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D E C I S I O N
of 24 January 1995

Case Number: T 0068/93 - 3.3.1

Application Number: 84901874.2

Publication Number: 0151581

IPC: C07F 9/165

Language of the proceedings: EN

Title of invention:

Phosphorus-containing metal salt/olefin compositions and
reaction products of same with active sulfur

Patentee:

The Lubrizol Corporation

Opponent:

Exxon Chemical Patents Inc.

Headword:

Phosphorodithioates/LUBRIZOL

Relevant legal provisions:

EPC Art. 52(1), 54(1)(2), 56, 111(1), 123(2)(3)

Keyword:

"Novelty (yes)"

"Ex post facto analysis of a citation (not allowable)"

"Inventive step (yes) - no hint that a measure known in a
different field of technology would solve a particular technical
problem"

"Comparative tests - irrelevant if not expertly carried out"

Decisions cited:

T 0741/91 (followed), T 0666/89 (followed), T 0526/92
(distinguished), T 0014/83 (followed)

Catchword:

-



Case Number: T 0062/93 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 24 January 1995

Appellant:
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Respondent:
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Representative: UEXKÜLL & STOLBERG
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office of 22 October 1992, posted
19 November 1992, revoking European patent
No. 0 151 581 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: P. Krasa
R. E. Teschemacher

Summary of Facts and Submissions

I. This appeal is from the Opposition Division's decision revoking the European patent No. 151 581 relating to a composition comprising the product of reacting a phosphorus containing metal salt with an olefinic compound and with active sulphur (Claims 1 to 14), to an additive concentrate, a lubricant or a functional fluid comprising these compositions (Claims 15 and 16) and to a process for obtaining these compositions (Claims 17 and 18).

II. The grounds of opposition were that the subject matter of the patent was not novel and not inventive. The opposition was based on the documents

- (1) US-A-4 293 430 and
- (2) US-A-4 228 022.

Furthermore, in the course of the opposition proceedings, the documents

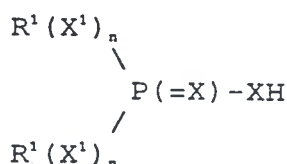
- (3) US-A-4 289 635 and
- (4) US-A-4 308 154

were cited by the Opponent (now the Respondent).

III. The Opposition Division found that the subject matter of the then pending Claim 1, while being novel over documents (1) to (3), was anticipated by document (4) and was obvious over document (3).

IV. The Appellant (patent proprietor) submitted, in the course of the oral proceedings, which took place before the Board on 24 January 1995, a set of seventeen claims, Claims 1 and 15 of which read:

- "1. A composition made by reacting at a temperature in the range of 80 to 140°C
- (B) an olefinically unsaturated compound containing 8 to 36 carbon atoms, with
 - (C) active sulfur in an amount of more than 300 ppm as measured by IP-155 in the reaction mixture, in the presence of
 - (A) a metal salt of (A)(I) at least one acid of the formula



wherein each X and X¹ is independently oxygen or sulfur, each n is zero or one, and each R¹ is independently the same or different hydrocarbon based group containing no acetylenic or ethylenic unsaturation; and optionally (A)(II) at least one carboxylic acid of about 2 to about 40 carbon atoms, the ratio of equivalents of (A)(I) to equivalents of (A)(II), when (A)(II) is present, being in the range of 0.5:1 to 500:1, component (A) being present in an effective amount to promote the reaction between components (B) and (C) and/or components (A), (B) and (C) sufficiently to consume substantially all of component (C), and the ratio of equivalents of component (A) to equivalents of component (B) is in the range of 1000 : 1 to 1 : 5; wherein the metal for the component (A) is at least one of Group I metals, Group II metals, aluminum, tin, cobalt, lead, zinc, manganese, nickel or a mixture thereof, and wherein the composition contains less than 300 ppm of active sulfur as measured by IP-155.

15. A lubricant or functional fluid comprising a major amount of oil and a minor amount of the composition of any of Claims 1 to 13."

