

Candidate's Answer Paper

RESPONSE

We refer to the communication issued in connection with this application. We herein file amendments to the claims, in triplicate. It is requested that the amended claims are substituted for the claims presently on file. A copy of the amended claims is enclosed herewith (see pages 9-11).

Amendments

Original claims 1 + 7 have been deleted
Original claim 2 (new claim 1) has been amended

- by (i) amending R to 6-16. Basis for this upper limit may be found on page 2 line 29 of the description
- (ii) specifying the degree of oxyalkylation. Basis for this amendment may be found at page 6 line 24.
- (iii) Specifying that the starting material may be present either as individual compounds or in the form of mixtures. Basis for this amendment may be found at page 2 lines 24-25 of the description.
- (iv) introducing the neutralisation step, discussed on page 5 lines 9-24, as an essential step of the process.

Original claims 3 to 6 now appear as claims 4 to 7.

New claim 2 has been introduced, specifying the preferred range of alkyl groups R as 10-14. Basis may be found at page 2 lines 29-32 of the description.

New claim 3 has been introduced specifying the preferred value for n. Basis for the amendment is at page 6 lines 24-25. New claims 9 and 10 specify the particular embodiment of example 4 (page 9)

As there is clear support for each amendment, A. 123 EPC is not violated.

As discussed below, the new claims define patentable subject-matter in accordance with A. 52 EPC and are thus allowable.

Novelty

To determine novelty, each prior art document must, as a general rule, be considered in isolation [T153/85]. Thus, to destroy the novelty of a claim, each feature must be present in a single prior art document.

Claim 1 is novel over document III since the compounds therein are produced by a first step of oxyalkylating and a second step of sulphonation. The compounds of the present invention can only be obtained by performing the sulphonation reaction first.

Claim 1 is novel over documents IV and II since there is no mention of an oxyalkylation stage in the products disclosed therein and there is no mention of the presence of an oxyalkylate group.

Claim 1 is novel over document V since the compounds therein have $R = C_{18-24}$. The present invention is

now limited to compounds wherein $R=C_6-C_{16}$ alkyl.

Claim 1 is novel over document I since the compounds do not contain a sulphonate group + there is no mention of a sulphonation reaction.

Claims 2 and 3 and 10 are both dependent on claim 1 and therefore also describe novel subject matter.

In accordance with the Guidelines (C-III; 3.7a) if a product claim is patentable, a claim to the use of that product and a claim to a process which results in that product are also patentable. Hence, claims 4-7 and 9 (use) and claim 8 (process) are also novel.

In addition, the novelty of the process claim is supported by decision T119/82: an (analogy) process is patentable in as far as the compound itself is new and inventive.

Inventive step

Inventive step has been considered using the problem + solution approach + by considering whether the skilled person would, rather than could, have reached the claimed solution on the basis of the closest prior art.

It is considered that document III is the closest prior art to claim 1. The principal difference between the compounds of the present invention and those of document III is that the compounds of the present invention are obtainable by a process in which the sulphonation is carried out before the oxyalkylation step. This is not disclosed or suggested by document III. The order of steps in document III is unambiguous, as is indicated by the sentence at page 2 line 14 of DIII: "... is then converted ... ". The technical problem to be overcome with respect to this prior art is the production of emulsifiers which have an increased stability in acid media. The present invention overcomes this problem by performing the sulphonation step first. It is evident from Example 3 that emulsifiers produced in this way do indeed have an increased stability in acid media. Hence, claim 1 is inventive over document III. It is noted that D-III mentions the problem of, but gives no solution to, acid instability (page 2 line 22).

In the event that the Examiner should wish to combine documents III and V for the purposes of alleging lack of inventive step of claim 1 (although it is noted that such objection has not been raised in the present Communication), it is submitted that such combination is also insufficient to destroy the inventive step of claim 1 for the following reasons.

Again, the closest prior art is considered as DIII. DV does envisage that the oxyalkylation step can be performed subsequently to the sulphonation step. Such a reaction is carried out on compounds of $R=C_{18-24}$ acryl. There is, however, no suggestion that compounds obtained in this way would be sufficient to increase the stability of the emulsifiers according to D-III in acid media. Indeed, if one were to adopt this teaching of D-V, one would not expect that the acid stability to be improved. In this regard, it should be noted that where the number of C atoms in the R group is 18, the acid stability is poor, as is evident from the tests performed on sample (g) in the second paragraph of example 3 of the present invention. (Sample (g) was obtained by a sulphonation-first type reaction). There is also no indication in D-V that compounds having fewer than 18 carbon atoms may be obtained by a sulphonation-first type process.

