

Internal distribution code:

- (A) [] Publication in OJ
(B) [] To Chairmen and Members
(C) [X] To Chairmen
(D) [] No distribution

D E C I S I O N
of 18 October 2001

Case Number: T 0116/99 - 3.3.6

Application Number: 92904183.8

Publication Number: 0516838

IPC: C10L 1/22

Language of the proceedings: EN

Title of invention:

Fuel compositions containing hydroxyalkyl-substituted amines

Patentee:

Chevron Chemical Company LLC

Opponent:

BASF Aktiengesellschaft
Ferro Corporation

Headword:

Hydroxyalkyl substituted amine/CHEVRON

Relevant legal provisions:

EPC Art. 54(3), 123(3), 56

Keyword:

"Late filed request - admitted"
"Extension of scope (no); Novelty (yes)"
"Inventive step (no) - obvious use of a structural similar compound"

Decisions cited:

G 0002/88; T 0939/92; T 0181/82

Catchword:

-



Case Number: T 0116/99 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 18 October 2001

Appellant 01: BASF Aktiengesellschaft
(Opponent 01) D-67056 Ludwigshafen (DE)

Representative: Kinzebach, Werner, Dr.
Patentanwälte
Reitstötter, Kinzebach und Partner
Postfach 86 06 49
D-81633 München (DE)

Appellant 02: Ferro Corporation
(Opponent 02) 1000 Lakeside Avenue, Cleveland
Ohio 44114-1183 (US)

Representative: Gille, Christian, Dipl.-Ing
Gille Hrabal Struck
Neidlein Prop Roos
Brucknerstrasse 20
D-40593 Düsseldorf (DE)

Respondent: Chevron Chemical Company LLC
(Proprietor of the patent) 2613 Camino Ramon
San Ramon, CA 94583-4289 (US)

Representative: Nash, David Allan
Haseltine Lake & Co.
Imperial House
15-19 Kingsway
London WC2B 6UD (GB)

Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 3 December
1998 concerning maintenance of European patent
No. 0 516 838 in amended form.

Composition of the Board:

Chairman: P. Krasa
Members: L. Li Voti
C. Rennie-Smith

Summary of Facts and Submissions

- I. The present appeal is from the interlocutory decision of the Opposition Division to maintain in amended form the European patent No. 0 516 838 relating to a fuel composition.
- II. Two notices of opposition were filed against the patent, wherein the Appellants 01 and 02 (Opponents 01 and 02) sought revocation of the patent on the grounds of Article 100(a) EPC, in particular because of an alleged lack of novelty and of inventive step of the claimed subject-matter.

The oppositions were based *inter alia* upon the following documents:

- (1): EP-A-0476485
- (2): US-A-3794586
- (5): H.P. Rath et al, "Wirkung optimierter Kraftstoffadditive", Lecture hold on 16 March 1988, pages 1 to 15
- (8): US-A-4832702
- (16): R.C. Tupa and C.J. Dorer, "Gasoline and Diesel Fuel additives for Performance/Distribution/Quality", Paper No. N 841211, SAE Passenger Car Meeting (Dearborn, Mich. 10/1-4/84), SAE Special Publication No. SP-603, 69-100 October 1984; pages 69 to 100

- (18): K. Owen et al, "Critical Reports on Applied Chemistry", vol. 25 (Gasoline Fuel Additives), 1989, pages 1 to 37
- (25): Ullmann's Encyclopaedia of Industrial Chemistry, 1990, vol. A16, page 735

III. In its decision, the Opposition Division found that

- the claimed subject-matter was novel over document (1) since this document did not explicitly mention the use of a carrier oil for the amine alcohols disclosed therein and it had not been proved that the skilled person would have interpreted the teaching of this document as necessarily including the use of such an oil, as was obligatory for the compositions claimed in the patent in suit;
- moreover the claimed subject-matter could not be derived e.g. from the teaching of documents (2) or (8). Nor would a skilled person have combined the teaching of document (2) with that of document (8), since they related to different kinds of composition. Therefore, the claimed subject-matter amounted to a non-obvious alternative fuel additive for the reduction of valve intake deposits;
- thus the claimed invention and the patent in suit, as amended by the Respondent (Patent proprietor) according to the main request, fulfilled the patentability requirements of the EPC.