V. The Appellant submitted that the subject matter of Claim 1 was both novel and inventive. He argued in particular that document (4) related to the preparation of mixed metal salts of dialkylphosphorodithioic acids and carboxylic acids by reacting a metal compound with a mixture of these acids at moderate temperatures and the products obtained fell within the definition of component (A) of the compositions according to the patent in suit. He maintained further that citation (4) did not disclose the reaction of an olefinically unsaturated compound with active sulphur and that, contrary to the Opposition Division's unsubstantiated assumption, no common general knowledge existed according to which metal salts of dialkylphosphorodithioic acids (component (A)) inevitably contained active sulphur. He submitted results of analyses of samples of zinc salts of dialkylphosphorodithioic acids in support.

The Appellant further submitted that prior art lubricating compositions comprising metal salts of phosphorus acids and sulphurized olefins suffered from poor colour and/or a tendency of staining or corroding copper. Thus, in his view, the technical problem underlying the patent in suit was to provide compositions comprising the reaction products of metal salts of phosphorus acids, olefins and sulphur having a desirable light colour and a reduced tendency to stain or corrode copper and similar materials.

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The process disclosed in document (2) was, according to the Appellant, carried out in the absence of a metal salt (A) as defined in the patent in suit and, thus, the resulting product was not comparable with that of the latter.

In respect to document (3), the Appellant submitted that this citation was not concerned with the same technical problem as that of the patent in suit and, furthermore, that the molybdenum compounds disclosed there were not comparable with the salts according to the patent in suit. He argued that document (3) was not concerned with producing lubricating compositions containing a combination of metal salt and sulphurized olefin having a reduced active sulphur content and improved colour characteristics.

The Appellant submitted that there was neither a suggestion in any of the prior art documents to use the metal salts (A) of the patent in suit in the reaction of sulphur and olefins to enhance the production of sulphurized olefins nor a suggestion in document (3) that active sulphur in these salts (A) could be reduced by reaction with an olefin.

VI. The Respondent submitted that Claim 1 as amended did not satisfy the requirements of Article 123(2) EPC as the amount of active sulphur of more than 300 ppm in the unreacted mixture was not derivable from the application as originally filed. He also contended that the composition of Claim 1 would not be obtained at reaction temperatures of 100°C or below. An experimental report was submitted in support of this statement.

According to the Respondent, the subject-matter of Claim 1 was anticipated by document (4), which in particular a comparison of Example 5 of this citation

with Example 15 of the patent in suit would reveal. He further submitted that document (2) disclosed lubricants comprising the product of Claim 1 and, therefore, anticipated the subject-matter of Claim 15.

The Respondent further submitted that the patent in suit addressed two different technical problems, namely:

- to provide metal salts of phosphorus-containing acids, or of a mixture of such acids with carboxylic acids, with sufficiently low levels of active sulphur to avoid staining or corroding of copper or similar materials; and
- to provide a process for sulphurising olefinic compounds at relatively low temperatures and relatively short reaction times, resulting in light coloured compositions, which would not stain or corrode copper or similar materials.

According to the Respondent, the solution of the first problem was obvious, since citation (3) related to the same problem and suggested as a solution to react molybdenum dithiophosphates with one or more olefinically unsaturated compounds (column 7, lines 1 to 3), and the skilled reader had no reason to assume that the metal molybdenum could not be replaced by the other metals mentioned in the present Claim 1.

Relying on the documents

- (6) Kirk-Othmer, Encyclopedia of Chemical Technology, 3rd Ed., Vol. 20 (1982) pages 337 - 364, and
- (7) Ullmanns Encyklopädie der technischen Chemie, Vol. 13, 4th Ed. (1977), pages 619 - 621,

which he submitted only in the appeal stage, the Respondent further argued that the subject-matter claimed was also obvious as a solution of the second problem, since these documents in combination disclosed the use of zinc dithiophosphate for a closely related purpose, i.e. as an accelerator in the vulcanisation of olefinically unsaturated EPDM with sulphur.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained as amended on the basis of the Claims 1 to 17 (main request) or, alternatively of Claims 1 to 15 (auxiliary request), and the description (pages 2 to 17), all as submitted during oral proceedings. The Respondent requested that the appeal be dismissed.

