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**Datasheet for the decision
of 21 September 2020**

Case Number: T 1914/15 - 3.3.02

Application Number: 10780474.2

Publication Number: 2436701

IPC: C07D251/26, C07D251/34

Language of the proceedings: EN

Title of invention:

Method for storing triallyl isocyanurate

Patent Proprietor:

Mitsubishi Chemical Corporation

Opponent:

Evonik Operations GmbH

Headword:

Relevant legal provisions:

EPC Art. 54, 56, 83, 123(2)

EPC R. 80

RPBA 2020 Art. 13(1)

Keyword:

Amendment occasioned by ground for opposition
Amendments
Sufficiency of disclosure
Novelty
Late allegation of fact
Inventive step

Decisions cited:

T 0057/84, T 0608/07, T 0593/09, T 1085/13

Catchword:



Beschwerdekammern

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Case Number: T 1914/15 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 21 September 2020

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
30 July 2015 concerning maintenance of the
European Patent No. 2436701 in amended form**

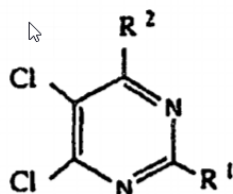
Composition of the Board:

Chairman M. O. Müller
Members: S. Bertrand
M. Blasi

Summary of Facts and Submissions

- I. The appeal lodged by the opponent ("appellant") lies from the opposition division's interlocutory decision that European patent No. 2 436 701 as amended according to the main request met the requirements of the EPC.
- II. The main request contained a set of 3 claims, independent claim 1 of which read as follows:

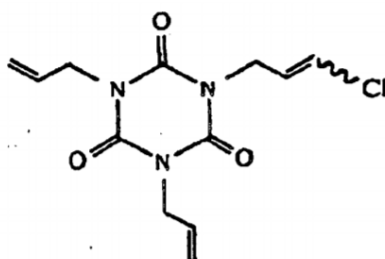
"A method of storing triallyl isocyanurate, comprising the steps of mixing the triallyl isocyanurate with a silane coupling agent to prepare a composition comprising both thereof, and storing the resulting composition, wherein the triallyl isocyanurate comprises an organic chlorine compound represented by the following chemical formula (I) in an amount of not more than 100 ppm:



(I)

wherein R¹ and R² are respectively a chlorine atom or an allyloxy group with the proviso that at least one of R¹ and R² is a chlorine atom, or

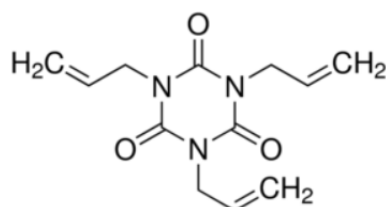
wherein the triallyl isocyanurate comprises an organic chlorine compound represented by the following chemical formula (V) in an amount of not more than 500 ppm:



(V)

wherein a bond expressed by a wavy line indicates that the organic chlorine compound is a cis-type compound, a trans-type compound or a mixture comprising the cis-type and trans-type compounds at an optional ratio."

Triallyl isocyanurate (TAIC) has the following formula:



III. The following documents are referred to in the present decision:

D1	JP 2006-36876 A
D1A	Machine translation of D1
D1B	Translation of paragraphs [0018]-[0037] of D1
D2	Dudley et al., J. Am. Chem. Soc., 1951, 73, 2986-2990
D3	JP 4-65070
D3a	US 4 451 651
D6	US 3 700 667
D17	JP H11-255753
D17A	Machine translation of D17
D17B	Translation of D17
D18	EP 0 227 470 A2
D19	US 5 372 887

D20	EP 0 406 664 A1
D21	JP H10-168419 A
D21A	Machine translation of D21
D21B	Translation of D21
D25	JP 2008-260894
D25A	Machine translation of D25
D25B	Translation of paragraphs [0206]-[0213] of D25
D26	WO 2010/055840 A1
D26A	EP 2 355 163 A1
A002	"Experimental Report" on the corrosion of chlorine ions filed in the proceedings for EP 2436677 A1

IV. The opposition division's conclusions included the following:

- Claim 1 of the set of claims of the main request filed on 27 April 2015 fulfilled the requirements of Article 123(2) EPC.
- The invention as defined in the main request was sufficiently disclosed within the meaning of Article 83 EPC.
- The subject-matter of the claims according to the main request was novel in view of *inter alia* the disclosure of D1.
- The subject-matter of the claims according to the main request involved an inventive step in view of D1 as the closest prior art.

V. In its statement setting out the grounds of appeal, the appellant contested the opposition division's reasoning and submitted that the subject-matter of the claims according to the main request added subject-matter

beyond the content of the application as filed, was not sufficiently disclosed, was not novel and did not involve an inventive step.

- VI. In its reply to the grounds of appeal, the patent proprietor ("respondent") requested the dismissal of the appeal and provided counter-arguments regarding added subject-matter, sufficiency of disclosure, novelty and inventive step. It submitted sets of claims of auxiliary requests 1 to 10.
- VII. In a further letter, the appellant submitted further arguments against the allowability and/or admittance of the claims of the main request and the auxiliary requests.
- VIII. On 5 June 2020, the board issued a communication in preparation for the oral proceedings to be scheduled as requested by the parties.
- IX. Oral proceedings before the board were held on 21 September 2020.
- X. The parties' final requests relevant to the present decision were the following:
- The appellant requested that the decision under appeal be set aside and the patent be revoked in its entirety.
 - The respondent requested that the appeal be dismissed implying that the patent be maintained as amended on the basis of the main request held allowable by the opposition division, or alternatively, as amended on the basis of one of

the sets of claims of auxiliary requests 1 to 10 filed with the reply to the grounds of appeal.

XI. The appellant's case, where relevant to the present decision, may be summarised as follows:

Main request

- Article 123(2) EPC

- According to claim 1 of the main request, only one of the two provisos referred to in the claim had to be fulfilled, namely either the content of the compound of formula (I) or the content of the compound of formula (V) was as defined in claim 1 of the main request. Hence, the claim excluded a method fulfilling both provisos. However, the application as filed, e.g. claims 4 and 5, did not provide a basis for an embodiment where just one proviso was fulfilled.

- Article 83 EPC

- If it was considered that the amount being 0 ppm of the compound of formula (I) or (V) was not covered by this claim, the skilled person would not be able to distinguish between e.g. an amount of 1 ppm of the compound of formula (I) or (V) (i.e. an embodiment according to claim 1 of the main request) and an embodiment where both compounds were totally absent (i.e. an embodiment not covered by claim 1 of the main request following the above consideration).