IV. Two appeals were filed against this decision.

Subsequent to the statements of the grounds for appeal the Respondent filed with a letter of 30 December 1999 an amended main request.

Claim 1 of the main request reads as follows:

"1. A fuel composition comprising:

a major amount of hydrocarbons boiling in the gasoline or diesel range; and

a deposit control additive composition comprising:

(1) an effective detergent amount of a hydroxyalkyl-substituted amine which is the reaction product of:

(a) a polyolefin epoxide derived from a branched chain polyolefin having an average molecular weight of 400 to 5000; and

(b) a nitrogen-containing compound selected from ammonia, a monoamine having from 1 to 40 carbon atoms, and a polyamine having from 2 to 12 amine nitrogen atoms and from 2 to 40 carbon atoms and

(2) a fuel-soluble, nonvolatile carrier oil."

Claim 4 of the main request reads as follows:

"4. A deposit control additive composition for fuel compositions comprising a major amount of hydrocarbons boiling in the gasoline or diesel range, the deposit control additive composition comprising

(1) an effective detergent amount of a hydroxyalkyl-substituted amine which is the reaction product of:

(a) a polyolefin epoxide derived from a branched chain polyolefin having an average molecular weight of 400 to 5000; and

(b) a nitrogen-containing compound selected from ammonia, a monoamine having from 1 to 40 carbon atoms, and a polyamine having from 2 to 12 amine nitrogen atoms and from 2 to 40 carbon atoms; and

(2) a fuel-soluble, nonvolatile carrier oil;

wherein the deposit control additive composition is formulated as a concentrate and contains an inert stable oleophilic organic solvent boiling in the range of from 65° to 205° C and 10 to 50 weight% of the hydroxyalkyl-substituted amine."

Following communication from the Board and to the experimental evidence filed by Appellant 01, the Respondent filed a number of other requests, inter alia auxiliary requests B, C and D.

The auxiliary request B differed from the main request insofar as the fuel-soluble, nonvolatile carrier oil of Claim 1 was specified to be selected from a lubricating mineral oil; and poly(oxyalkylene) alcohols, glycols and polyols or mixtures thereof.

The auxiliary request C differed from the main request insofar as Claims 1 and 4 specified that the polyolefin epoxide was derived from a polyisobutene and the nitrogen containing compound was limited to ammonia or a monoamine having from 1 to 40 carbon atoms.

The auxiliary request D differed from auxiliary request C insofar as Claim 1 contained the same limitation with respect to the fuel-soluble nonvolatile carrier oil contained in auxiliary request B.

All requests also contained dependent claims relating to specific embodiments of the fuel or additive claimed in the respective Claims 1 and 4.

V. The Appellants' arguments submitted in writing, and at the oral proceedings held before the Board on 18 October 2001, can be summarized as follows:

- since claim 1 as granted related to a deposit control additive and claim 1 of all requests on the contrary related to a fuel composition comprising such additive, these claims would contravene the requirements of Article 123(3) EPC; in particular the fuel composition had to be construed as to relate to a composition comprising the listed components independently from their provenance, e.g. deriving from the deposit control additive or from other sources. Therefore these claims extended to compositions prepared by adding, separately, a deposit control additive not comprising a carrier oil and a different oil source to a fuel. Moreover a fuel and a deposit control additive were different products, produced and marketed by different industrial sectors having different interests; thus the change of the subject-matter of a granted claim from an additive to a fuel would be prejudicial to legal certainty. The scope of the amended claims was thus broader than that of the granted claims.

With regard to the issue of novelty and inventive step the Appellants submitted

- that the claims were not novel in the light of document (1), since the skilled man would have inevitably used a carrier oil for the additives disclosed in this document; in particular documents (5), (25) and (18), representing common

general knowledge, showed that the skilled person would have always used a carrier oil together with the compounds of document (1); experimental evidence was also filed in order to support this argument;

- the claimed subject-matter was not inventive in the light of the combination of documents (8) and (2); in particular, document (8) already disclosed a solution to the same problem as that of the patent in suit, i.e. the provision of alternative chlorine-free polyisobutylamines suitable as fuel additives for reducing intake valve deposits; moreover a skilled person aware of the compounds of document (2), which were structurally similar and were used for their cleaning and dispersing activity in a motor oil, would have tried such compounds in a fuel because of their structural similarity with those of document (8) and because of their known detergent and dispersing activity and would have expected a similar reduction of the intake valve deposits. In this respect neither the patent in suit nor the other experimental evidence referred to by the Respondent could confirm the achievement of surprising superior cleansing properties with respect to the closest prior art, e.g. with regard to one of the compounds disclosed in document (8), comprising a hydroxyl rest on a similar polar amino group.

