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**Datasheet for the decision  
of 5 September 2022**

**Case Number:** T 0735/20 - 3.3.06

**Application Number:** 16158792.8

**Publication Number:** 3070150

**IPC:** C10L1/00, C07C43/205, C10L1/185

**Language of the proceedings:** EN

**Title of invention:**  
Fuel markers

**Applicant:**  
Authentix, Inc.

**Headword:**  
Fuel markers / AUTHENTIX

**Relevant legal provisions:**  
EPC Art. 54, 56, 83, 84, 123(2)  
RPBA 2020 Art. 13(1), 13(2)

**Keyword:**

Admittance into the proceedings of auxiliary requests 6 to 12  
- (yes) - exceptional circumstances  
Clarity (auxiliary requests 6 to 11) - (no)  
Compliance with all the requirements of the EPC (Auxiliary  
request 12) - (yes)

**Decisions cited:**

T 0642/05

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

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Case Number: T 0735/20 - 3.3.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.06**  
**of 5 September 2022**

**Appellant:** Authentix, Inc.  
(Applicant) 4355 Excel Parkway, Suite 100  
Addison, TX 75001 (US)

**Representative:** Turner, Craig Robert  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 11 November  
2019 refusing European patent application No.  
16158792.8 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chair** S. Arrojo  
**Members:** L. Li Voti  
R. Winkelhofer

## Summary of Facts and Submissions

I. The appeal is against the decision of the examining division to refuse the European patent application no. 16158792.8.

In particular, the examining division decided that claim 1 of all pending requests lacked novelty over document D1 (WO 2014/088898 A1).

II. With the statement of grounds of appeal the appellant filed 6 sets of claims as main request and 1<sup>st</sup> to 5<sup>th</sup> auxiliary request, and Annex 1 (Laundering Results GC/MS Markers). Moreover it was maintained that the claimed subject-matter was novel over D1 and D2 (DATABASE CAPLUS, AN 1986:68511, Alisova et al. "Simultaneous reaction of acetyl chloride with cyclohexene and phenetole in the presence of aluminum chloride", Zhurnal Organicheskoi Khimii (1985), 21(5), 1066-8), and also involved an inventive step.

III. With a communication pursuant to Article 15(1) RPBA dated 24 January 2022, the board expressed its preliminary opinion that claim 1 according to all requests lacked clarity, that the invention was not sufficiently disclosed and that the wording of claim 1 had to be construed as not implying any limitation to the radicals of structural formula I, thus lacking novelty over D1.

IV. With submissions dated 4 August 2022 and 19 August 2022 the appellant respectively filed six sets of amended claims as 6<sup>th</sup> to 11<sup>th</sup> auxiliary requests and amended versions of the description adapted to the pending requests.

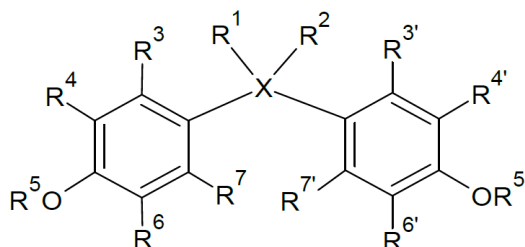
V. During the oral proceedings held on 5 September 2022 the appellant withdrew its main request and the 1<sup>st</sup> to 5<sup>th</sup> auxiliary requests and filed two amended sets of claims as 12<sup>th</sup> and 13<sup>th</sup> auxiliary requests, respectively.

VI. The final appellant's requests were the following:

The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of one of the 6<sup>th</sup> to 11<sup>th</sup> auxiliary requests, filed with submission of 4 August 2022, or of the 12<sup>th</sup> or 13<sup>th</sup> auxiliary request, filed during oral proceedings.