- Novelty

- D1 (paragraph [0030]), D18 (page 4, lines 12-13 and 16-17; page 5, table 1), D19 (example A and table 1), D20 (examples 2 and 4; page 7, lines 55 to page 8, lines 2; and page 11, lines 27-28), D21 (examples 4, 6-9), D25 (working examples 3 to 7, paragraph [0211], table 1) and D26 (examples 1-7, table 1) disclosed a method of storing TAIC comprising the steps of mixing triallyl isocyanurate with a silane coupling agent to prepare a composition comprising both of these, and storing the resulting composition.
- Each of these documents anticipated the subject-matter of claim 1 of the main request.

- Inventive step

- D20 was the closest prior art.
- The distinguishing feature was the content of the compound of formula (I) (not more than 100 ppm) or (V) (not more than 500 ppm).
- Comparative production examples 1 and 2 of the patent were embodiments according to claim 1 of the main request since the content of the compound of formula (V) was not more than 500 ppm for comparative example 1 and the content of the compound of formula (I) was not more than 100 ppm for comparative example 2. These examples did not reduce metal corrosion, as evidenced by the chlorine ion concentration of the composition after hydrolysis in table 4 of the patent.

- There was therefore no technical effect associated with the distinguishing feature. The objective technical problem in view of D20 was the provision of an alternative method of storing TAIC.
- The solution to the problem proposed by claim 1 of the main request was obvious in view of D20 or D17.
- Admittance of the submission concerning the hypothetical comparative example
 - The hypothetical "truly" comparative production example outlined by the respondent during the oral proceedings to corroborate the presence of a reduced metal corrosion of the examples according to the invention should not be admitted into the proceedings.
 - The respondent should have reacted at an earlier stage of the proceedings. Its submission was a reaction to the appellant's assertion that the problem was to be formulated as an alternative, which had been on file from the outset; it was unfair to be confronted with this new allegation of fact at the oral proceedings. The new submission took the appellant by surprise. The respondent had submitted auxiliary requests but had not presented this aspect in writing. Admitting the submission could change the discussion of inventive step entirely. Time would be needed to properly examine the hypothetical comparative example and the possible conclusions to be drawn from it.

Auxiliary request 1

- Article 84 EPC
 - The term "impurity" was a vague feature which left the skilled person in doubt as to which specific compounds were encompassed by this term and which were not. The description mentioned many components as impurities but gave no well-established definition of this feature.
 - The skilled person could not determine which ingredients were encompassed by the composition prepared using the method of claim 1 of auxiliary request 1. Therefore he did not know when he was working inside or outside the scope of claim 1.

Auxiliary request 2

- Article 123(2) EPC
 - The combinations of (i) the features "triallyl cyanurate rearrangement method" and "an organic chlorine compound of formula (I) in an amount of not more than 100 ppm" and (ii) the features "sodium cyanate method or the isocyanuric acid method" and "an organic chlorine compound of formula (V) in an amount of not more than 500 ppm" in claim 1 of auxiliary request 2 were not disclosed in the application as filed.
 - The application as filed disclosed a treatment required for removing the organic chlorine compound represented by chemical formula (II) from TAIC when the TAC rearrangement method was involved. Omitting that treatment from claim 1 of auxiliary request 2 represented a violation of Article 123(2) EPC.

- Article 84 EPC
 - The product-by-process features in claim 1 of auxiliary request 2 were redundant with respect to the structural features and were therefore unnecessary, contrary to Article 84 EPC.
 - The TAC rearrangement method, the sodium cyanate method and the isocyanuric acid method were not clearly defined in claim 1 of auxiliary request 2.
 - According to the description, in order to obtain TAIC with the purity required by claim 1 of auxiliary request 2, specific purification steps were necessary in addition to the conventional methods referred to in the claim. These essential steps were missing from claim 1 of auxiliary request 2.
- Article 56 EPC
 - D20 was the closest prior art.
 - The reduced metal corrosion was not achieved over the whole scope of claim 1 as evidenced in the patent and document A002. The objective technical problem in view of D20 was to provide an alternative composition. The solution was obvious for the same reasons as those given for the main request since the additional product by process-feature in claim 1 of auxiliary request 2 did not limit the scope of the claim in comparison with the scope of claim 1 of the main request.
 - If metal corrosion were reduced by the compositions prepared according to claim 1 of auxiliary request 2, the objective technical

problem would be the provision of a TAIC storage method, in which the TAIC was less corrosive. The solution was obvious in view of D6, D17 or the combination of both documents.

- The subject-matter of claim 1 of auxiliary request 2 did not involve an inventive step for these reasons.

XII. The respondent's case, where relevant to the present decision, may be summarised as follows.

Main request

- Article 123(2) EPC
 - Claim 1 resulted from a combination of claim 1 with dependent claims 4 and 5 of the application as filed. Therefore, claim 1 did not introduce subject-matter beyond the content of the application as filed.
- Article 83 EPC
 - The limit 0 ppm of the compound of formula (I) or (V) was covered by claim 1. It was irrelevant for the question of sufficiency of disclosure whether a concentration close to 0 ppm could be determined.
- Novelty
 - None of the documents cited by the appellant explicitly or implicitly disclosed the content of compounds of formulae (I) and (V).

- Inventive step
 - D20 was an inappropriate choice for the closest prior art since it did not disclose any method of storing TAIC. D2, D3, D6, D17 and D20 were completely silent on the reduction or prevention of the corrosive action of TAIC. None of the documents cited by the appellant suggested using TAIC with the amount of compound of formula (I) or (V) below the upper limit required by claim 1 of the main request.
 - The subject-matter of claim 1 was inventive.
- Admittance of the submission concerning the hypothetical comparative example
 - The submission was merely an argument and it was possible to present new arguments, even at the oral proceedings. The respondent should be given the opportunity to defend the patent. The submission was not new but rather had been implied in what had been always on file. The conclusions from this hypothetical comparative example relied on logic and common sense; it could not come as a surprise to the appellant.

Auxiliary request 1

- Article 84 EPC
 - The term impurity was understood by the skilled person in the art. The purpose of a compound enabled the skilled person to consider whether or not a compound was an impurity. Furthermore, the impurity was to be considered in the context of

the process for preparing TAIC. The term "impurity" was clear in the context of the claim.