- Moreover the selection of a specific carrier oil or the selection of a monoamino instead of a polyamino polar group did not bring about any additional contribution which could be regarded as an evidence of the presence of an inventive step.

VI. The Respondent argued in writing and at the oral proceedings that:

- the claims complied with the requirements of Article 123(3) EPC since the scope of the claims had been rendered narrower by modifying the subject-matter of Claim 1 from an additive to a composition comprising such an additive;
- the claimed subject-matter was novel over document (1) since the cited prior art documents, which had been referred to by the Appellants as representing common general knowledge, did not teach that a carrier oil would have been inevitably used by a skilled person in combination with any type of polyisobutylamine.

With regard to the inventive step issue it submitted that

- the problem underlying the present invention was the provision of a further, chlorine-free deposit control agent for use in a fuel composition, able to clean and maintain clean the intake valve ("clean-up" and "keep-clean" effects) at least as well as the products of the closest prior art represented by document (8); in this respect a skilled person would not have combined the teaching of documents (8) and (2) in order to arrive at the claimed subject-matter without the use of hindsight; in fact the activity of a compound with respect to its cleaning and keep-clean activity on intake valves was not at all predictable and even a small change in the structure of the used additive could have brought about substantial changes in its activity.

Therefore, it was not obvious for a skilled person to expect the cleansing and dispersing activity of the selected compounds as shown in the patent in suit and in the submitted tests.

VII. The Appellants requested the decision to be set aside and the patent to be revoked.

The Respondent requested that the patent be maintained on the basis of the main request filed with letter of 30 December 1999 or according to one of auxiliary requests B, C or D, all filed with letter of 18 September 2001.

VIII. At the end of the oral proceedings, the chairman announced the decision of the Board.

Reasons for the Decision

1. *Procedural issues*

1.1 The Respondent filed auxiliary requests B, C and D with a letter dated 18 September 2001, i.e. one month before oral proceedings.

These requests are thus late filed.

As the Respondent argued, auxiliary requests B, C and D had been filed as a precaution against a possible finding of lack of novelty and/or of inventive step in view of the experimental report filed by Appellant 01 with a letter dated 11 September 2001 as further support to the objections already raised in the grounds of appeal.

In the Board's view all the amendments contained in these requests were easily understandable and amounted to a limitation to embodiments already contained in the original claims. Moreover none of these amendments led to a substantial change in the subject-matter of the proceedings, which would have needed ample

reconsiderations by the Appellants.

Therefore, the Board finds that these requests, even though late filed, amounted to a fair attempt by the Respondent to defend its patent and did not delay the proceedings.

Accordingly, the Board has admitted these requests.

2. *Article 123(3) EPC*

2.1 In each of the requests in question, Claim 1 differs from Claim 1 as granted *inter alia* insofar by no longer relating to a deposit control additive comprising the specified hydroxyalkyl substituted amine and a carrier oil, but to a fuel composition comprising a major amount of hydrocarbons boiling in the gasoline or diesel range and a minor amount of the previously mentioned additive.

Since a claim to a product "per se" gives absolute protection for the claimed product (see G 2/88, OJ EPO 1990, 93, point 5 of the reasons for the decision), the scope of the claim as granted also encompassed all compositions comprising this deposit control additive. Therefore, the scope of a claim directed to a fuel composition comprising such an additive is necessarily narrower than that of the original additive claim and this amendment cannot contravene the requirements of Article 123(3) EPC.

One of the Appellants argued that the fuel composition had to be construed as relating to a composition comprising the listed components independently from their provenance, e.g. deriving from the deposit control additive or from other sources. Therefore these claims extended to compositions prepared by adding,

separately, a deposit control additive not comprising a carrier oil and a different oil source to a fuel, i.e. they encompassed an invention which was not covered by the scope of the granted claims.

