to the public

and **can be analysed and reproduced** by the skilled person, irrespective of whether or not particular reasons can be identified for analysing the composition".

2.4 However, even accepting (*arguendo*) in favour of the Appellant that the evidence on file proves the alleged facts "a)" and "b)", *supra*, the Board is not convinced by the Appellant's line of argument for the following reasons.

2.4.1 Firstly, as stressed by the Respondent and apparent from e.g. the technical bulletins D8 (first data row of the table) and D11 (first page, left-hand column), JEFFCAT™ ZF-20 has been commercialised as a single catalytic chemical compound, i.e. BDMAEE, and not as a chemical **composition** (except for the presence of 0.5 wt.% max. water) comprising further functional ingredients, let alone a chemical composition comprising a further catalyst. In particular, it is indicated in D11 that the the product is a "liquid substantially free of foreign matter" and has a high purity of "98.6 min." wt.%, and contains at most 0.5 wt.% water.

The Board gathers from D8 and D11 that the producer of the JEFFCAT™ ZF-20 catalyst considered that the above information sufficiently describes this high-purity chemical product to a skilled person intending to use it as PU catalyst. In other words, all other ingredients possibly present in this product are, *prima facie*, to be considered as traces of impurities having no relevance as regards the intended application of the product.

2.4.2 Secondly, in the chromatogram shown in D16 (wherein the area of the peak allegedly representative of TMAEE is just about 0.28% of the total peak area (see column

"Norm %") there are three other peaks with peak areas (between 0.07 and 0.33% of the total) comparable in magnitude to that attributed to the TMAEE.

Hence, according to D16, TMAEE is not only present in very small amounts, but it is also just **one of several impurities present** in JEFFCAT™ ZF-20 **in comparably small amounts.**

2.4.3 Finally, in the Board's conviction, opinion G 1/92 does not imply that the commercial availability of a chemical product as such necessarily amounts to a disclosure of (also) **all the impurities** contained therein without being mentioned in the context of the product's commercialisation, let alone of their respective relative amounts, merely because it is possible to identify and quantify these impurities by analytical means.

More particularly, the board holds that conclusion 1 of G 1/92 is to be read by attributing a technically reasonable meaning to the technical expression "chemical composition" contained in conclusion 1 thereof (2.3.2, *supra*). This expression has to be understood taking into account that when the question to be answered concerns which **impurities** are present in a given aggregation of matter, the level of precision necessary to describe, to a skilled person, the "chemical composition" of the product of interest is not necessarily the same in each an every case. It may vary depending, for instance, on the nature of that matter and on its intended technical field of application.
More specifically, the level of detail in the knowledge - and, thus, the level of precision of the chemical analysis required for obtaining such knowledge - that is to be regarded as corresponding to a description of the

"chemical composition" in question to a person skilled in the art, i.e. the need to identify the structure of all ingredients present therein in at least e.g. 1% by weight, or at least 0.1% by weight, or at least 0.01% by weight, or at least 0.001% by weight, or in parts per million, etc.) may depend, in particular, on the technical relevance, that a person skilled in the art of the technical field concerned will attribute to the possible presence of further compounds in trace amounts only.

2.5 Based on the above considerations (points 2.4.1 and 2.4.2, *supra*) there was no reason inducing a person skilled in the art of PU production who got hold of JEFFCAT™ ZF-20, and of the information contained in D8 and D11 regarding its chemical nature, its purity and its intended field of application, to perform an analysis with the aim of identifying the chemical and/or physical structure and relative amount of each and every impurity contained in this commercial chemical product (or "chemical composition" within the meaning of G 1/92) detectable by at least one available analytical of any degree of precision.

2.5.1 For the Board, a finding, in the present case, that the public availability of JEFFCAT™ ZF-20 and the technical information in D8 and D11 would amount to a disclosure of a composition consisting essentially of BDMAEE but comprising also a very small amount of TMAEE, despite the absence of a direct or indirect pointer to the possible technical relevance of further impurities (besides water), can only be based on a reading of G 1/92 going beyond what the Enlarged Board wanted to express.