Auxiliary request 2

- Article 123(2) EPC
 - The basis for the TAC rearrangement method was found in paragraph [0015] of the application as filed. Paragraphs [0014], [0018] and [0025] of the application as filed disclosed that the presence of compounds of formula (I) in TAIC was linked to this method. Paragraph [0025] explained that compounds of formula (I) remained in TAIC produced from the TAC rearrangement method. This constituted a pointer to combine the TAC rearrangement method with the features of paragraph [0026] or claim 4 of the application as filed, disclosing TAIC with an amount of not more than 100 ppm of a compound of formula (I).
 - Paragraph [0031] of the application as filed disclosed the sodium cyanate method or isocyanuric acid method. The presence of compounds of formula (V) in TAIC, as disclosed in paragraph [0032] of the application as filed, was linked to these methods. Paragraph [0032] was thus a pointer to combine the sodium cyanate method or the isocyanuric acid method with the features of an organic chlorine compound of formula (V) in an amount of not more than 500 ppm, as disclosed in paragraph [0037] or claim 5 of the application as filed.
 - Paragraph [0015] was a general disclosure without any specific reference to certain conditions. Therefore, omitting the treatment required for removing the organic chlorine compound

represented by chemical formula (II) from TAIC when the TAC rearrangement method was involved, as disclosed in paragraph [0025], did not contravene Article 123(2) EPC.

- Article 84 EPC

- The methods referred to in claim 1 were known in the art, as acknowledged in the description of the application as filed.
- The presence of impurities (at least the compounds of formulae (I) and (V)) depended on the TAIC manufacturing method. Thus the product-by-process features introduced into claim 1 of auxiliary request 2 limited the claim and were not redundant.
- Claim 1 of auxiliary request 2 required maximum amounts of the compounds of formulae (I) and (V) as impurities, so the purification steps to achieve the required TAIC purity were implicit in the claim.

- Article 56 EPC

- The introduction of the product-by-process features clearly excluded comparative examples 1 and 2 of the patent from claim 1 of auxiliary request 2.
- Compared with the comparative examples, the examples of the patent showed that a lower concentration of compounds of formulae (I) and (V) entailed a lower chlorine ion concentration after hydrolysis and less metal corrosion.

- The objective technical problem was the provision of a storing method for TAIC in which the TAIC was less corrosive.
- There was no teaching in the prior art to lower the concentration of the chlorine-containing organic compounds of formula (I) or (V) in order to reduce metal corrosion.
- The subject-matter of claim 1 of auxiliary request 2 involved an inventive step for these reasons.

Reasons for the Decision

Main request

1. Claim 1 of the main request relates to a method of storing triallyl isocyanurate (TAIC), "*wherein the triallyl isocyanurate comprises an organic chlorine compound represented by the following chemical formula (I) in an amount of not more than 100 ppm [...] or wherein the triallyl isocyanurate comprises an organic chlorine compound represented by the following chemical formula (V) in an amount of not more than 500 ppm [...]*" (emphasis added by the board).
2. Article 123(2) EPC
 - 2.1 The appellant objected that claim 1 of the main request was not based on the combination of claims 1, 4 and 5 of the application as filed. It submitted that this combination of claims did not provide a basis for the embodiment in claim 1 of the main request where either the proviso "TAIC comprises an organic chlorine

compound represented by the chemical formula (I) in an amount of not more than 100 ppm" or the proviso "TAIC comprises an organic chlorine compound represented by the chemical formula (V) in an amount of not more than 500 ppm" was fulfilled.

- 2.2 As set out in the board's communication under Article 15(1) RPBA 2020, claim 1 of the main request is based on the combination of claims 1, 4 and 5 as filed. Claim 1 as filed reads "*A method of storing triallyl isocyanurate, comprising the steps of mixing the triallyl isocyanurate with a silane coupling agent to prepare a composition comprising both thereof, and storing the resulting composition*". Except for the two provisos, claim 1 of the main request is thus based on claim 1 as filed. The first proviso (compound of formula (I) in an amount of not more than 100 ppm) is based on dependent claim 4 as filed. The second proviso (compound of formula (V) in an amount of not more than 500 ppm) is based on dependent claim 5 as filed. As in claim 1 of the main request, the two provisos are independent from each other in the application as filed. More specifically, claim 5 as filed, which discloses the second proviso of claim 1 of the main request depends only on claims 1 to 3 as filed but not on claim 4 as filed, which contains the first proviso of claim 1 of the main request. Hence, the application as filed discloses embodiments which satisfy only the first proviso and embodiments which satisfy only the second proviso but not both provisos. Even if there were passages in the application as filed disclosing embodiments meeting both provisos at the same time, this would not take away the disclosure in claims 4 and 5 as filed, which, together with claim 1 as filed, provide a basis for claim 1 of the main request. Incidentally, it is noted that production examples 1, 2

and 3 of the application as filed disclose a triallyl isocyanurate where either the content of the compound of formula (I) is not more than 100 ppm (production examples 1 and 2) or the content of the compound of formula (V) is not more than 500 ppm (production example 3). This supports the conclusion that the application as filed provides a basis for embodiments fulfilling either the first or the second proviso of claim 1.

2.3 Thus, claim 1 of the main request fulfils the requirements of Article 123(2) EPC.

3. Sufficiency of disclosure - Article 83 EPC

The appellant contested the sufficiency of disclosure of the invention defined in claim 1 of the main request if the claim were considered not to cover the amount 0 ppm of the compound of formula (I) or (V). It argued in particular that the skilled person would not be able to distinguish between e.g. an amount of 1 ppm of the compound of formula (I) or (V) (i.e. an embodiment according to claim 1 of the main request) and an embodiment where both compounds were totally absent (i.e. an embodiment not covered by claim 1 of the main request according to the above consideration).

3.1 Firstly, the board does not see any reason to consider an amount of 0 ppm of the compound of formula (I) or (V) to be excluded by claim 1 of the main request. This claim only defines upper limits, so there are no restrictions as regards any lower limit. Thus, the precondition for the appellant's argument does not hold true.

Secondly, even if it were assumed that claim 1 of the main request excluded 0 ppm of the compound of formula

(I) or (V), the appellant's objection merely implies that the skilled person does not know whether he is working within (above 0 ppm) or outside (at 0 ppm) of the scope of claim 1. This as such does not give rise to any insufficiency of disclosure (see, e.g., decision T 593/09). In fact in the present case the appellant's objection at best concerns an ambiguity at the lower limit of claim 1. An ambiguity at the edges of a claim is, however, a matter of lack of clarity rather than insufficient disclosure (see e.g. decision T 608/07).