It is, however, established jurisprudence of the Boards of Appeal that, following the provisions of Article 69(1) EPC and its Protocol on Interpretation, the scope of a claim must be assessed taking into account not only the claims but also the description and any drawings (see G 2/88, OJ EPO 1990, 93, point 4 of the reasons for the decision). The skilled person would therefore readily understand by reading the patent in suit that the mentioned carrier oil has to be added as a carrier for the hydroxyalkyl substituted amine in the deposit control additive (see page 6, line 45).

Therefore it is the Board's finding that, on a fair reading of the description, the theoretical situation described by the Appellant is not contemplated by the invention of the patent in suit.

Therefore, Claim 1 according to all requests complies with the requirements of Article 123(3) EPC.

3. *Main Request*

3.1 *Novelty*

3.1.1 According to the established jurisprudence of the Boards of Appeal, a prior art disclosure is novelty destroying if it discloses directly and unambiguously the subject-matter in question when also taking account of everything which would be considered by a skilled person as part of the common general knowledge in connection with the disclosed subject-matter at the publication date of the cited document in case of prior

art cited under Article 54(2) EPC, or at the priority date of the cited document in case of an Article 54(3) document (see Case Law of the Boards of Appeal of the EPO, 3rd ed., 1998, page 74, point 4).

- 3.1.2 In the present case document (1) had been cited against the novelty of the subject-matter of Claim 1 under Article 54(3) EPC. All parties agreed that this document explicitly discloses a fuel composition comprising a hydroxyalkyl substituted amine of the type used in the patent in suit, which amine can be used in amounts of 50 to 5000 ppm in a fuel (page 4, lines 4 to 5); however, it does not explicitly disclose the use of a carrier oil in combination with such an amine.

The Appellants referred to various documents in order to show that it was common general knowledge to use a carrier oil in combination with such amines at the priority date of the cited document. Indeed, these documents teach that the use of a carrier oil together with amines of the polybuteneamine class leads to advantages with respect to their cleaning performance.

For example, document (25) teaches that second-generation detergents, e.g., polyisobutenamines, are **frequently used** in combination with very thermally stable carrier oils that keep the surface of the valve lubricated and ensure continuous flowing off of deposit particles, and that relatively high concentrations of detergent and carrier oils are used to keep inlet valves clean, and indeed many suppliers provide additive packages with a claimed effectiveness over the entire inlet system (page 735, left column, lines 30 to 37 and 41 to 45 and passage bridging left and right columns).

Document (18) teaches on pages 32 and 33 that it is customary to combine polymeric inlet valve deposit control additives such as the polybutene amines with petroleum-based or thermally-stable synthetic oils known as fluidizers, carrier oils or solvent oils. These additives are added to a fuel at higher concentrations than conventional amine detergents and fluidizers or solvents may also be added resulting in a multi-functional additive package.

Finally, document (5) teaches that fuel additive packages comprise detergents and carrier oils (page 5) and that carrier oils are used to support the detergent action of e.g. additives like polybutene amines (page 13).

However, none of these documents suggests that such an oil would have been inevitably used by the skilled person at the priority date of document (1), i.e. independently from the amount of additive used and with any type of amine, e.g. also with substituted amines as used in the patent in suit. It is thus the Board's view that document (1) does not contain any explicit or implicit teaching that a carrier oil should inevitably be used.

- 3.1.3 One of the Appellants also filed an experimental report in order to show that it was not possible to carry out a motor test with the hydroxyalkyl substituted amines of document (1) or with the amines of document (8) in the absence of a carrier oil; therefore a carrier oil must have also been used in document (1). However, the only conclusion which can be drawn from these tests is that the skilled person would have not been able to use the additives of document (1) in a motor test without a carrier oil under the specific conditions used in such tests. That does not mean that a carrier oil should

inevitably be used for performing the invention of document (1) or that the disclosure of document (1) contains a pointer to the use of a carrier oil.

Therefore, in the Board's finding the subject-matter of Claim 1 has to be regarded as being novel.