2.5.2 The Board holds, instead, that a person skilled in the

art getting hold of the "high-purity" BDMAEE commercialised under the trade name JEFFCAT™ ZF-20 as urethane catalyst prior to the effective filing of the patent in suit, would have considered sufficient, in determining the "chemical composition" (in the sense of G 1/92) of this commercial product, an analysis permitting to verify its content in BDMAEE (i.e. the level of purity) and water. Thus, in the present case, the possible determination of the "chemical composition" of this product does not provide the skilled person with information regarding the nature and amount of minor impurities (besides water) possibly present, let alone, specifically, TMAEE.

2.6 Accordingly, even considering that the three "prior uses" invoked by the Appellant made available to the public the use of JEFFCAT™ ZF-20 as polyurethane catalyst, this does not mean that the presence of trace amounts of, specifically, TMAEE in this commercial product was also made available to the public.

2.7 The Appellant disputed the relevance of the lack of motivation for performing an exhaustive analysis of JEFFCAT™ ZF-20 by referring to decision T 0952/92 (OJ 1995, 755, Reasons, 2.2), and in particular to the passage reading "....the analysis by a skilled person of a product which has per se been 'made available to the public' by means of prior sale for example, using available analytical techniques, can be considered as equivalent to the reading by a skilled person of a written description in a document which has *per se* been 'made available to the public'. The likelihood or otherwise of such a skilled person either reading such a written description, or analysing such a prior sold product, and the degree of burden (i.e. the amount of work and time) involved in such reading or analysing, is

in principle irrelevant to the determination of what constitutes the state of the art".

2.7.1 T 952/92 is essentially concerned with the question whether a skilled person in possession of a product needed to have a reason to actually perform an analysis of the product using available and adequately precise analysis protocols, in particular if such **analysis entailed substantial difficulties**.

2.7.2 For the present Board, T 0952/92 addresses a different issue and its rationale is thus not analogously applicable to the present case. Indeed, T 0952/92 does **not** relate the question whether the public availability of a chemical product in combination with information regarding its chemical nature, its purity and its intended field of application also makes available to the public the nature and amount of each and every impurity contained therein and being detectable by at least one available analytical method of any degree of precision.

2.8 Consequently, a composition as defined in claim 1, i.e. a composition comprising at least one of the listed polyols and (even traces of) TMAEE is not part of the prior art to be considered pursuant to Article 54(2) EPC. Hence, the Board concludes that the subject-matter of claim 1 at issue is novel (Articles 52(1) and 54 EPC).

3. Novelty - Claim 5

3.1 Also in respect of the method of claim 5 the Appellant ultimately only maintained novelty objections based on the three alleged "prior uses" of the urethane catalyst commercialised as JEFFCAT™ ZF-20.

If only for the reason that these "prior uses" cannot possibly amount to a direct and unambiguous disclosure of a product comprising TMAEE (2.6, *supra)*, a method of making a PU according to claim 5, i.e. using a catalytically effective amount of the compound of the specified formula, is not part of the prior art either.

3.2 The Board concludes the subject-matter of claim 5 as granted is also novel (Articles 52(1) and 54 EPC).

4. Inventive step - claim 1

4.1 The invention - Subject-matter of claim 1

4.1.1 It is apparent to the skilled person reading the patent in suit (and in particular of paragraph [0005]) that the inventors were seeking to provide catalyst compositions for the production of PU foams or gels.

4.1.2 Under the heading "*BACKGROUND OF THE INVENTION*" it is first mentioned in the patent in suit that certain amine compounds that are typically used as catalysts in the production of PU gels and foams, and which allow to modulate selectively the gelling and the blowing reactions in PU formation, have the disadvantage of rendering the final product malodorous and offensive (see paragraphs [0002] to [0004]. Herein below these conventional urethane catalysts are referred to as the **conventional fugitive catalysts**)). Hence, the patent in suit presents, as starting point, other prior art urethane catalysts. This is also apparent when considering