4. Novelty - Article 54 EPC

4.1 The appellant submitted that the subject-matter of claim 1 of the main request lacked novelty in view of the disclosure of D1, D18 to D21, D25 and D26.

4.2 Claim 1 of the main request (point II, *supra*) is a method of storing TAIC, comprising the following steps:

- mixing TAIC with a silane coupling agent to prepare a solution thereof;
- storing the resulting composition.

According to claim 1 of the main request, TAIC must comprise an amount of not more than 100 ppm of the compound of formula (I) or not more than 500 ppm of the compound of formula (V).

4.3 Novelty in view of D1

4.3.1 D1 (working example 1 in paragraph [0030]; see translation D1B) discloses the impregnation of ethylene vinyl acetate (EVA) resin pellets in the presence of a crosslinking agent ("A"), TAIC and a silane coupling agent ("KBM503"). More specifically, in working example 1 of D1, EVA resin pellets, the *"auxiliary crosslinking*

agent" TAIC and the silane coupling agent KBM503 were mixed and left to stand overnight in order to impregnate the pellets.

D1 thus implicitly discloses the preparation of a composition comprising TAIC and a silane coupling agent (KBM203), as required by claim 1 of the main request. D1 does not disclose the amount of the compound of formula (I) or (V), as identified in claim 1 of the main request. Furthermore, D1 does not disclose, or at least not explicitly disclose, a step of storing as required by claim 1 of the main request.

4.3.2 The appellant interpreted the content of compounds of formulae (I) and (V) as defined in claim 1 to be amounts of impurities, which, in line with the opposition division's decision (point 6.2 of its decision) did not represent a novelty-imparting feature over the prior art.

4.3.3 The board accepts that the content of compounds of formulae (I) and (V) may be interpreted as amounts of impurities. However, it still disagrees with the appellant's conclusion. The board in this respect follows the rationale of decision T 1085/13 which states the following (point 3.7 of the reasons): "*A claim defining a compound as having a certain purity ... lacks novelty over a prior-art disclosure describing the same compound only if the prior art discloses the claimed purity at least implicitly, for example by way of a method for preparing said compound, the method inevitably resulting in the purity as claimed. Such a claim, however, does not lack novelty if the disclosure of the prior art needs to be supplemented, for example by suitable (further)*

purification methods allowing the skilled person to arrive at the claimed purity."

D1 does not contain any explicit disclosure on the amounts of compounds (I) and (V) as defined in claim 1 of the main request, remaining silent in that respect. Furthermore, it does not contain any implicit disclosure leading to the conclusion that amounts as claimed are the inevitable outcome, and in particular does not disclose a method for preparing said compound in which the purity as claimed is the inevitable result. Since D1 neither explicitly nor implicitly discloses the content of compounds of formulae (I) and (V), the specified content represents, in accordance with the considerations in decision T 1085/13, a distinguishing feature of the subject-matter of claim 1 of the main request in view of the disclosure of D1.

4.4 Novelty in view of D20

D20 (examples 1 to 4) discloses the preparation of adhesive compositions comprising mixing *inter alia* methacryloxypropyltrimethoxysilane (C1), glycidylxypropyltrimethoxysilane (C2) and TAIC (C3). (C1) and (C2) are silane coupling agents according to claim 1 of the main request. The mixture of (C1), (C2) and (C3) thus represents a composition comprising TAIC and a silane coupling agent, as required by claim 1 of the main request.

D20 (page 7, line 55 to page 8, line 3) further refers to packages comprising a polysiloxane (A), a polyorganohydrogensiloxane (B), a mixture (C) consisting of at least two members selected from a methacryloxyalkyl silicon compound (C1), an epoxy silicon (C2) and an isocyanurate (C3), and a catalyst (D). Mixture (C) may comprise (C1), (C2) and (C3)

(page 11, lines 27-28). (C3) may be TAIC. The packages are mixed at the time of use. Where the packages comprise (C1) to (C3), this disclosure in D20 represents a step of storing a solution of TAIC with a silane coupling agent as required by claim 1 of the main request.

However, D20 does not disclose the content of the compounds of formulae (I) and (V) as defined in claim 1 of the main request, neither explicitly nor implicitly. For the reasons set out above with regard to D1, the subject-matter of claim 1 of the main request is novel in view of the disclosure of D20.

4.5 Novelty in view of D18, D19, D21, D25 and D26

D18 (page 4, lines 12-13 and 16-17; page 5, table 1) discloses the preparation of EVAT resins (ethylene vinyl acetate copolymer crosslinked with TAIC), comprising the step of contacting a composition of EVA, TAIC and methacryloxypropyltrimethoxysilane, which is a silane coupling agent according to claim 1 of the main request.

D19 (example A and table 1) discloses the preparation of an EVA copolymer resin, comprising the step of contacting a composition containing *inter alia* EVA, TAIC and methacryloxypropyltrimethoxysilane which is a silane coupling agent according to claim 1 of the main request.

D21 (examples 4, 6-9; see translation D21B) discloses the preparation of adhesive compositions which are coated on degreased substrates. The adhesive compositions comprise *inter alia* TAIC and at least three compounds selected from silane coupling agents *¹ to *⁵.

D25 (working examples 3 to 7, paragraph [0211] and table 1; see partial translation D25B) discloses the preparation of curable compositions comprising *inter alia* TAIC and glycidyoxypropyltrimethoxysilane, which is a silane coupling agent according to claim 1 of the main request.

D26 (examples 1-7, table 1; see patent family member D26A) discloses the preparation of solar-cell sealing films, comprising mixing EVA, a crosslinking auxiliary agent (TAIC, footnote 3) and a silane coupling agent (methacryloxypropyltrimethoxysilane, footnote 4).

D18, D19, D21, D25 and D26 thus each disclose the preparation of a composition comprising TAIC and a silane coupling agent - a step of the method as required by claim 1 of the main request. However, none of these documents discloses, either explicitly or implicitly, the content of compounds of formulae (I) and (V) as defined in claim 1 of the main request. For the reasons set out above with regard to D1 (point 4.3.3), the subject-matter of claim 1 of the main request is novel in view of the disclosure of each of D18, D19, D21, D25 and D26. The same applies to the subject-matter of remaining claims 2 and 3 which are each dependent on claim 1.