VII. Claim 1 according to the 6<sup>th</sup> auxiliary request reads as follows:

"1. A compound characterized by Formula I:



Formula I

wherein X is carbon (C);  $R^1$  and  $R^2$  are independently selected from hydrogen, a  $C_1$  to  $C_{20}$  alkyl group, or a  $C_6$  to  $C_{10}$  aryl group, wherein "aryl group" refers to any aromatic group derived from an arene by removal of a hydrogen atom from any carbon atom of an aromatic ring, and wherein the arene is a hydrocarbon;  $R^3$  and  $R^{3'}$  are independently selected from hydrogen or a  $C_1$  to  $C_4$  alkyl group;  $R^4$  and  $R^{4'}$  are independently selected

*from hydrogen, a C<sub>1</sub> to C<sub>4</sub> alkyl group, a C<sub>4</sub> to C<sub>10</sub> cycloalkyl group, or a C<sub>6</sub> to C<sub>10</sub> aryl group; R<sup>5</sup> and R<sup>5'</sup> are independently selected from a C<sub>4</sub> to C<sub>10</sub> alkyl group; R<sup>6</sup> and R<sup>6'</sup> are independently selected from hydrogen or a C<sub>1</sub> to C<sub>6</sub> alkyl group; and R<sup>7</sup> and R<sup>7'</sup> are independently selected from hydrogen or a C<sub>1</sub> to C<sub>4</sub> alkyl group;*

*and wherein the compound characterized by Formula I when subjected to gas chromatography mass spectrometry (GC-MS) using electron ionization produces at least one ion having a mass-to-charge ratio from 300 to 600 at an ionization energy equal to 70 eV."*

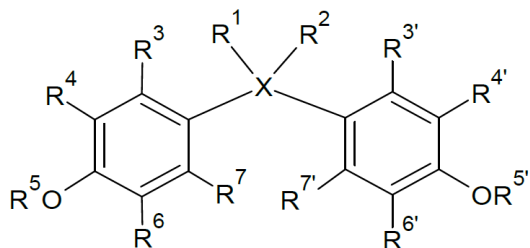
Claim 1 according to the 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> auxiliary request differs from claim 1 according to the 6<sup>th</sup> auxiliary request insofar as the wording "a C<sub>6</sub> to C<sub>10</sub> aryl group, wherein "aryl group" refers to any aromatic group derived from an arene by removal of a hydrogen atom from any carbon atom of an aromatic ring, and wherein the arene is a hydrocarbon" is replaced, respectively, by the wording "**a C<sub>6</sub> to C<sub>10</sub> aryl group, and wherein the C<sub>6</sub> to C<sub>10</sub> aryl group is a hydrocarbon**", or "**a substituted or unsubstituted C<sub>6</sub> to C<sub>10</sub> aryl group, and wherein the substituted or unsubstituted C<sub>6</sub> to C<sub>10</sub> aryl group is a hydrocarbon**" or "**a phenyl group**".

Claim 1 according to the 10<sup>th</sup> auxiliary request relates to a composition comprising a fuel and a compound characterized by Formula I as defined in claim 1 according to the 9<sup>th</sup> auxiliary request.

Claim 1 according to the 11<sup>th</sup> auxiliary request relates to the use as a fuel marker of a compound characterized by Formula I as defined in claim 1 according to the 9<sup>th</sup> auxiliary request.

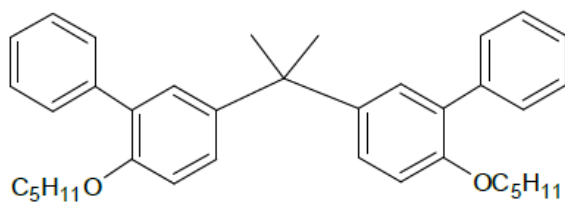
The set of 3 claims according to the 12<sup>th</sup> auxiliary request reads as follows:

"1. A compound characterized by Formula I

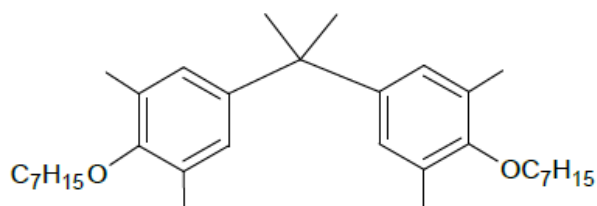


Formula I

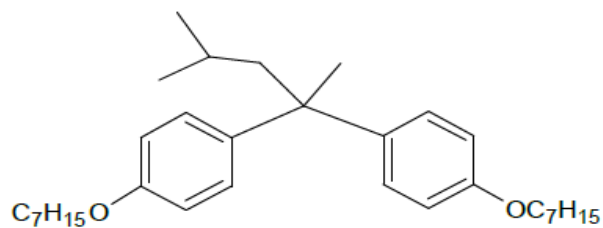
wherein the compound of Formula I is selected from Structures G-P:



