

Examiners' Report Paper B 2014 (Chemistry)

1. Introduction

The paper relates to a catalytic process for the hydrogenation of edible oils. The process converts the oil into a useful product with a higher melting point. This type of process is widely used in the food industry for example when making margarine. The application describes known hydrogenation processes, but states that these processes have the disadvantage that they produce too high a percentage of trans-isomers (45-65%). The application as filed proposed a process using a precious metal catalyst comprising a solid support with precious metal particles on the support to solve this problem.

1.1. The prior art

Two documents are cited against the application both of which are novelty-destroying for claim 1 of the application.

Document D1 discloses a process for the catalytic hydrogenation of oils using a catalyst comprising precious metal particles on a solid support. The average particle size of the precious metal particles in the catalyst is not disclosed in this document. The process described in this document is able to obtain a product with a low trans-isomer content of about 20 %, however, the reaction has to be performed at a low temperature (30-40°C) and a high pressure (150-200 bar) and also took a long time (3-4 hours) to complete. The document also mentions that polymers, including polyvinylpyrrolidone, were added to the catalyst in very low concentrations of 0.05 % by weight of the catalyst in reduced form in an attempt to improve the filterability. The polymer additions, however, had no effect on the filterability or on the reaction.

Document D2 discloses a process able to catalytically hydrogenate edible oils in order to obtain products of a desired melting point. The process described in this document uses a catalyst comprising a silica support and platinum nanoparticles with an average particle size of 2-8 nm. The process using this catalyst is able to hydrogenate fish oil to the desired product in a high yield and in a short time. The document mentions neither the content of trans-isomers in the final product nor that a further additive could be present in the catalyst.

In addition to the two documents cited, the application itself in paragraph [011] states that the catalyst used in the claimed process is known.

1.2. The communication

Novelty objections are raised by the examiner in the communication against claims 1, 4 and 5 on the basis of document D1, and against claims 1, 3 and 5 on the basis of document D2. In addition the subject-matter of claim 6 is held not to be inventive. Finally a clarity objection is raised against claim 2. This claim defines a preferred range of average pore sizes. The examiner objects to the term average pore size stating that there are various methods for measuring average pore sizes, which give different results. The examiner also notes that no method for measuring average pore sizes is disclosed in the application.

1.3. The letter from the applicant

The client proposes a set of claims addressing the objections raised by the examiner. In this set of claims, claim 1 is limited to a process using a catalyst containing both precious metal nanoparticles and a polymer. In addition, the client states that the metal particles have been limited to nanoparticles because larger particles give worse results. The client addresses the clarity objection by stating that the average pore size is measured by nitrogen adsorption using an internal standard method and proposes clarifying claim 2 by specifying that the average pore size is measured by nitrogen adsorption. The client in the letter also stresses that the hydrogenation of fish oils is a very important aspect that must be covered by the patent application.

Two of the amendments proposed by the client add subject-matter, contrary to Article 123(2) EPC. There is no basis in the application for the generic term "polymer" only for the specific polymers defined for example in original claim 3. The proposed amendment to claim 2 also adds subject-matter. There is no basis in the application for specifying that the average pore size is measured by nitrogen adsorption.

1.4. The expected solution

The solution to the paper that is expected is limiting the polymers in claim 1 to polymers containing a heterocyclic group. In addition it is necessary, as shown in paragraph [016] to specify a minimum concentration of the polymer of 0.1 wt.% based on the weight of the catalyst in reduced form. Claim 2 should be deleted as there is no way that this claim can be amended to make it clear without adding subject-matter. Claim 3 should be modified to make it consistent with claim 1 and the remaining claims need to be renumbered. An additional dependent claim directed to a process in which the polymer is polyvinylpyrrolidone is also useful, as this was the polymer with a heterocyclic group used in all the examples.

It is finally necessary to provide arguments demonstrating that the objections raised by the examiner have been overcome, providing a basis for all the amendments made and explaining why the subject-matter is both novel and inventive.

1.5 The marking scheme

The claims and the arguments are assessed separately. Therefore candidates who have provided very good arguments for the claims they have submitted can receive good marks for argumentation even if the claims receive few marks.