5. Inventive step - Article 56 EPC

5.1 The appellant contended that the subject-matter of the claims according to the main request did not involve an inventive step in view of D20 as the closest prior art.

5.1.1 The invention

The core of the invention involves the provision of a TAIC storage method in which TAIC is free from freezing

and solidification during storage in winter (paragraph [0005] of the patent).

5.1.2 Closest prior art

The appellant relied upon D20 as the closest prior art.

D20 is concerned with adhesive silicone compositions for plastic materials (abstract of D20). D20 (point 4.5, *supra*) discloses a method for preparing an adhesive composition comprising *inter alia* TAIC and a silane coupling agent. When the packages of D20 contain TAIC, they imply a method of storing TAIC.

Thus, D20, in the same way as the patent, is also concerned with a method of storing TAIC.

5.1.3 Distinguishing features

As set out above in the context of novelty (point 4.4), the subject-matter of claim 1 of the main request differs from D20 on account of the content of compounds of formulae (I) and (V).

5.1.4 Formulation of the technical problem

In the patent, experimental example 1 is a hydrolysis test of TAICs prepared in production examples 1 to 3 and comparative production examples 1 and 2. In production example 1, TAIC is prepared by the TAC rearrangement method and the obtained TAIC does not comprise any compound of formula (I) (paragraph [0058]: no mixture of compounds of formula (I) was detected) and, implicitly, no compound of formula (V). According to the description (e.g. paragraphs [0014] and [0018]), when TAIC is prepared using the TAC rearrangement method, the TAIC comprises compounds of formula (I) but no compounds of formula (V). In production example 2, the TAIC obtained using the TAC rearrangement method

comprises 10 ppm of compound of formula (I) (paragraph [0060]) and, implicitly, no compound of formula (V) (for the same reasons as for production example 1). The TAIC from production example 3 was prepared using the cyanate sodium method; it does not comprises any compound of formula (V) (paragraph [0062]) or, implicitly, no compound of formula (I). According to the description (e.g. paragraphs [0014] and [0032]), when TAIC is prepared using the sodium cyanate method or the isocyanuric acid method, the TAIC comprises only compounds of formula (V) and no compounds of formula (I). Comparative production example 1 comprises 120 ppm of a mixtures of compounds of formula (I) (paragraph [0056]) and, implicitly, no compound of formula (V) (for the same reason as production example 1). Comparative production example 2 comprises 590 ppm of a compound of formula (V) and, implicitly, no compound of formula (I) (for the same reason as production example 3). Following the hydrolysis test carried out in experimental example 1 (table 4), production examples 1 to 3 show chlorine ion concentration of less than 1 ppm, 21 ppm and less than 1 ppm, respectively. Comparative production examples 1 and 2 show chlorine ion concentration of 237 ppm and 150 ppm, respectively. Production examples 1 to 3 thus have lower chlorine ion concentrations than comparative production examples 1 and 2.

According to the patent (paragraph [0024]), chlorine ions generated during hydrolysis cause corrosion. Accordingly, as was common ground between the parties, a lower chlorine ion concentration implies less metal corrosion.

The amount of compound (I) in comparative production example 1 is 120 ppm and is thus outside the range defined for the amount of compound (I) in claim 1 of

the main request. The amount of compound (V) in comparative production example 2 is 590 ppm and thus outside the range defined for the amount of compound (V) in claim 1 of the main request. Nevertheless, as was common ground between the parties, comparative production examples 1 and 2 of the patent still fall within the scope of claim 1 of the main request since the amount of the respective other compound is within the range defined for this compound in claim 1 of the main request. More specifically, for comparative production example 1 the content of the compound of formula (V) is 0 ppm and thus not more than 500 ppm, and for comparative production example 2 the content of the compound of formula (I) is 0 ppm and thus not more than 100 ppm. In view of the high chlorine ion concentration in comparative production examples 1 and 2 (237 and 150 ppm), claim 1 of the main request is considered to encompass embodiments that do not exhibit reduced metal corrosion. Thus, no technical effect is associated with the distinguishing features of claim 1 of the main request in view of D20.

The objective technical problem in view of D20 is thus the provision of an alternative method of storing TAIC.

5.1.5 Obviousness of the solution

The solution to the above problem involves the arbitrary variation of the contents of compounds of formula (I) or (V), which would have been within the skilled person's routine abilities. Reducing the impurities of products comes within the routine work of the skilled person and cannot contribute to inventive step. This was not contested by the respondent. Hence, the subject-matter of claim 1 lacks an inventive step in view of D20 alone.

Incidentally, it is noted that D17 discloses a TAIC with a chlorine ion concentration of 0.17 ppm (working example 1 of D17B) or 0.1 ppm (working example 2). The low chlorine ion concentration of the TAIC implies that the content of compounds of formulae (I) and (V) of the TAIC is lower than 100 ppm and 500 ppm, respectively. Hence, TAIC compounds with a content of compounds of formulae (I) and (V) as low as required by claim 1 of the main request are known from D17. Therefore, the subject-matter of claim 1 also lacks inventive step over D20 in combination with D17.

- 5.1.6 The board therefore concludes that the subject-matter of claim 1 does not involve an inventive step.
- 5.2 Admittance of the respondent's submission concerning a hypothetical comparative example for claim 1 of the main request
 - 5.2.1 During the oral proceedings, the respondent described a hypothetical "truly" comparative production example to corroborate the presence of a reduced metal corrosion of the examples and comparative examples according to the invention as defined in the main request. This hypothetical comparative production example involved a TAIC in which amounts of compounds of both formulae (I) and (V) were outside the scope of claim 1. According to the respondent, it could be assumed that reducing either of the two amounts to a value within the claimed range would reduce metal corrosion. This assumption was corroborated by the production examples and the comparative production examples described in table 4 of the patent, where reducing the amount of the compound of formula (I) or (V) from that in the comparative production example to that in the corresponding example resulted in reduced metal corrosion.

- 5.2.2 The appellant objected to the admittance of the respondent's submission concerning this hypothetical comparative example.
- 5.2.3 The board notes that the hypothetical comparative example was submitted by the respondent for the first time at the oral proceedings before the board. The assertion that metal corrosion could be reduced by starting from a composition in which the amounts of compounds of formulae (I) and (V) were both outside the scope of claim 1 and by reducing either of the two amounts to a value within the claimed range is an allegation of fact that can be proven or disproved by evidence.