VIII. At the end of the oral proceedings the Chairman announced the Board's decision to allow the Appellant's main request.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

The Board is satisfied that the amended claims according to this request meet the requirements of Article 123(2) and (3) EPC.

2.1 The only feature objected to in respect of Article 123(2) EPC was the indication in Claim 1 that the amount of the active sulphur (component (C)) to be reacted is

"more than 300 ppm as measured by IP-155". It is therefore sufficient to deal only with this issue in detail. In the Board's judgement the above mentioned feature follows directly and unambiguously from page 17, lines 8 to 12 of the description as filed (page 9, lines 10 to 13 of the granted patent). There it is stated that "By heating the combination of compounds (A) (B) and (C), substantially all of component (C) reacts with or is consumed ... and the resulting compositions are characterized by relatively low (for example, less than 300 parts per million as measured by IP-155) levels of active sulfur". This passage unambiguously implies - as the only technically meaningful consequence - that the starting mixture had to comprise more than 300 ppm of active sulphur, in each case measured according to IP-155.

2.2 The Board cannot accept the Respondent's objection that IP-155 was not the only method disclosed in the patent in suit for the determination of the active sulphur content and that, therefore, its incorporation into the present Claim 1 was arbitrary. While it is true that ASTM D 1662 was mentioned as a further method on page 15, lines 10 to 11 (page 8, lines 17 to 18 of the patent in suit), IP-155 is the (only) method expressly disclosed together with the said 300 ppm limit. Moreover, only the latter method was used in the examples whenever the amount of active sulphur was directly measured (see e.g. Examples 5 to 8). The Board concludes therefore, that this amendment does not extend the subject-matter of the patent beyond the content of the original application.

2.3 Neither is the Respondent's argument convincing that the gist of the invention was changed by incorporating into Claim 1 the feature of "more than 300 ppm" of active sulphur in the starting material, as the original

disclosure did not contain any hint that the skilled person had to pay attention to the active sulphur content of the starting material. As already explained, the original disclosure contained an implicit teaching that the starting material had to comprise more than 300 ppm of active sulphur, as only this made a process technically meaningful which was aiming at a reduction of the sulphur content below this value.

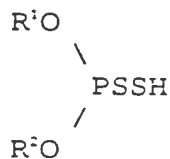
2.4 This conclusion is not in contradiction with the finding of this Board in the decision T 526/92, where the incorporation of a particular parameter into the claims was not allowed, since the specification - apart from the examples - was completely silent on the parameter concerned, and the importance of this parameter to the alleged invention was not deducible from any part of the application documents (T 526/92, Nos. 5.1 and 5.3.1 to 5.3.6, not published in the OJ EPO). In contrast, the reduction of the active sulphur content is the very issue of the patent in suit (see e.g. page 2, lines 25 to 28; page 2, lines 7 to 11 as originally filed).

3. *Novelty*

3.1 Claim 1

3.1.1 Document (4) discloses a

"mixed metal salt of
(A) at least one acid of the formula



wherein each of R¹ and R² is a hydrocarbon-based radical, and

(B) at least one carboxylic acid having the formula R³COOH which contains from about 5 to about 20 carbon atoms and wherein R³ is an aliphatic or alicyclic hydrocarbon-based radical; the ratio of equivalents of A and B being in between 2.5 : 1 and about 4.5 : 1; up to about 2 equivalents of metal being present per equivalent of acid; and the metal being at least one of Group I metals, Group II metals, aluminum, tin, cobalt, lead, molybdenum, manganese, and nickel" (Claim 1, columns 8 and 9).

According to Example 1, the mixed salt is obtained by reacting 1.63 equivalents of zinc oxide with 1 equivalent of di-(2-ethylhexyl)-phosphorodithioic acid and 0.25 equivalents of oleic acid in mineral oil (column 4, lines 16 to 18 in combination with column 3, lines 39 to 48). Document (4) is silent on the possibility of the presence of active sulphur (in the present context "active sulphur" designates sulphur in a form which can cause staining of e.g. copper, i.e. elemental sulphur or sulphur present in compounds of the formula R⁹-S_x-R¹⁰, wherein R⁹ and R¹⁰ are independently hydrogen or an organic group and x is a number greater than 2; see page 8, lines 16 to 25 of the contested patent). However, the Respondent contended that the skilled person would have known from common general knowledge that active sulphur was necessarily present in dialkyl-dithiophosphoric acids (= DDP acids), due to their preparation from P₂S₅. He concluded that Example 5 of document (4) anticipated the subject matter of present Claim 1, since oleic acid fell within the range of olefinically unsaturated compounds defined in the patent in suit as component (B) (page 7, lines 51 to 55 in combination with e.g. page 3, line 24).