- that the problems mentioned in paragraph [0004] reading
  "*Tertiary amine catalysts generally are malodorous and offensive and many have high volatility due to*

their low molecular weight. The release of tertiary amines during foam processing may present safety and toxicity problems, and the release of residual amines from customer products is generally undesirable."
are indicated in the patent in suit as being already solved in the prior art by the "*[c]atalysts containing functionalities capable of reacting with isocyanate*" (see second sentence in paragraph [0005]), and

- that also the catalysts used as "*blowing catalyst standard*" in the preparation of some of the comparative foams of Examples 1 to 3 apparently differ from the conventional fugitive catalysts in term of the additional presence of groups that are reactive towards the isocyanate group and can, thus, be immobilized in the PU matrix (herein below these prior art catalysts are identified as **conventional non-volatile fugitive catalysts**).

4.1.3 Accordingly, the Board holds that it is also apparent from the whole patent (and in particular from paragraph [0009] and examples 1 to 3) that the essence of the invention lies in the finding that the compound of the specified formula, such as TMAEE, is a further non-volatile fugitive catalyst that is particularly effective for promoting gelling.

4.1.4 However, as already indicated (point 1.1.4, *supra*) the wording of claim 1 does not imply any requirement for a minimum amount of the compound of the specified formula having to be present in the composition claimed.

Hence, as convincingly argued by the Appellant, claim 1 encompasses, *inter alia*, urethane catalyst compositions (e.g. in the sense of compositions containing **all** the

catalysts required in certain PU making methods) wherein the compound of the specified formula is only present in detectable traces, but which additionally contain (as explicitly foreseen according to e.g. claim 3 as granted) conventional catalysts in much larger amounts (several orders of magnitude) than the detectable traces of e.g. TMAEE.

Such conceivable embodiments of the subject-matter of claim 1 as granted are referred to herein below as **compositions comprising conventional catalyst(s) / TMAEE-traces / specified polyol(s).**

4.1.5 For the Board, TMAEE-traces present in such catalytic compositions encompassed by claim 1 do not necessarily contribute significantly to the catalysis of the polyurethane formation. Such compositions do thus not necessarily provide any of the advantages allegedly achieved according to the patent in suit. In other words, at least part of the subject-matter encompassed by claim 1 is unrelated to what is presented as the essence of the invention in the patent in suit (see 4.1.3, *supra*).

The following reasoning concerns only the obviousness of such embodiments of claim 1, i.e. of compositions comprising conventional catalyst(s) / TMAEE-traces / specified polyol(s).

4.2 The closest prior art

4.2.1 For the Board, an assessment of inventive step for such embodiments based on considering, as the closest prior art, the catalyst compositions comprising conventional non-fugitive catalysts identified in the patent in suit (point 4.1.2, *supra)*, as proposed by the Respondent, is

not appropriate.

4.2.2 Instead, the Board holds that in assessing the obviousness of such compositions comprising conventional catalyst(s) / TMAEE-traces / specified polyol(s), the closest prior art may also be represented by a composition containing conventional urethane catalysts applicable in PU forming methods, as the technical advantages or goals mentioned in the patent in suit are not necessarily achieved by these embodiments of the claimed subject-matter.

4.2.3 The Appellant pointed out conventional urethane catalyst compositions referred to in paragraph [0004] of document D1, where it is stated that BDMAEE is as "an industry standard blowing catalyst" for the production of certain PU foams, this also implies contacting the BDMAEE with polyol(s) at some stage of the PU forming method.

4.2.4 Hence, as regards the assessment of inventive step for those claimed compositions which comprise conventional catalyst(s) / TMAEE-traces / specified polyol(s), the Board holds that compositions that comprising BDMAEE as blowing catalyst and a polyol are a most appropriate starting point.

4.3 The technical problem

Based on the above considerations, the technical problem to be solved by the claimed compositions comprising conventional catalyst(s) / TMAEE-traces / specified polyol(s) compositions can merely be seen in providing further catalyst compositions, i.e. an alternative to the prior art compositions.

4.4 The solution

As a solution to this technical problem, the patent suit proposes compositions according to claim 1, i.e. *inter alia* compositions comprising, besides conventional catalyst(s) (at least detectable traces) of TMAEE and at least one of the specified polyols.