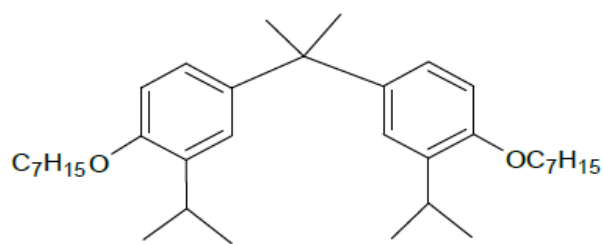
Structure G



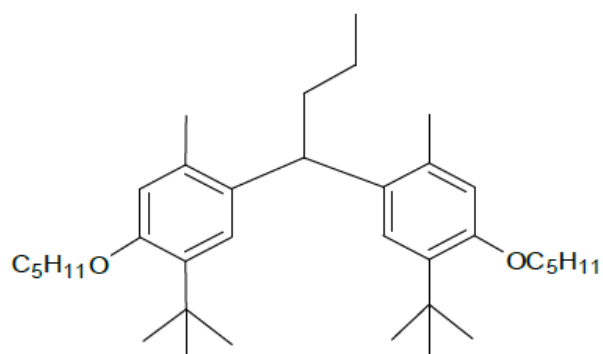
Structure H



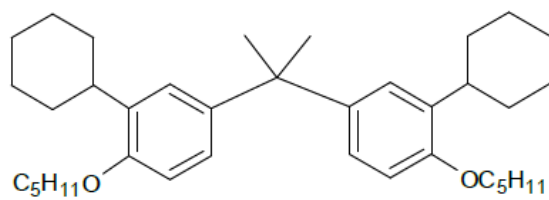
Structure I



Structure J

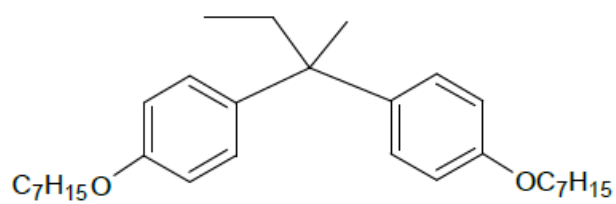


Structure K

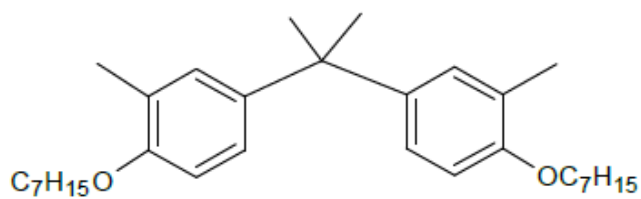


Structure L

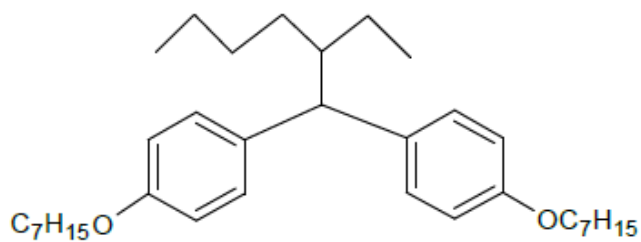




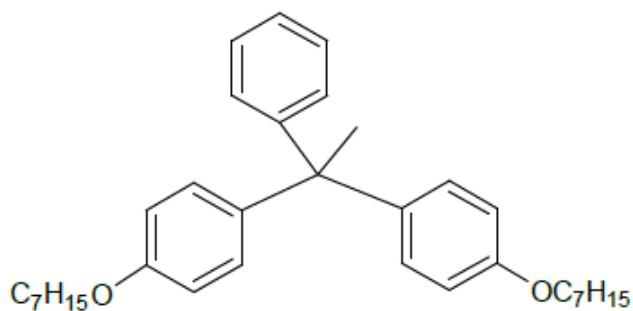
Structure M



Structure N



Structure O



Structure P

."