Furthermore, and as not contested by the Appellants, the prior art does not disclose an additive concentrate as in Claim 4 of the patent in suit, which therefore also complies with the requirements of Article 54 EPC.

3.2 Inventive step

3.2.1 Closest prior art and technical problem

The patent in suit and in particular the subject-matter of Claim 1 of the main request relates to a fuel composition comprising a deposit control additive comprising a hydroxyalkyl substituted amine and a carrier oil, the amine being the reaction product of a polyolefin epoxide derived from a branched chain polyolefin having an average molecular weight of 400 to 5000 and a nitrogen-containing compound selected from ammonia, a monoamine having from 1 to 40 carbon atoms, and a polyamine having from 2 to 12 amine nitrogen atoms and from 2 to 40 carbon atoms (page 2, lines 48 to 53).

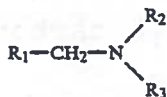
As explained in the patent in suit, deposit control additives were used in a fuel for reducing deposit formation on different parts of an internal combustion engine, e.g. the intake valves. However, an inconvenience of the methods of manufacturing the prior art additives, e.g. of the polybutenamines, was the

presence of residual chlorine in the final product, which had an undesirable impact on the emissions produced by the combustion process (page 2, lines 1 to 13).

As suggested by the parties, the Board takes document (8), which appears to be representative for the state of the art addressed in the patent in suit, as the starting point for evaluating inventive step.

Document (8) discloses polyisobutenamine derivatives prepared without using halogenated reactants and being suitable additives for fuel in order to provide reduced deposit formation on the intake valves (see column 1, lines 35 to 59; column 3, lines 1 to 34; column 4, lines 16 to 25 and column 5, lines 35 to 61).

These additives differ from those used in the patent in suit insofar as they contain a hydroxyl on the polar alkyl amino group and not on the polymeric alkyl chain in β -position to the amino group and insofar as the polyisobutylene chain is connected to the amino group via an additional methylene group deriving from the hydroformylation step; they comply with the general formula



wherein R_1 is a polyisobutylene having an average molecular weight of 500 to 1500 and R_2 and R_3 may be a hydroxyalkyl group, e.g. an ethyl alcohol group.

The compounds of the patent in suit may instead be represented by the general formulae reported in document (1), i.e. by



and



wherein R represents a polyisobutylene group having an average molecular weight of 400 to 5000 and one of X is a hydroxy group and the other one an optionally substituted amino group.

No credible technical advantage over the closest compounds of document (8) has been established by the Respondent.

In particular the experimental report filed by the Respondent with its letter of 18 September 2001 compares an amine according to Example 2 of document (1), i.e. the reaction product of a polyisobutenepoxide and a diethylenetriamine, with a compound prepared as in document (8) by hydroformylation of a reactive polyisobutene and subsequent reductive amination with ammonia.

However, the Board considers that these comparative tests should have been carried out with respect to a compound having an alkyl amino group bearing also a hydroxyl substituent, as also preferred in document (8) in the case of fuel additives (column 3, lines 1 to 28, in particular the formulae between lines 20 and 25, and column 5, lines 59 to 61), and not with respect to a

product derived from a reaction with ammonia (see T 181/82, OJ EPO, 1984, 401, point 5 of the reasons for the decision).

The results of the Respondent's tests are thus not directly comparable, since they have not been carried out with respect to the closest compound of the prior art; they cannot therefore prove any advantage with respect to the closest prior art.

Finally, the comparative tests contained in the patent in suit cannot prove any advantage either. In fact, they compare a commercial product, which according to the Respondent was a commercially available reaction product of polyisobutylamine and diethyleneamine, with either compounds of the patent in suit having different polar groups (Examples 3 to 6), which results are thus not directly comparable; or with a similar product of the invention (Example 7). This Example 7 however shows, if anything, a similar result to the commercial product tests, and presents no comparison with the closest prior art, i.e. the closest compound of document (8) mentioned above.

Therefore no unexpected superior technical advantage with respect to the closest prior art has been proved by the Respondent.

The technical problem solved by the patent in suit and deducible from it was therefore simply the provision of further fuels containing no residual chlorine and thus of alternative amine additives, prepared in such a way as not to contain residual chlorine and providing a reduction of the deposit formation on intake valves comparable with that of the prior art (page 2, lines 14 to 16 and 46 to 47).