4.5 Success of the solution

It is self-evident that these embodiments of the claimed subject-matter solve the posed problem.

4.6 Obviousness of the proposed solution

4.6.1 The Board considers it appropriate to preliminarily stress that it is undisputedly common general knowledge that urethane catalyst(s) is(are) normally premixed with the polyol component and that the alternatives given for the specified polyols in claim 1 are so broadly defined that they cover most polyol components conventionally used in the industrial production of PU. This common general knowledge is also illustrated by e.g. D2, page 9, Figure 2-2 and the subsequent section "Polyols").

Accordingly, the arguments of the Parties also focused exclusively on the issue of whether it was obvious to provide compositions containing traces of TMAEE in addition to much larger amounts of compounds known as conventional urethane catalyst(s) such as BDMAEE.

4.6.2 The Board notes that D1 (paragraphs [0004] to [0009]) explicitly reminds its skilled reader of the following:

- BDMAEE is an industry standard blowing catalyst for PU foams that has been prepared, *inter alia*,

via catalytic amination of DMAEE (i.e. dimethlyamino ethoxy ethanol).

- TMAEE can be, *inter alia*, an "**unwanted** by-product" formed during the synthetic methods aiming at the production of DMAEE and/or at the conversion of this latter into BDMAEE.

- Measures are taken in these synthetic methods also as to remove TMAEE by-product.

4.6.3 The Board notes further, on the one hand, that D1 does not indicate any specific reasons for which the by-product TMAEE is qualified as "unwanted" in the context of the production of BDMAEE or of its precursor DMAEE.

On the other hand, it is common general knowledge that the intensity of the effect(s) of an ingredient of a chemical composition generally depends on its concentration and, thus, that by-products (that may *per se* be "unwanted" in view of e.g. reduced efficiency or undesired effects) are nevertheless tolerated in detectable trace amounts in most industrial grade reagents, unless there are special reasons (e.g. in the rare case that even just trace amounts of the "unwanted by-products" provide to a substantial level the unwanted effect(s)).

In the present case, the lack of information as to why the TMAEE is qualified in D1 as "unwanted by-product", as well as the limited description in this citation as to the measures used for removing this "unwanted by-product" (such as e.g. the "methylation step" just mentioned at the end of [0007] of D1) do simply not render plausible that e.g. the BDMAEE conventionally used as urethane catalyst has been synthesised and

possibly purified to the extent required to ensure the absence of any detectable trace of TMAEE.

Hence, the Board is convinced that, contrary to the Respondent's allegation that the teaching in D1 would have led away the skilled person from any addition of TMAEE to BDMAEE, the qualification of TMAEE as "unwanted by-product" in D1 would only discourage the person skilled in the art from deliberately adding to the conventional urethane catalyst BDMAEE a substantial amount of TMAEE, e.g. discourage the addition of TMAEE in amounts comparable to the amount of BDMAEE.

4.6.4 Thus, the Board holds that the skilled person reading D1 would nevertheless reasonably expect that:

a) either some minor traces of TMAEE might already have been present in conventional commercial catalysts for PU foam of the prior art that comprised BDMAEE,

and

b) minor (e.g. just detectable) traces of TMAEE, if present in compositions also comprising much larger amounts of conventional urethane catalysts, can interfere only to a negligible degree with the catalytic activity of these latter.

These reasonable expectations of the skilled reader of D1 render obvious to solve the posed technical problem by intentionally adding some traces of TMAEE to the prior art compositions or, for instance, by intentionally leaving some traces of TMAEE in the BDMAEE urethane catalyst obtained from DMAEE.

Thereby, the skilled person would arrive at compositions

comprising the claimed conventional catalysts such as BDMAEE and TMAEE-traces without any inventive skills.

4.6.5 As already indicated above, it is common ground between the Parties that urethane catalyst(s) are normally premixed with polyol component(s) and that the use of the polyols referred to in claim 1 is conventional.