- 3.1.2 The Appellant contested the existence of the alleged common general knowledge. The Respondent relied, in support of his respective allegation, only on the patent in suit. There it is stated that preparations of "phosphorodithioic acid **usually** involve the reaction of P_2S_5 , and that "they **often** result in levels of active sulfur that are unacceptable ... due to the corrosive nature of active sulfur," (page 2, lines 14 to 16; emphasis added).
- 3.1.3 In the Board's judgement, the passage of the patent in suit quoted by the Respondent does not exclude the possibility that DDP acid may be free of active sulphur. Consequently, on the sole basis of the above statement in the patent in suit, it cannot be concluded that the DDP acid used according to document (4), in particular in Example 5, necessarily contained active sulphur.
- 3.1.4 Thus, the Respondent's burden of proving the assertion, on which his novelty objection was based, could not be discharged by this argument. Under these circumstances it is not necessary further to consider the relevance of the analytical data filed by the Appellant in respect to the active sulphur content of DDP acid Zn salts.
- 3.1.5 During the oral proceedings the Respondent suggested that the case be remitted to the first instance in order to give him an opportunity to provide experimental evidence demonstrating that the DDP acids mentioned in citation (4) inevitably contained more than 300 ppm of active sulphur, since, so he argued, he was taken by surprise by this restriction which was introduced into Claim 1 only in the course of the oral proceedings before the Board.

However, the Board did not accede to this suggestion, since the presence of active sulphur and its staining and corroding properties was the central issue of the patent in suit. The Respondent's above assertion was already raised during the opposition proceedings. It was however contested by the Appellant in his Statement of Grounds of Appeal, received on 18 March 1993. Therefore, the Respondent had almost two years to support his allegation by corroborating evidence.

In addition, the Board observes that the expression "non-staining amounts of active sulphur" was equated throughout the proceedings to a content of less than 300 ppm of active sulphur as measured by IP-155 (see the patent in suit, page 9, lines 10 to 17). Thus, the introduction of this feature into the claims could neither have taken the Respondent by surprise, nor did it change the situation in respect of the Respondent's burden of proof.

3.1.6 The Respondent further submitted that, as both the Example 5 of document (4) and the Example 15 of the patent in suit use the same language in respect to the content of active sulphur in the DDP acid, they must both relate to the same amount of active sulphur. He concluded that the lack of any information in Example 15 of the patent in suit - which on the other hand must refer to active sulphur containing DDP acid, if its technical relevance was to be acknowledged - was sufficient evidence that a skilled person would have understood that also the DDP acid of document (4) comprised active sulphur, even if this was not expressly stated.

3.1.7 This line of argument cannot discharge the Respondent's burden of proof either. According to the consistent case law of the Boards of Appeal the information available

from a document has to be established on the basis of its whole content (see T 666/89, No. 5 of the Reasons for the Decision, OJ EPO 1993, 495, 501 and the further decisions cited there). This means that it is not allowable to take a particular example out of context. Therefore, as the patent in suit is mainly concerned with the removal of active sulphur, the only technically reasonable meaning of e.g. Example 15 is, that the starting DDP acid contained active sulphur, even if its amount was not specified. By contrast, document (4) is silent on the presence of active sulphur, which simply means that it comprises no information at all as to this feature. The Respondent's interpretation of this document, which is solely based on the knowledge of the patent in suit, is therefore the result of a typical ex-post facto analysis, which is not allowable.