This allegation of fact had not been submitted at a previous stage of the appeal proceedings and thus represented an amendment to the respondent's case, the admittance of which was at the board's discretion in view of Article 13(1) and (3) RPBA 2007.

Under Article 13(1) RPBA 2007, the board exercises its discretion in view of in particular the complexity of the new subject-matter submitted, the state of the proceedings and the need for procedural economy.

Under Article 13(3) RPBA 2007, amendments to a party's case submitted after the oral proceedings have been arranged are not admitted if they raise issues which the board or the other party cannot reasonably be expected to deal with without adjournment of the oral proceedings.

The new allegation of fact was a new line of defence and deviated completely from the respondent's

submissions before the point in time at which it was raised at the oral proceedings. More specifically, leading up to the oral proceedings the respondent did not challenge the appellant's position that comparative production examples 1 and 2 of the patent fell within the scope of claim 1 of the main request and that no technical effect was associated with the distinguishing features of claim 1. The respondent used this new allegation of fact as the basis to argue - for the first time - that the technical effect of reduced metal corrosion was obtained even though comparative production examples 1 and 2 of the patent fell within the scope of claim 1 of the main request.

Admitting this new allegation of fact would have necessitated a discussion, for the first time at the oral proceedings, as to whether the hypothetical comparative example demonstrated reduced metal corrosion in the compositions according to claim 1 and could be taken into account for formulating a more ambitious objective technical problem than that set out in the communication under Article 15(1) RPBA 2020. It would then have had to be discussed whether the solution proposed by the claims of the main request was obvious in view of this more ambitious technical problem.

The allegation of fact submitted by the respondent thus raised complex new issues which had not previously been addressed during the written proceedings and occurred at the latest possible state of the proceedings, namely at the oral proceedings. The discussion of these new issues at such a late stage of the proceedings would have been contrary to procedural economy.

Lastly, the appellant underlined that it was not able to challenge the respondent's allegation of fact within the short time available during the oral proceedings. It would, for instance, have had to be given time to file counter-evidence in an attempt to disprove the respondent's assertion that the hypothetical comparative example demonstrated reduced metal corrosion. Oral proceedings would thus have had to be postponed, in contravention of Article 13(3) RPBA 2007.

The board therefore decided not to admit the allegation of fact based on the hypothetical example into the proceedings (Article 13(1) and (3) RPBA 2007).

Auxiliary request 1

6. Claim 1 of auxiliary request 1 reads as follows:" A *method of storing triallyl isocyanurate, comprising the steps of mixing the triallyl isocyanurate with a silane coupling agent to prepare a composition consisting of triallyl isocyanurate, the silane coupling agent and **impurities** which include either an organic chlorine compound represented by the following chemical formula (I) in an amount of not more than 100 ppm based on the triallyl isocyanurate, or an organic chlorine compound represented by the following chemical formula (V) in an amount of not more than 500 ppm based on the triallyl isocyanurate, and storing the resulting composition [...]*" (emphasis added by the board).

The chemical formulae (I) and (V) in claim 1 of auxiliary request 1 are defined as in claim 1 of the main request.

7. Article 84 EPC

7.1 The appellant disputed the clarity of the term "impurities" inserted into claim 1 of the first auxiliary request.

7.2 The term "impurities" is not found in the claims as granted and is thus questionable in view of Article 84 EPC (see decision G 3/14, OJ EPO 2015, A102, order).

Article 84 EPC stipulates *inter alia* that the claims must be clear.

In the present case, however, it cannot be clearly determined which components the term "impurities" encompasses. Thus, the skilled person cannot clearly determine the whole group of components covered by this term and thus the compositions prepared according to the method of claim 1.

The nature of an impurity depends *inter alia* on the process used for preparing a compound or a composition, and on the purity of the starting material/ingredients. However, claim 1 of auxiliary request 1 refers to a step of mixing TAIC and the silane coupling agent but not to any specific processes for preparing TAIC or the silane coupling agent. These specific processes are essential for determining which compounds are regarded as impurities. Consequently, for want of a clear definition of the term "impurities" and since claim 1 of auxiliary request 1 does not specify the processes for preparing TAIC or the silane coupling agent, it is not possible for the skilled person to determine which compounds are encompassed by this term.

7.3 The board is not convinced by the respondent's argument that the purpose of the components present in the composition referred to in claim 1 limited the definition of the term "impurities"

Claim 1 is silent about any purpose, and the purpose of an ingredient of a composition cannot be determined from the reference to a composition per se.

Furthermore, even if it were accepted that, in view of the comparative examples in the opposed patent or the application as filed, respectively, the purpose was the reduction of metal corrosion and impurities were thus to be understood as compounds leading to metal corrosion, it would be unclear which compounds, apart from the two specific compounds (I) and (V) referred to in claim 1, had this undesirable property and thus fell under this definition. In the same way, on the basis of a composition according to D20 comprising components (B), (C1), (C2) and (C3), it is not possible to deduce the purpose of the polyorganohydrogensiloxane compound (B) and whether or not it has to be deemed an impurity in the context of claim 1.

7.4 Thus the introduction of the term "impurities" into claim 1 of auxiliary request 1 renders the claim unclear, contrary to the requirements of Article 84 EPC.

7.5 For these reasons, the set of claims of auxiliary request 1 is not allowable.

Auxiliary request 2

8. Claim 1 of auxiliary request 2 reads:

"A method of storing triallyl isocyanurate, comprising the steps of mixing the triallyl isocyanurate with a

silane coupling agent to prepare a composition comprising both thereof, and storing the resulting composition,

wherein the triallyl isocyanurate is obtained by either (i) the triallyl cyanurate rearrangement method or (ii) the sodium cyanate method or the isocyanuric acid method,

wherein when the triallyl isocyanurate is obtained by method (i), the triallyl isocyanurate comprises an organic chlorine compound represented by the following chemical formula (I) in an amount of not more than 100 ppm: [...]

wherein when the triallyl isocyanurate is obtained by one of the methods (ii), the triallyl isocyanurate comprises an organic chlorine compound represented by the following chemical formula (V) in an amount of not more than 500 ppm: [...]" (emphasis added by the board).

The chemical formulae (I) and (V) in claim 1 of auxiliary request 2 are defined as in claim 1 of the main request.