"2. A composition comprising (a) a fuel and (b) a compound according to claim 1."

"3. Use of a compound according to claim 1 as a fuel marker."

### **Reasons for the Decision**

Admittance into the proceedings of the 6<sup>th</sup> to 12<sup>th</sup> auxiliary requests.

1. The 6<sup>th</sup> to 11<sup>th</sup> auxiliary requests were filed by the appellant with submission of 4 August 2022 in reply to the board's provisional opinion of 24 January 2022. In particular, as explained in said appellant's submission, the newly filed requests address the objections under Articles 83 and 84 EPC raised for the first time in the board's communication as well as the novelty objection based on the board's interpretation of the wording of claim 1 which was different from that adopted by the examining division in its decision.

The board thus agrees that in the present case there exist exceptional circumstances justified with cogent reasons for the filing of these requests at such a late stage of the proceedings. Moreover, the newly filed requests overcome *prima facie* at least part of the board's concerns. Therefore, these requests are admitted and considered in the proceedings under Articles 13(1) and (2) RPBA 2020.

2. Following the discussion upon the clarity of claim 1 according to the 6<sup>th</sup> to 11<sup>th</sup> auxiliary request during oral proceedings, including some new objections raised by the board, the appellant filed a new set of claims as 12<sup>th</sup> auxiliary request which *prima facie* overcomes all raised objections and is allowable as explained in the following.

Therefore the board also admits this request into the proceedings under Articles 13(1) and (2) RPBA 2020.

The 6<sup>th</sup> auxiliary request

3. Clarity (Article 84 EPC)

3.1 Claim 1 according to the 6<sup>th</sup> auxiliary request concerns a compound of generic structural formula I which is further limited by the requirement that when it is subjected to gas chromatography mass spectrometry (GC-MS) using electron ionization at least one ion having a mass-to-charge ratio (MCR) from 300 to 600 at an ionization energy equal to 70 eV is produced (in the following referred to as the "**GC-MS requirement**").

3.1.1 It is directly apparent from formula I that the lowest possible molecular weight of a compound encompassed by this formula (when all radicals R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>3'</sup>, R<sup>4</sup>, R<sup>4'</sup>, R<sup>6</sup> and R<sup>6'</sup> are hydrogen and R<sup>5</sup> and R<sup>5'</sup> are butyl) is of 312. On the other hand, the highest possible molecular weight is well above 1000.

3.1.2 It is moreover undisputed that claim 1 does not cover all the compounds encompassed by said formula I but it is only directed to the group of compounds of formula I which also complies with the above GC-MS requirement.

3.2 It is established jurisprudence of the boards of appeal (see for example T 0642/05, reasons 2.3) that a claim has to be considered as not complying with the requirement of clarity according to Article 84 EPC if, at variance with the principle of legal certainty, it is not defined in such a way that the subject-matter covered by the claim can be clearly distinguished from that which is not covered (see also Case Law of the

Boards of Appeal of the EPO, 10<sup>th</sup> edition 2022, CII.A. 3.1).

It is thus to be evaluated whether the GC-MS requirement satisfies the condition of enabling the skilled person to clearly identify the group of compounds of formula I covered by claim 1.

- 3.3 The board remarks in this respect that the claim, apart from mentioning the ionization energy to be applied, does not specify the conditions under which the GC-MS has to be carried out for determining the necessary presence of an ion having the required MCR.

Moreover, the description (paragraphs [0154] to [0170] and example 7) does not disclose the application of the GC-MS method to a compound of formula I alone but only within a method for the determination of adulteration in a fuel, which implies the presence of a fuel of unknown composition as well as, possibly, of additional markers. Therefore, in the absence of a description of the mixture to which the GC-MS is applied, it is not possible to conclude that the ion having an MCR between 300 and 600 derives from the compound of formula I rather than from other components of the tested mixture (see for example paragraph [0168] or paragraph [0175]).