Taking into account this undisputed common general knowledge, the Board holds that the skilled person would obviously consider solving the posed problem by using (at least one of) the specified polyols.

4.7 The Board thus concludes that the conventional catalysts / TMAEE-traces / specified polyols compositions embraced by the very broad definition of claim 1 as granted represent an obvious alternative to the catalyst compositions according to the closest prior art (4.2.4, *supra*).

4.8 Hence, in the Board's judgement, claim 1 as granted encompasses subject-matter which does not involve an inventive step (Articles 52(1) and 56 EPC).

4.9 The Respondent's Main request is thus not allowable.

Respondent's 1st Auxiliary Request

5. Admissibility

5.1 This request was filed two months before the oral proceedings. Its admittance is is thus a matter of the Board's discretion under Article 13(1)(3) RPBA.

5.2 Claims 1 to 8 of this request are identical to granted claims 5 to 12 (renumbered). They are thus directed to

the method whose patentability had already been discussed before the Opposition Division.

Moreover, the Appellant did not object to the admission of this request.

5.3 The Board thus decided to admit the request at issue into the proceedings despite its late filing.

6. Construction and novelty

Claim 1 of this request is identical to claim 5 as granted. Hence, the reasons given above as regards the construction of claim 5 as granted (point 1.2, *supra*) and the novelty of the subject-matter of claim 5 as granted (point 3, *supra*) apply likewise to claim 1 of the 1st Auxiliary Request as well.

As claims 2 to 8 of this request are identical to claims 6 to 12 as granted and, thus, define preferred embodiments of the method of present claim 1, also their subject-matter is novel for the same reasons.

7. Sufficiency of disclosure (Article 83/100(b) EPC)

7.1 According to the Appellant claim 1 was objectionable under Article 83/100(b) EPC for substantially the following two reasons:

a) The patent examples could not be reproduced because they were not described in sufficient detail as to the reaction conditions and the specific amounts and sorts of reagents actually used.

b) The patent in suit did not disclose how to ascertain whether or not a given amount of the

compound of the specified formula was used in a "*catalytically effective amount*", in particular considering that the claimed method also encompassed the simultaneous use of other urethane catalysts.

7.2 As to objection "a)", the Board notes that most of the ingredients used according to examples 1 to 3 of the patent, i.e. those relating to the claimed PU formation method, are only identified by generic names (such as "*polyol*" or "s*ilicone surfactant*") and used in amounts that are only partially described in terms of quantitative ranges (see Table I).

7.2.1 However, sufficiency of disclosure merely requires that a person skilled in the art must be able to carry out the invention as claimed and, thus, not necessarily that he must also be able to exactly reproduce the examples of the patent.

7.2.2 Moreover, the Board also considers relevant the following aspects:

- Paragraph [0046] of the patent in suit underlines that the production of PU foams is a well established technical field by explicitly referring to common general knowledge regarding the conditions required for producing a PU foam.

- The only compound identified more **specifically** in claim 1 at issue, i.e. that of the specified formula, was undisputedly already available in the prior art as such (see e.g. the fact that it is mentioned in [0004] of D1 as a precursor of BDMAEE).

- All the other ingredients (defined in claim 1 at issue by general terms) to be used in the claimed method were already conventionally used in the formation of PU foams or gels before the effective filing date of the patent in suit, and the patent description provides long lists of preferred examples for each of them in paragraphs [0029] to [0041].

- Information as to possible and preferred amounts of all ingredients mentioned in claim 1 is not only given in the form of ranges in Table I, but also in form of discrete values in Tables II to IV (for the urethane catalyst) and in paragraphs [0030], [0033], [0040], [0042] and [0044] also for the remaining reagents.

7.2.3 In the absence of any evidence to the contrary and taking into account the above aspects, the Board concludes that the person skilled in the art reading the patent in suit finds therein sufficient guidance, possibly to be complemented by common general knowledge, on how to carry out embodiments of the claimed method.

7.3 As to objection "b)" (point 7.1, *supra*) the Board notes that it is substantially the same objection as the one raised regarding the alleged lack of clarity of the expression "*catalytically effective amount*", mentioned under point 1.2.3, *supra*, and rejected by the Board for the reasons indicated under point 1.2.4, *supra*.