3.2 Claim 15

3.2.1 Document (2) discloses lubricating oil additives formed from the reaction of (a) an alkylphenol, (b) sulphur, (c) an alkaline earth metal, and (d) an olefin (column 1, lines 41 to 46). The olefin reacts with the active sulphur so that the product is essentially free of the latter (column 1, lines 50 to 53). These products were tested in a base oil composition. In particular a lubricating oil composition was tested, comprising 1.1% of a product obtained by heating a sulphurised alkylphenol with 10% by weight of a mixture of about equal portions of C₁₅-C₁₈ 1-olefins for 4 hours at 135°C in a base oil formulation comprising, inter alia, 18 mmols of a DDP acid zinc salt (the composition of test No. 18 in table II in columns 5 and 6; column 5, lines 16 to 21, in combination with column 5, lines 54 and 55, column 4, lines 43 to 50, and column 6, lines 9 to 11, and 18 to 23).

In the oral proceedings before the Board, the Respondent submitted that the ratio of olefin to DDP acid zinc salt in this lubricating oil composition fell within the range of this ratio valid for Claim 15 of the patent in suit. He concluded that the composition of Claim 15, which did not contain the lower limit for the active sulphur content of Claim 1, was therefore anticipated by document (2).

3.2.2 It is to be noted that according to document (2) the reaction of the active sulphur and the olefin does not take place in the presence of a DDP acid metal salt but that the latter is rather mixed with the reaction product of the olefin and the active sulphur comprised in sulphurised alkylphenols. Pointing to this difference, the Appellant contested that the product obtained according to the patent in suit and contained in the compositions of the present Claim 15 was the same as the mixture obtained according to and contained in the lubricating oils of citation (2). In the absence of any further evidence the Board finds that the Respondent, who has the burden of proof, did not sufficiently demonstrate that such difference was irrelevant and that the subject-matter of present Claim 15 was clearly and unambiguously disclosed in document (2), even if it would accept in the Respondent's favour, for the sake of argument, his submission that a skilled person would understand the expression "a zinc dithiophosphate" used there as having no other practical meaning than the different definition used for component A(I) in the patent in suit.

3.3 Hence, the Board concludes that neither document (4) anticipates Claim 1, nor document (2) anticipates Claim 15. The Board is also satisfied that none of the other citations on file discloses the subject-matter of

any of the Claims 1 to 17. As novelty was not disputed on the basis of those other documents, no detailed comments are required.

4. *Inventive step*

4.1 It is stated in the patent in suit that preparations of DDP acids obtained according to the state of the art from P_2S_5 and an alcohol or a phenol may often comprise unacceptably high levels of active sulphur causing staining or corroding of copper or similar materials. Furthermore, sulphurisation of olefinically unsaturated compounds at relatively low temperatures (at about 140°C) according to the state of the art, tended also to leave unacceptably high levels of active sulphur in the product, whereas sulphurisation at higher temperatures (about $150 - 180^\circ\text{C}$) often led to very dark to black products, which were commercially unacceptable for use in lubricants or in functional fluids (page 2, lines 14 to 24).

4.2 Thus, although the Board accepts in principle the Respondent's position that, according to the patent in suit, the twin technical problem underlying to the claimed invention was

- (i) to provide metal salts of phosphorus-containing acids, or of a mixture of such acids with carboxylic acids, with sufficiently low levels of active sulphur to avoid staining or corroding of copper or similar materials; and

(ii) to provide a process for sulphurising olefinic compounds at relatively low temperatures and relatively short reaction times, resulting in light coloured compositions, which would not stain or corrode copper or similar materials

(see page 2, lines 14 to 31), it wishes to state that the requirement of avoiding dark coloured products also existed in respect to part (i) of the above technical problem.

4.3 The only document before the Board relating to the reduction of active sulphur in accordance with part (i) of the above technical problem is citation (3) (see column 1, lines 35 to 38, and column 6, lines 55 to 66) which the Board, therefore, takes as the starting point for evaluating this aspect of the subject-matter of the patent in suit.

While there is no document in the proceedings referring to part (ii) of the technical problem, the Respondent, in the course of the oral proceedings, confirmed that the sulphurisation of olefinic compounds may lead to dark products. Thus, the Board is satisfied that the respective state of the art exists and that this part of the problem is realistically formulated in the patent in suit and may form the basis for evaluating inventive step.