Furthermore, as stated in the description (paragraph [0157]), the MS produces a variety of ions and claim 1 does not even specify whether the required ion having an MCR from 300 to 600 must be the heaviest ion produced or just an arbitrary ion visible in the mass spectrum. Therefore, in the absence of further specification of the obtained mass spectrum, this characteristic cannot be considered to represent a

"fingerprint" enabling the identification of a compound covered by claim 1.

In view of the above, the skilled person would be in doubt as to whether certain compounds fall within the scope of protection or not in a number of situations covered by the claims, such as: when a compound meets the GC-MS requirement under certain GC-MS conditions but not under other conditions or when the compound is analysed in a mixture and it is uncertain whether the ion with an MCR from 300 to 600 results from the compound itself or from other components of the mixture, particularly if only minor peaks with an MCR from 300 to 600 are identified. The GC-MS requirement of claim 1 therefore leads to a diffuse scope of demarcation and is, in its present form, unsuitable for clearly identifying the compounds covered by the claim.

- 3.4 It is credible that compounds according to formula I having a molecular weight up to about 600 would necessarily provide an ion having the required MCR and are thus covered by claim 1.
- 3.4.1 As regards the compounds of formula I of higher molecular weight above 1000 the appellant additionally argued that the skilled person, thanks to their knowledge of organic chemistry and of GC-MS, would also be able to recognise on the basis of the substituents if a given compound would be unable to produce an ion under GC-MS or at least an ion having the required MCR and would thus **not** be covered by claim 1.

However, even if sharing the appellant's view for the sake of the argument, it still remains unclear how the skilled person could identify which compounds of formula I having an intermediate molecular weight, for

example a molecular weight between 650 and 700, closer to the upper limit of the ion MCR of claim 1, comply with the GC-MS requirement and which do not, particularly considering the diffuse scope of demarcation of this feature (see point 3.3 above).

- 3.5 Therefore, even taking into account common general knowledge, in certain cases neither the claim nor the description allow a distinction to be made between the compounds of formula I which are covered by the claim and those which are not.
- 3.6 The board also notes, for the sake of completeness, that the definition of the "aryl group" of radicals  $R^1$  and  $R^2$  in claim 1 might also be considered unclear. While the wording appears to be an attempt to discard the presence of atoms different from hydrogen and carbon in the aryl group, the definition of the "arene" as a "hydrocarbon" may leave the reader in doubt as to whether arenes with substituents containing atoms different from carbon and hydrogen are indeed excluded, as such substances could still be referred to as "substituted hydrocarbons" and thus also as "hydrocarbons" in a broader sense. This objection is further reinforced by the use of the expression "derived from", which raises the question of whether compounds obtained from reacting the arene with other substances would also be encompassed by the claim.
- 3.7 Claim 1 thus lacks clarity and does not comply with the requirements of Article 84 EPC.
- 3.8 The 6<sup>th</sup> auxiliary request is thus not allowable.

The 7<sup>th</sup> to 11<sup>th</sup> auxiliary requests

4. Clarity (Article 84 EPC)

4.1 Since each claim 1 according to the 7<sup>th</sup> to 11<sup>th</sup> auxiliary request contains the same or a similar definition of the compound of structural formula I as the 6<sup>th</sup> auxiliary request (only auxiliary requests 9<sup>th</sup> to 11<sup>th</sup> limiting the "aryl group" of radicals R<sup>1</sup> and R<sup>2</sup> to phenyl) and the same GC-MS requirement, it also lacks clarity at least for the reasons brought forward in points 3.3 and 3.4 above.

4.2 All these requests are thus not allowable.

The 12<sup>th</sup> auxiliary request

5. Compliance with the requirements of Article 123(2) EPC

5.1 Claim 1 of the 12<sup>th</sup> auxiliary request is directed to selected compounds of formula I having structures G-P, each structure identifying one single compound.

Claim 2 concerns a composition comprising a fuel and a compound according to claim 1, and claim 3 concerns the use of a compound according to claim 1 as a fuel marker.