Hence, claim 1 is also inventive over D-V, when taken alone, in the event that the Examiner considered the document to be the closest prior art. The properties of compounds in which R has 16 or fewer carbon atoms lie in their stability in acid media; there is no indication in D-V that acid stability is a problem and therefore no disclosure or suggestion that going from R=18 carbon atoms to a compound having 16 or fewer carbon atoms would solve this problem. Reference is again made to the fact that C₁₈ compounds (eg sample (g)) made by a sulphonation-first type process are not stable in acid media (see example 3 of the present application).

In accordance, with the Guidelines at C-IV, 9.5a, claims 2 and 3 and 10, which are dependent on claim 1, are also considered as non-obvious.

In accordance with the Guidelines at C-III, 3.7a, claims 4 to 7 and 9 (use) and claim 8 (process) are considered as patentable since claim 1 is considered as patentable. The particular efficacy of the compound of claim 10 as a lubricant (claim 9) should be noted - see example 4. Therefore, no further examination of the obviousness or non-obviousness of claims 2-8 is necessary.

It is believed that the amended claims are novel over each prior art document and are inventive over the prior art documents taken alone or in combination. Reconsideration of this application is respectfully requested.

In the event of further objections, the applicant reserves the right to oral proceedings before issue of any negative decision. The description may be brought into conformity with the amended claims when the allowability of the claims is indicated.

Signed

Authorised Representative.

NB Further inventive step arguments

Claim 1 is also considered inventive over any of documents DI, DII, or DIV. None of them disclose that stability in acid media is a problem or that compounds having R=C₆ to C₁₆ and made by the sulphonation-first route are of particular advantage in this regard. Hence, even when taken in combination, there is no solution provided to address the problem addressed by the present invention. Indeed, the problem is not even recognised. Hence, claim 1 is inventive over these documents. For the reasons given above, the subsequent claims are also inventive.

It should be noted that the subject matter of claims 9 + 10 has the unexpected advantage of a particularly good emulsifying effect, thereby supporting its non-obviousness.

The Examiner's comments at paragraph 8 have been noted + overcome by the incorporation of these essential features in the claims.

1. An emulsifier obtainable by reacting para-alkyl phenol(s) having the formula $p\text{-R-C}_6\text{H}_4\text{-OH}$ where R is a linear C to 10C alkyl group, said para-alkyl phenol(s) being used individually or in the form of mixtures of such compounds having different alkyl groups, with sulphur trioxide (SO_3) in a form diluted with a carrier gas at a temperature of up to 135°C in an excess of 20 to 10 mol% in relation to the equimolar amount theoretically necessary to add one SO_3 molecule to each benzene ring, neutralising this sulphonated reaction product and then reacting the neutralised sulphonated product with at least one alkylene oxide of formula R^1O where $\text{R}^1 = \text{-CH}_2\text{-CHR}^2$ and $\text{R}^2 = \text{-H, -CH}_3$ or $\text{-C}_2\text{H}_5$ in a molar ratio of 2 to 10 at a temperature from 100 to 150°C , wherein the emulsifier has a degree of oxyalkylation $n = 1$ to 10
2. An emulsifier according to claim 1 wherein the average number of carbon atoms in the alkyl groups R is 10 to 14
3. An emulsifier according to claim 1 or 2 wherein the degree of oxyalkylation $n = 2$ to 4
4. Use of an emulsifier according to claim 1, 2 or 3 in enhanced mineral oil recovery
5. Use of an emulsifier according to claim 1, 2 or 3 in lubricants for the production of polymer fibres and yarn
6. Use of an emulsifier according to claim 1, 2 or 3 as a concrete additive
7. Use of an emulsifier according to claim 1, 2 or 3 in the emulsion or microsuspension polymerisation of ethylenically unsaturated monomers
8. A process for the preparation of an emulsifier as set out in claims 1, 2 or 3, said process being as described in claim 1.
9. Use of an emulsifier according to claim 1, obtained from a mixture of para-alkyl phenol(s) having an average number of carbon atoms of 12 wherein ethylene oxide is used as the alkylene oxide + wherein the average degree of oxyethylation $n = 4$, as a lubricant.
10. An emulsifier according to claim 1 or 2 or 3 wherein R and n are as defined in claim 9.