It is not possible to award negative marks in any section of the marking sheet. Therefore if more marks need to be deducted under a heading than there are marks available 0 marks are awarded.

No marks are available for formulating a letter to the client setting out the reasons why the client's suggested claims were further amended.

2. Expected claims

A suitable wording for the amended claims is as follows:

1. Process for the hydrogenation of edible oils in the presence of a precious metal catalyst and hydrogen, the catalyst comprising a solid support, precious metal nanoparticles on the support and a polymer containing a heterocyclic group having at least one heteroatom at a concentration of at least 0.1 wt.% based the weight of the catalyst in reduced form.
2. Process according to claim 1 in which the heteroatom is nitrogen.
3. Process according to claim 2 in which the polymer is polyvinylpyrrolidone.
4. Process according to claims 1-3, wherein the precious metal nanoparticles have a weight average particle size of 1 to 12 nm.
5. Process according to claims 1-4, wherein the edible oil is fish oil.
6. Process according to claims 1-4, wherein the edible oil is soy bean oil.

3. Claim Amendments

A total of 30 marks is available for the amended set of claims. No marks are available or are deducted for claims other than those listed above. Drafting a large number of additional claims is not expected.

3.1 The independent claim

The expected independent claim 1 is worth 22 marks.

The limitation of the polymer to polymers in which the heteroatom is nitrogen or in which the heterocyclic group is a side group each result in a deduction of 5 marks. If the polymer is limited to polyvinylpyrrolidone or if the minimum concentration of 0.1 wt.% is missing 10 marks are lost. Similarly 10 marks are deducted if the metal is limited to platinum.

It is not necessary to specify an upper limit for the polymer concentration and 4 marks are deducted if one is present. Paragraph [016] in the patent application indicates that an upper limit for the concentration is not essential.

5 marks are deducted if the claim is not limited to "nanoparticles". The client in the letter states that the use of nanoparticles is important and thus deleting this feature from the independent claim proposed by the client is considered to go arbitrarily against the instructions.

A claim which does not encompass a process of hydrogenating fish oil receives no marks (for example a claim limited to the use of soy bean oil). The client clearly states in the letter that the patent application must cover the hydrogenation of fish oil.

10 marks are deducted if the claim contains added subject-matter (for example if the polymer is not limited to polymers with heterocyclic groups, omitting the requirement that the nanoparticles are on the support or failing to specify that the weight percent of the polymer containing a heterocyclic group is based on the catalyst in reduced form).

Up to 5 marks can be deducted if the claim is unclear. 8 marks are deducted for any unnecessary limitation not listed above.

3.2 The dependent claims

Deleting claim 2 (the claim directed to the average pore sizes) is worth 3 marks. 1 mark is awarded if the original wording of the claim is maintained (the added subject-matter proposed by the applicant thus being deleted).

Adding the dependent claim to polyvinylpyrrolidone is worth 3 marks and the remaining 2 marks are reserved for retaining claims 3-6, amending claim 3 to make it consistent with the main claim and renumbering claims 4-6 if necessary.

4. Arguments

A total of 70 marks is available for the arguments. The arguments are assessed on the basis of the actual set of claims submitted. Thus, for example, if additional claims are formulated, a full basis needs to be provided for all the claims. If additional independent claims are submitted novelty and inventive step arguments for these claims are expected.

4.1. Basis for the amendments (12 marks)

A full basis has to be provided for all of the amendments. In order to obtain full marks it is necessary to identify all the amendments made in the set of claims to be filed as compared to the original set of claims. The basis needs to be provided irrespective of whether the amendment was proposed in the client's letter or is a further amendment to the set of claims proposed by the client. Amendments proposed by the client but not in the set of claims submitted should not be discussed.

In addition the passages in the original application which form the basis for the amendments need to be identified. If only a series of paragraph numbers are cited a maximum of 4 marks are awarded. No marks are available for referring to the client's letter or to the set of claims proposed by the client as the basis for the amendments.

Arguments need to be provided if features have been combined from different parts of the application. Similarly, if the wording used in the application is modified, if a feature is taken from an example or if features are deleted from a claim, detailed arguments will need to be provided in support of these amendments.