4.4 The solution to the above technical problem consists according to Claim 1 in providing a composition made, in essence, by reacting particular metal salts of DDP acids, optionally in the presence of a carboxylic acid, with an olefinically unsaturated compound and more than 300 ppm of active sulphur under the reaction conditions

and the reactant ratios as set out in Claim 1, which yield compositions containing less than 300 ppm of active sulphur.

The Respondent submitted that Examples 4, 17, 30, and 36 disclose a "red-amber liquid", a "brown liquid", "a brown-reddish liquid", and "an opaque, tan, gel-like material", respectively, as the reaction products obtained in accordance with the process used to define the compositions of Claim 1. However, the Board cannot accept the Respondent's conclusion that this shows that part (ii) of the existing technical problem was in fact not solved. In the Board's judgement, these examples, while indicating that the products concerned may be coloured, are no evidence that such colours are not lighter than those of the products of conventional sulphur clean-up processes using higher temperatures.

Therefore, and in view of the Examples 5 to 8 (page 10, lines 21 to 45 of the patent in suit), the Board is satisfied that both of the above-mentioned problems are solved.

4.5 It has now to be investigated whether or not the cited state of the art suggested to a skilled person the solution of the above-defined technical problem in the manner indicated by the present claims.

4.5.1 Document (3) discloses that the active sulphur content of the reaction product of

- (a) a DDP acid with
- (b) a hexavelant molybdenum oxide compound and
- (c) hydrogen sulphide

may be reduced by including in the reaction mixture an olefinically unsaturated compound capable of reacting with active sulphur (column 1, line 55 to column 2, line 7, and column 6, line 62 to column 7, line 3).

The products obtained according to document (3) were said to be essentially free of "free sulfur" when having "less than 1.0 weight percent ... preferably less than 0.6 weight percent" of free sulphur (column 3, lines 21 to 24). Therefore, the tolerable active sulphur content aimed at according to this citation is much higher than that obtained according to the patent in suit.

Considering, furthermore, that molybdenum is the indispensable metal in the compositions disclosed in document (3) and that no quantitative data on their active sulphur content is available, the Board finds that this citation comprises no hint for the skilled person to the compositions of present Claim 1.

Moreover, since molybdenum compounds are dark coloured in any case, the problem of obtaining light coloured products did not arise there and, consequently, was not mentioned in this document.

- 4.5.2 The Respondent argued that it would, nevertheless, have been obvious for a skilled person to replace the molybdenum by other metals, e.g. those of present Claim 1. He relied in this connection upon documents (6) and (7) disclosing that the slow reaction of unsaturated polymers with sulphur may be accelerated by compounds such as zinc O,O-di-(n-butyl)-phosphorodithioate in the case of vulcanisation of EPDM (document (6), page 337, first paragraph, in combination with page 343, compound (36), and document (7), page 619, right hand column, last paragraph).

However, the Board finds it questionable whether a person skilled in the field of lubricants would have consulted publications in the field of synthetic rubber vulcanisation at all. Moreover, whereas document (6) discloses that a Zn salt of a DDP acid accelerates the

reaction of sulphur with EPDM, it is neither concerned with the reduction of the sulphur content to such a degree that copper is not stained nor with the colour of the products obtained. In view of this difference in the respective technical problem, the Board finds that a skilled person would not have combined the teachings of documents (3) and (6) with a view to solving the existing technical problem underlying to the patent in suit.

- 4.5.3 The Respondent further submitted that the present Claim 1 reads also on e.g. compositions containing 299 ppm of active sulphur which were prepared from a starting mixture comprising 301 ppm of active sulphur. Such a minute reduction of active sulphur would not require the presence of a DDP acid salt, nor would it be surprising in view of the common general knowledge that practically all chemical reactions known to proceed rapidly at elevated temperatures would also occur slowly at lower temperatures. Thus, not all embodiments falling within the scope of present Claim 1, would involve an inventive step.