9. Article 123(2) EPC

9.1 The respondent asserted that the following combinations were not disclosed in the application as filed:

- combination of the features "TAC rearrangement method" and "an organic chlorine compound of formula (I) in an amount of not more than 100 ppm", and
- combination of the features "sodium cyanate method or the isocyanuric acid method" and "an

organic chlorine compound of formula (V) in an amount of not more than 500 ppm".

- 9.2 Claim 1 of auxiliary request 2 differs from claim 1 of the main request *inter alia* in that trialkyl isocyanurate (TAIC) is obtained by either (i) the triallyl cyanurate (TAC) rearrangement method or (ii) the sodium cyanate method or the isocyanuric acid method.

The basis of the TAC rearrangement method is found in paragraph [0015] of the application as filed, which refers to "*the rearrangement reaction of TAC*" for the production of TAIC. As explained in paragraphs [0014], [0018] and [0025] of the application as filed, this method is linked to the presence in TAIC of an organic chlorine compound of formula (I) in an amount of not more than 100 ppm. The last sentence of paragraph [0014] discloses that the impurities in TAIC depend on the process of production. Paragraph [0018] mentions that the impurities in TAIC are also present in TAC and refers to compounds of formula (I), (II) or (III). Paragraph [0025] of the application as filed explains that, when TAIC is produced from the TAC rearrangement method, "*... organic chlorine compound represented by the chemical formula (I) remains in TAIC as produced...*". Thus this last passage is a pointer to combine the feature TAC rearrangement method (found e.g. in paragraph [0015] of the application as filed) with the feature of "an organic chlorine compound of formula (I) in an amount of not more than 100 ppm" as disclosed in paragraph [0026] or claim 4 of the application as filed.

Paragraph [0031] of the application as filed discloses "*TAIC produced by sodium cyanate method or isocyanuric acid method*" and is a basis for the feature "sodium

cyanate method or the isocyanuric acid method" in claim 1 of auxiliary request 2. These methods are linked to the presence in TAIC of an organic chlorine compound of formula (V) in an amount of not more than 500 ppm, as disclosed in paragraph [0032] of the application as filed: "*The TAIC obtained by the sodium cyanate method or the isocynauric [sic] acid method comprises, as one of impurities, an organic chlorine compound represented by the following chemical formula (V)*". This passage is thus a pointer to combine the features "sodium cyanate method or the isocyanuric acid method" (found e.g. in paragraph [0031] of the application as filed) with the feature of "an organic chlorine compound of formula (V) in an amount of not more than 500 ppm" as disclosed in paragraph [0037] and claim 5 as filed.

- 9.3 The appellant argued that the application as filed (see e.g. paragraph [0025]) disclosed a treatment required for removing the organic chlorine compound represented by chemical formula (II) from TAIC when the TAC rearrangement method was involved. Omitting that treatment from claim 1 of auxiliary request 2 violated Article 123(2) EPC.

The board does not agree with the appellant. Paragraph [0025] of the application as filed refers to the TAC rearrangement method and to the decomposition and removal of the compound represented by chemical formula (II) during the TAIC production and purification steps. However, paragraph [0015] discloses the TAC rearrangement method as a general disclosure without any specific reference to certain conditions. Therefore, omitting e.g. the treatment required for removing the organic chlorine compound represented by chemical formula (II) is not an impermissible

generalisation of the original disclosure of paragraph [0015].

9.4 Thus the board concludes that claim 1 of auxiliary request 2 meets the requirements of Article 123(2) EPC.

10. Article 84 EPC

10.1 The appellant disputed the clarity of the TAC rearrangement method, sodium cyanate method and the isocyanuric acid method, submitting that the methods were not clearly defined in claim 1 of auxiliary request 2 and that the product-by-process features were redundant.

The board is not convinced. As acknowledged in the description of the application as filed, the methods referred to in claim 1 of auxiliary request 2 are known in the art (see paragraphs [0015], [0039] and [0040], which cite prior art identifying the methods referred to in claim 1: JACS, vol. 73, 2986-2990 and JP 4-6570 for the TAC rearrangement method; JP 5835515 for the sodium cyanate method and US 3,965,231 for the isocyanuric acid method).

With regard to the argument that the product-by-process features were not limiting and thus not necessary, the board notes that the presence of impurities (at least the compounds of formulae (I) and (V)) depends on the TAIC manufacturing method, as explained in the description of the application as filed (point 9.2, *supra*). Thus, each TAIC preparation method according to claim 1 of auxiliary request 2 limits the impurity concerned. In other words, when TAIC is prepared using the TAC rearrangement method, TAIC comprises compounds of formula (I) but no compounds of formula (V), and when TAIC is prepared using the sodium cyanate method or the isocyanuric acid method, TAIC comprises

compounds of formula (V) but no compounds of formula (I).

10.2 Thus the board sees no lack of clarity linked to the introduction of the product-by-process features into claim 1 of auxiliary request 2.

10.3 The appellant also submitted that claim 1 of auxiliary request 2 lacked essential features since the claim required low amounts of compounds of formulae (I) and (V), and the purification treatment steps were essential in the description of the application as filed to achieve these low amounts.

The board does not agree with the appellant's argument. The appellant referred to the following steps or conditions:

- (i) for the TAC rearrangement method: treatment by hydrolysis of crude TAC in order to remove the compounds of formulae (I) and (II) (paragraph [0028] of the application as filed) and final distillation of TAIC (paragraph [0030] of the application as filed).
- (ii) for the sodium cyanate method or the isocyanuric acid method: use of allyl chloride with an amount below 200 ppm of 1,3-dichloro propene (paragraph [0041] of the application as filed).

These steps or conditions are implicitly part of the method of claim 1 of auxiliary request 2. Indeed, the claim requires maximum amounts of the compounds of formulae (I) and (V). The skilled person would know which common purification techniques or which reactant

purity they would need to reach the required TAIC purity. Thus claim 1 does not lack essential features.

10.4 Therefore, claim 1 of auxiliary request 2 meets the requirements of Article 84 EPC.

11. Article 83 EPC

For the reasons given for the main request (point 3, *supra*), the invention defined in the claims of auxiliary request 2 is sufficiently disclosed and therefore meets the requirements of Article 83 EPC.

12. Articles 54 and 56 EPC

12.1 As set out above for the main request, none of D1, D18, D19, D20, D21, D25 and D26 discloses the content of compounds of formulae (I) and (V) as required by claim 1. For the same reasons as given for the main request, the subject-matter of claim 1 and, by the same token, of claims 2 and 3 of auxiliary request 2 is novel in view of these documents. Thus, the claims fulfil the requirements of Article 54 EPC.