5.2 Compounds having structures G-P, suitable as fuel markers as well as compositions comprising such a compound and a fuel, are disclosed in the application as filed (paragraphs [0037] and [0040] in combination with paragraph [0026], paragraphs [0238] and [0241] in combination with paragraph [0233], as well as claims 6 and 9).

5.3 Even though the claims at issue no longer include the GC-MS requirement contained in the claims of the higher ranking requests, the compounds of structures G-P, having a molecular weight between 300 and 600, necessarily comply with this requirement.

Therefore, the omission of this requirement in the claims does not contravene Article 123(2) EPC.

5.4 Consequently, the claims at issue comply with the requirements of Article 123(2) EPC.

6. Clarity (Article 84 EPC)

6.1 Even though claims 1 to 3 do not explicitly specify the meaning of the radicals of the generic formula I, the only compounds covered by this generic formula are clearly listed individually.

6.2 Therefore claims 1 to 3 are clear.

7. Sufficiency of the disclosure (Article 83 EPC)

7.1 Paragraph [0093] of the description discloses how compounds of formula I can be prepared. Moreover, the description illustrates how the compounds of formula I, including the specific structures of claim 1, can be incorporated into a fuel and used as fuel markers.

7.2 The claimed invention is thus sufficiently disclosed.

8. Novelty (Article 54 EPC)

8.1 The subject-matter of claim 1 at issue differs from the disclosure of D1 (see claim 1) or D2 *inter alia* in the nature of the proposed radical R<sup>1</sup>. In particular, the



structure in claim 1 at issue which can be considered closest to that in D1 or D2 is the "structure P", containing an unsubstituted phenyl as R<sup>1</sup> and not the phenyl ether group proposed in these documents.

8.2 Claims 1 to 3 are thus novel.

9. Inventive step (Article 56 EPC)

9.1 The present application (paragraph [0010]) concerns the provision of further or improved fuel markers. It is in this respect not in dispute that, as indicated in the board's provisional opinion, D1 already provides fuel markers having a structure similar to that of the compounds claimed and thus represents a suitable starting point for the evaluation of inventive step.

9.2 As regards the experimental report filed by the appellant as Annex 1 with the statement of grounds of appeal, it corresponds to the experimental report of 2<sup>nd</sup> October 2018, filed during examination, but limited to the claimed compounds having structures G-P. The board has thus no reason to disregard this document.

However, neither the present application nor Annex 1 provide a comparison with the fuel markers disclosed in the examples of D1, which represent the closest prior art. Therefore, Annex 1 appears to simply confirm the teaching of the application (paragraph [0094]) that compounds of formula I, which include compounds of structures G-P, are particularly resistant to laundering and suitable as fuel markers.

The technical problem solved can thus be formulated as indicated in the application, as the provision of further compounds suitable as fuel markers.

- 9.3 It is thus to be decided whether it was obvious for the skilled person, starting from the different fuel markers disclosed in the closest prior art represented by D1, to modify the compounds disclosed therein with the expectation of providing further compounds also suitable as fuel markers.
- 9.4 D1 does not contain any suggestion that further compounds suitable as fuel markers could be obtained by replacing one of the essential -OR substituted phenyl groups of the compounds disclosed in this document with an alkyl or a phenyl group as required by the structures G-P.
- 9.4.1 Even though the presently claimed compounds may be prepared by applying known chemical reaction schemes (see paragraph [0093] of the application), the prior art does not contain any pointer that would have led the skilled person to try this particular modification of the compounds of the closest prior art with the expectation of succeeding in providing further suitable fuel markers.
- 9.4.2 Thus, the skilled person would have only arrived at the claimed subject-matter with the benefit of hindsight.
- 9.5 The claimed subject-matter therefore involves an inventive step.
10. The board thus concludes that the claims according to the 12<sup>th</sup> auxiliary request comply with all the requirements of the EPC.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division with the order to grant a patent on the basis of the claims according to the 12<sup>th</sup> auxiliary request, filed during oral proceedings, and the description to be adapted.

The Registrar:

The Chair:



A. Pinna

S. Arrojo

Decision electronically authenticated