This argument is not convincing, because it is based on a construction of the meaning of Claim 1 which, in the Board's judgement, is rather artificial. However, if a claim refers to interrelated ranges of concentrations, it cannot normally be construed as comprising all arbitrarily chosen combinations falling within such ranges but has to be construed in the light of the description (see e.g. T 14/83, No. 9 of the Reasons for the Decision, OJ EPO 1984, 105). The Board finds that on that basis it is clear to a skilled person, that what is claimed is not just a marginal reduction of the active sulphur content of DDP acid salts, but one in the order of about 50 to 100 fold (see Examples 5 to 8) in a technically reasonable reaction time - depending on the

reaction temperature. Thus, on its proper construction, the present Claim 1 does not comprise the allegedly obvious subject-matter. Hence, it is not necessary to investigate whether such subject-matter would in fact have been obvious in the light of the common general knowledge referred to.

4.5.4 As already explained, document (4) is not concerned with problems linked to active sulphur and, hence, contains no hint for the skilled person to the claimed solution. It could have amounted to an accidental anticipation only, as the Respondent conceded. It is not necessary, therefore, to deal further with this document in connection with the issue of inventive step.

4.5.5 In addition, the Respondent, relying on an experimental report of 11 March 1994, submitted that at a reaction temperature of 100°C (or below) no product was obtained meeting the requirements of Claim 1. The rating of the products obtained according to the experiments 3 and 4 - only these met the ratio set forth in the present Claim 1 for the components (A) and (B) - was 4A in the ASTM D130 test, which indicated (also in accordance with the Appellant's submission in the grounds of appeal; see the sentence bridging pages 5 and 6) an unacceptably high content of active sulphur of above 300 ppm (the patent in suit, page 9, lines 11 to 17). Therefore, so the Respondent argued, the subject-matter of Claim 1 comprised embodiments not solving the existing technical problem and, hence, not involving an inventive step.

The Board cannot accept this argument either. According to the uncontested submission of the Appellant, the olefin used in the Respondent's tests was highly branched and sterically hindered (first paragraph on page 2 of the Appellant's submission dated 13 January 1995). Taking into account that according to the

Examples 5 to 8 of the patent in suit the reaction time for alpha-olefins was three hours at temperatures of 110°C and 120°C, respectively, the Board finds that, under these circumstances, the reaction time of six hours chosen in the above experiments 3 and 4 for the reaction of a sterically hindered olefin at a lower reaction temperature was not sufficiently long.

According to common general knowledge the reaction velocity is normally enhanced by a factor of about 2 to 3, if the reaction temperature is increased by 10 degrees centigrade. From this rule of thumb a skilled person, when reading the Examples 5 to 8 of the patent in suit, would have concluded that a reaction temperature of 100°C required at least about two to three times the reaction time given in these examples for the reaction of alpha-olefines and, of course, still longer reaction times in the case of sterically hindered olefins. Therefore, the Board concludes, that the Respondent's experiments were not persuasive and cannot be a valid basis for attacking inventive step (T 741/91, not published in the OJ EPO, No. 4.5 of the Reasons for the Decision).

4.5.6 It follows from the above that neither document (3) nor any other document on file, either in isolation or in combination renders the subject-matter of Claim 1 obvious. The subject-matter of Claims 14, 15, 16, and 17 concerning an additive concentrate and a lubricant or functional fluid comprising a composition of Claim 1, respectively a process for making the compositions of Claim 1, define the same invention in different patent categories. Dependent Claims 2 to 13 relate to specific embodiments of this invention. Therefore, these claims are likewise allowable.

Auxiliary request

5. The Appellant's main request being allowable, it is not necessary to further consider his auxiliary request.
6. The Respondent did not submit any observations regarding the adapted description. Nevertheless, the Board considered this matter on its own motion and has found that the description as amended meets the requirements of the EPC. In particular the Board finds in the circumstances of this case that all examples contribute to illustrating the subject-matter of the patent in suit and, thus, should be maintained in the specification as a valuable source of information for the public, although the majority is silent on the active sulphur content of the starting material and/or of the resulting products as measured by IP-155.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent with the following documents:
Claims 1 to 17 (main request),
description pages 2 to 17,
both as submitted during oral proceedings.

The Registrar:


E. Görgmaier

The Chairman:


R. Spangenberg