7.4 Hence, the Appellant did not convince the Board that the claimed invention is not disclosed in manner sufficiently clear and complete for it to be carried out by a person skilled in the art. In the Board's

judgement, the patent with the set of claims at issue is thus not objectionable under Articles 83/100(b) EPC.

8. Inventive step

8.1 The invention

The claims according to the 1st Auxiliary Request are limited to a PU making method in which the compound of the specified formula contributes to the catalysis of the urethane forming reaction. The claimed method thus appears to correspond to the essence of the invention as identified at point 4.1.3, *supra*.

8.2 The closest prior art

8.2.1 Hence, the Board, based on the considerations set out at points 4.1.1 to 4.1.2, *supra*, accepts the view of the Respondent that the closest prior art is represented by the prior art PU forming methods making use of catalyst compositions comprising conventional non-fugitive catalysts. Such methods are also referred to in paragraph [0005] of the patent in suit in the section "*BACKGROUND OF THE INVENTION*".

8.2.2 Such prior art is also exemplified by the comparative methods (partially) disclosed in the patent examples 1 to 3. The Board thus considers these comparative PU forming methods of the patent examples based on conventional, known non-fugitive catalysts, to be the most appropriate starting point for the assessment of inventive step.

8.3 The technical problem derivable from the description

8.3.1 In paragraphs [0009], [0058], [0061] and [0063] of the

patent in suit it is clearly stated that the compound of the given formula has a "high" catalytic activity, which is, more particularly, higher than that of the conventional non-fugitive gelling catalysts used as comparison.

8.3.2 This manifestly implies that the subject-matter of claim 1 at issue is presented as solving vis-à-vis the closest prior art (8.2.1, *supra*) the technical problem of providing an improved method for forming PU foams or gels.

8.4 The solution

As the solution to this technical problem the patent in suit proposes the "*method of making a polyurethane*" according to claim 1 at issue, which is characterised in particular in that it comprises "***contacting at least one active hydrogen-containing*** *compound which is at least one* ***polyether polyol****, at least one* ***polyester polyol****, at least one* ***polymer polyol****, or any combination thereof* ***in the presence of a catalytically effective amount of a catalyst composition under conditions sufficient to produce the polyurethane****, the catalyst composition comprising at least one compound* of the specified formula.

8.5 The success of the solution

8.5.1 The experimental data as reported in the paragraphs [0058], [0061] and [0063] of the patent in suit (already cited above at 8.3.1) appear to support the statements in the same paragraphs that TMAEE is more effective as urethane catalyst, i.e. has a higher catalytic activity, than conventional non-fugitive catalysts, at least in promoting the gelling reaction, while providing PU foams

with comparable properties.

Thus, in the absence of any evidence to the contrary, the Board sees no reason for calling into question these statements and concludes that the method claimed is improved vis-à-vis the prior at least in that the former requires lower amounts of urethane catalyst.

8.5.2 Hence, the Board accepts that the posed problem (8.3.2, *supra*) is effectively solved by the subject-matter of claim 1 at issue.

8.6 Non-obviousness of the solution

8.6.1 Absent any evidence of prior art or common general knowledge rendering plausible that a skilled person would expect a superior activity (as urethane catalyst) of the compound of the specified formula, the Board concludes that a skilled person, seeking to solve the posed technical problem, would not, without hindsight, have considered modifying the closest prior art methods by replacing (at least in part) the conventional non-fugitive catalysts used therein by a compound of the specified formula.

8.6.2 Moreover, none of the arguments presented by the Appellant (in the context of a different line of reasoning on inventive step dealt with under 8.7 ff., *infra*) justifies a different conclusion.

Indeed, even assuming, merely for the sake of argument but in favour of the Appellant, that the structural similarity of e.g. TMAEE and BDMAEE is sufficient to suggest a similar catalytic activity of these compounds in the preparation of PU, the Board holds that the skilled person had no reason to expect a level of

catalytic activity of TMAEE which is **higher** than that of conventional non-fugitive catalysts.