12.2 As with claim 1 of the main request, D20 represents the prior art closest to the subject-matter of claim 1 of auxiliary request 2, and the distinguishing feature of the claim is the content of compounds of formulae (I) and (V) in TAIC, which is not disclosed in D20.

12.3 Objective technical problem

12.3.1 As set out above (point 10.1, *supra*), when TAIC is prepared using the TAC rearrangement method, the TAIC comprises compounds of formula (I) but no compounds of formula (V), and when TAIC is prepared using the sodium cyanate method or the isocyanuric acid method, the TAIC comprises compounds of formula (V) but no compounds of formula (I). This implies that, due to the product-by-

process features now introduced into claim 1, the TAIC comprises either the compound of formula (I) in an amount of not more than 100 ppm and 0 ppm of the compound of formula (V), or the compound of formula (V) in an amount of not more than 500 ppm and 0 ppm of the compound of formula (I). Therefore, unlike in claim 1 of the main request, the amount of both compounds (I) and (V) is now defined in claim 1 of auxiliary request 2 and it no longer suffices that the amount of just one of the two compounds is as required by the claim. The TAIC in comparative example 1 of the opposed patent contains 120 ppm of a mixture of two compounds (I) and 0 ppm of compound (V). The amount of 0 ppm of compound (V) is as required by claim 1 of auxiliary request 2, but the amount of 120 ppm of compound (I) is outside the range defined in claim 1 for the amount of compound (I). The TAIC in comparative production example 2 contains 590 ppm of compound (V) and 0 ppm of compound (I). An amount of 0 ppm of compound (I) is as required by claim 1 of auxiliary request 2, but the amount of 590 ppm of compound (V) is above the upper limit defined for the amount of this compound in claim 1 of auxiliary request 2. Unlike for the main request, comparative production examples 1 and 2 thus no longer fall under the scope of claim 1 of auxiliary request 2.

12.3.2 As can be deduced from table 4 of the opposed patent, the chlorine concentration after hydrolysis is less than 1 ppm for production example 1 and 21 ppm for production example 2, compared with 237 ppm for comparative production example 1 and 150 ppm for comparative production example 2. Hence the lower concentration of the compounds of formulae (I) and (V) in production examples 1 and 2 results in a lower chlorine ion concentration after hydrolysis, which implies less metal corrosion (point 5.1.4, *supra*). It

may thus be concluded that the TAIC according to claim 1 is less corrosive.

12.3.3 The appellant argued that table 4 of the patent and the data in A002 provided evidence that the reduced corrosion was not achieved over the whole scope of claim 1 of auxiliary request 2. It submitted that TAIC according to comparative production example 1 had a chlorine ion concentration of 237 ppm. According to table 1 of annex A002, TAIC with a chlorine ion concentration of 250 ppm showed corrosion after 29 days. Owing to a comparable chlorine ion concentration (237 ppm), TAIC of comparative production example 1 should have the same result in the corrosion test. According to table 4 of the patent, production example 2 had a chlorine ion concentration of 21 ppm and showed corrosion after 115 days. Since claim 1 did not limit the time, production example 2 was considered to have the same anti-corrosion properties as comparative production example 1 for at least 29 days. The appellant came to the same conclusion on the basis of the data in table 2 of A002 (test at 50°C), which showed that production example 2 had the same anti-corrosion properties as comparative production example 1 for at least 13 days.

The board does not agree for the following reasons.

It is undisputed that TAIC of production example 2, i.e. a TAIC according to claim 1, shows less corrosion than TAIC of comparative production example 1 after more than 29 days. If a compound takes longer to lead to visible corrosion, this compound must be less corrosive. The fact that claim 1 does not refer to this effect is immaterial since the problem-and-solution approach defines the objective problem on the basis of

the effect achieved (if any) without any need for the effect to be part of the claim.

Consequently, the reduced metal corrosion of TAIC according to claim 1, as shown in the examples of the patent, is to be taken into consideration in the formulation of the objective technical problem.

The objective technical problem is therefore the provision of a TAIC storage method, in which the TAIC is less corrosive.

12.4 Obviousness of the solution

The appellant referred to D17 and the combination of D6 with common general knowledge represented by D17.

- 12.4.1 D17 is concerned with the provision of a high-quality TAIC having a low content of residual halogen ions (abstract of D17B). TAIC is used as a crosslinking agent for a heat-resistant resin having high insulation reliability. Working examples 1 and 2 of D17B disclose TAICs with chlorine ion concentrations of 0.17 ppm and 0.1 ppm, respectively. The teaching in D17 is that the low content of residual halogen ions in the heat-resistant resin used on semiconductor chips leads to better durability and stability of semiconductor chips due to greater insulation reliability (page 2, lines 17-23; passage from page 6, line 37 to page 7, line 5; page 7, lines 8-16).

In view of its disclosure, D17 does not teach lowering the concentration of chlorine-containing organic compounds in TAIC, let alone reducing the concentration of the specific compounds of formulae (I) and (V), in order to reduce metal corrosion. Therefore, the skilled person, faced with the problem of providing a TAIC storage method, in which the TAIC is less corrosive,

would not have arrived at the claimed solution when considering the teaching of D17.

- 12.4.2 D6 relates to a process for purifying crude isocyanurates, involving bringing the crude isocyanurates containing 0.01 to 10.00 wt.% impurities into contact with a basic solution of a nitrogen-containing compound (column 1, lines 61-71). The impurities referred to in D6 are *inter alia* alkali halides (column 3, lines 1-7). Examples 1, 2, 6 and 9 disclose the purification of crude TAIC containing different impurities.

There is no teaching in the combination of D6 and common general knowledge represented by D17 (teaching TAIC with a low chlorine ion concentration) to lower the concentration of chlorine-containing organic compounds in order to reduce metal corrosion. Thus, the skilled person, faced with the problem to be solved, would not have found any solution in the combination of these documents.

The board concludes that the subject-matter of claim 1 and, by the same token, of dependent claims 2 and 3 of auxiliary request 2 involves an inventive step pursuant to Article 56 EPC.

13. In the absence of any further objections, the claims of auxiliary request 2 are allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of claims 1 to 3 of auxiliary request 2 filed with letter dated 18 April 2016, and a description to be adapted thereto.

The Registrar:

The Chairman:



N. Maslin

M. O. Müller

Decision electronically authenticated