The Board has no reason to doubt that the subject-matter of claim 1 solved this existing technical problem, nor was this disputed by the Appellants.

3.2.2. Evaluation of inventive step

A skilled person, faced with the technical problem mentioned above, would have looked for other polyisobutylenamines similar to those of document (8) as fuel additives, also prepared by a method not leading to the formation of residual chlorine in the additive.

In the Board's view, moreover, a slight structural modification of a known compound, e.g. a monoamine or a polyamine known from document (8), cannot be considered to involve an inventive step, if the preparation of such a similar compound was known to the skilled person and its use does not lead to an unexpected superior technical advantage with respect to the closest prior art (see T 939/92, OJ EPO 1996, 309; points 2.5.3 and 2.6.2 of the reasons for the decision), which closest prior art is represented by the similar compound of document (8) having an amino group bearing a hydroxyl residue.

As shown above under point 3.2.1 a superior technical advantage has not been proved.

In this respect the Respondent argued that the effect obtainable by a similar but structurally different compound was unpredictable and therefore the skilled person could not have known whether a compound was suitable or not as a fuel additive before having tried it.

However, the effect brought about by the polyisobutenamines which, as admitted by all parties,

were known fuel additives having a "clean-up" and "keep-clean" effect, derives from their structural detergent configuration, consisting of a long oleophilic chain and a polar hydrophilic group, as supported by the prior art teaching (see document (5), page 5, the paragraph below Figure 1 and document (16), passages bridging pages 72 and 73 and left and right column on page 73, respectively). Therefore, the presence either of an additional methylene group between the polyolefin chain and the amino group (which in fact means only that the long chain hydrocarbon residue is extended by one further $-CH_2-$ group) or of a hydroxyl on the alkyl amino group instead of on the polymeric alkyl chain in β -position to the amino group would be considered by the skilled person as having no appreciable influence on the detergent properties of the respective compounds. A skilled person would thus not have expected such structural change to bring about any noteworthy change in the ability to dissolve greasy rests and keep particles in suspension.

A skilled person, looking for other compounds similar to those of document (8) and prepared by a method not leading to the formation of residual chlorine, would thus have promptly recognised that document (2) already disclosed polyisobutylamines having cleaning and dispersing properties prepared by a method analogous to that of the patent in suit, which amines therefore must have an identical structure (see column 2, lines 1 to 70; column 3, lines 43 to 52 and Examples 1, 3 and 4). Even if these amines were used according to the teaching of document (2) as additives for a motor oil, the skilled person would have expected these compounds to be applicable as cleaning and dispersing additives in a fuel because of their structural similarity to those of the compounds of document (8) and to the known general class of polybutenamine fuel additives.

Consequently, it is the Board's finding that the subject-matter of Claim 1 of the main request does not involve an inventive step.

4. Auxiliary requests B, C and D

4.1 Novelty

The auxiliary request B differed from the main request insofar as the fuel-soluble, nonvolatile carrier oil of Claim 1 was specified to be selected from a lubricating mineral oil; and poly(oxyalkylene) alcohols, glycols and polyols or mixtures thereof.

The auxiliary request C differed from the main request insofar as Claims 1 and 4 specified that the polyolefin epoxide was derived from a polyisobutene and the nitrogen containing compound was limited to ammonia or a monoamine having from 1 to 40 carbon atoms.

The auxiliary request D differed from auxiliary request C insofar as Claim 1 contained the same limitation with respect to the fuel-soluble nonvolatile carrier oil contained in auxiliary request B.

Since the subject-matter of Claims 1 and 4 of the main request have been found to be novel, the more restricted claims of these requests must be novel too.

4.2 Inventive step

None of the additional features of the auxiliary requests B, C and D contribute in any way to providing greater efficiency of the claimed fuel or additive as

the Respondent admitted at the oral proceedings.
Therefore, they cannot support the presence of an
inventive step and the reasons put forward in paragraph
3.2.2 above apply equally to these requests.

Therefore, these requests must also be dismissed for
lack of inventive step of the claimed subject-matter.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:


G. Rauh


P. Krasa