For the Board, the fact (also stressed by the Appellant) that the patent in suit contains no comparison or statement as to whether or not the catalytic activity of TMAEE is actually higher than e.g. BDMAEE is not sufficient to cast doubts on the validity of the statements in the patent in suit as to the high activity of the compound of the specified formula in promoting the gelling reaction. Indeed, the compound of the specified formula is undisputedly neither a non-fugitive catalyst of conventional type (since it does not possess the group reactive towards the isocyanate; see 4.1.2, *supra*) nor is it conventionally used to control in particular the gelling reaction.

8.7 Inventive step objections raised by the Appellant

8.7.1 The Appellant has initially argued that D1 also disclosed (in addition to the teaching summarised under 4.6.2, *supra*) that TMAEE was a known urethane catalyst. This would be apparent from paragraphs [0002] and [0003] in the section entitled "BACKGROUND OF THE INVENTION" of D1, which document represented, in the Appellant's initial opinion, the closest prior art for the assessment of inventive step.

For the Board, D1 does not, however, provide such a teaching. In particular, while in [0002] it is stated in general that tertiary amine catalysts have been used in the production of PUs, [0003] add thereto that "Typical catalysts include amino ether amines, of which two examples are ... TMAEE ... and BDMAEE". This wording only qualifies TMAEE as an example of an "amino ether amine" but neither explicitly expresses or necessarily

implies that specifically TMAEE is a typical (urethane) catalyst.

8.7.2 The Appellant's objection of lack of inventive step as ultimately maintained at the oral proceedings starts instead from the prior art reflected in paragraph [0004] of D1 where it is stated that "*BDMAEE is an industry standard blowing catalyst for flex-molded polyurethane foams*". The Appellant's line of reasoning is essentially that, in the absence of any experimental comparison between the claimed method and the prior art based on the use of BDMAEE, the subject-matter of claim 1 at issue could only be considered to represent an obvious alternative to the prior art. More particularly, the skilled person could predict, simply in view of the structural similarity between BDMAEE and TMAEE, that also this latter would act as a good urethane catalyst.

This last objection does not convince the Board either, if only for the reason (already indicated above at points 8.2) that the closest prior art are methods involving the use of the conventional non-fugitive catalysts, whereas BDMAEE does not belong to such group.

Moreover, the Appellant's line of reasoning is also unconvincing because it is based on the allegation, disputed by the Respondent and not supported by any evidence, that the similarity of structure between TMAEE and BDMAEE would be sufficient to predict that TMAEE also had to be able to catalyze PU formation.

Finally, the Board holds that simply observing, as done by the Appellant, that the patent in suit does not describe experimental comparisons between the catalytic activity of BDMAEE and e.g. TMAEE is manifestly insufficient to convincingly establish that the

technical problem solved vis-à-vis methods based on the use of BDMAEE taken as the closest prior art may merely be seen in the provision of an alternative. Indeed such argument implies the purely speculative consideration that the level of catalytic activity in the gelling of PU provided by the compound of the specified formula, although presented in the patent in suit as being higher than that of certain conventional gelling catalysts, would merely be comparable to that of BDMAEE.

8.8 In summary, the Appellant did not convince the Board that the subject-matter of claim 1 of the 1st Auxiliary Request was obvious to the person skilled in the art having regard to the state of the art.

Thus, in the Board's judgment, claim 1 and, consequently, claims 2 to 5 dependent thereon, comply with the inventive step requirement (Articles 52(1) and 56 EPC).

Conclusion

9. The claims according to the Respondent's 1st auxiliary request are allowable.

Order

For these reasons it is decided that:

- The decision under appeal is set aside.

- The case is remitted to the Department of first instance with the order to maintain the patent with the following documents:

  claims 1 to 8 of the 1st Auxiliary Request filed with the letter of 18 November 2015,

  the figures of the patent as granted and

  a description to be adapted where appropriate.

The Registrar: The Chairman:

D. Magliano B. Czech

Decision electronically authenticated