A set of arguments for claims which contain added subject-matter and therefore an incorrect argument for an amendment can be awarded a maximum of 6 marks. A maximum of 8 marks may be awarded for arguments with an incorrect basis (for example by referring to the wrong paragraph).

The arguments for the expected set of claims can be worded as follows:

Claim 1 has been amended by limiting the precious metal particles to precious metal nanoparticles. This amendment is based on original claim 1 as the use of precious metal nanoparticles was preferred in the original claim. In addition this claim has been amended to specify that the catalyst used comprises "a polymer, containing a heterocyclic group in an amount of at least 0.1 wt.% based the weight of the reduced catalyst".

The use of a polymer containing a heterocyclic group is based on original claim 3 (paragraph [010] may additionally be referred to).[It is not correct to only refer to paragraph [010] in support of the expected independent claim. In paragraph [010] the catalyst

“consists of” the polymer, the support and the metal particles. Original claim 3 is the only disclosure of a catalyst “comprising” these three components.] The minimum concentration of the polymer is defined in paragraph [016] of the description. The concentrations in this paragraph refer to polymers in general. It is, however, clear that the polymers are the ones referred to in paragraph [010] and thus that the features can be combined. Original claim 2 has been deleted. New claim 2 is based on previous claim 3 and corresponds to that part of original claim 3 (the preferred use of nitrogen as the heteroatom), that was not introduced into claim 1. Claim 3 is new and is directed to the use of the most preferred polymer polyvinylpyrrolidone, this claim is based on paragraph [015]. Claims 4 to 6 are unchanged.

4.2 Clarity (2 marks)

The letter needs to explain how the clarity objection raised in the communication has been overcome. The marks for the expected set of claims are awarded if it is stated that the clarity objection has been overcome by deleting the claim objected to.

4.3 Novelty (18 marks)

The novelty of the claims also has to be discussed. Marks are awarded for providing a complete technical analysis of the prior art, identifying all the differences between the prior art and the subject-matter of the claims filed as well as for arguing why the claims are novel.

6 marks are reserved for summarising the prior art documents D1 and D2. The summary should mention all the features of these documents that are relevant for the discussion of novelty and inventive step and could be worded as in paragraph 1.1 above. Arguing that the claimed subject-matter is novel with respect to document D1 is worth 8 marks. It is necessary to explain in these arguments that the particle size of the precious metal particles is not known in document D1 and therefore that the claimed use of precious metal nanoparticles is novel. The argument that although document D1 discloses the use of polyvinylpyrrolidone (a polymer containing a heterocyclic group) the polymer was only used at a concentration of 0.05 wt.% of the catalyst in reduced form and thus below the minimum concentration of 0.1 wt.% of the catalyst in reduced form specified in claim 1 was also expected. The arguments for novelty with respect to document D2 are worth up to 4 marks. It should be stressed that document D2 does not disclose a catalyst containing a polymer with a heterocyclic group.

If an additional independent claim is formulated (for example directed to the catalyst used or to the hydrogenated oil produced), then 10 of the available marks are reserved for discussing the novelty of this claim. The application in paragraph [011] indicates that the catalysts used are known. If such a claim is filed it is necessary to argue in light of this paragraph, why the catalyst is supposed to be novel. The hydrogenated oil produced appears to be the same as the oil produced in document D1 (the trans-isomer content and the melting point of the oil in document D1 are the same as those obtained in example 5). If the hydrogenated oil is claimed, arguments are expected as to why this oil is supposed to differ from the oil obtained in document D1.

4.4 Inventive step (38 marks)

The inventive step of the proposed set of claims has to be argued on the basis of the problem-solution approach.

The first step is to identify the closest state of the art (8 marks). Documents D1 and D2 both relate to the hydrogenation of edible oils and thus both need to be discussed. Document D1 however explicitly relates to the minimisation of trans-isomers in a hydrogenation process (the focus of the application as originally filed as is clear from paragraph [007]) and thus is the more plausible starting point for the skilled person. Candidates that identified document D2 as the closest prior art on the basis that the process disclosed in document D2 has more features in common with the claimed process than that of document D1 could obtain a maximum of 4 marks. The marks under this heading are awarded for providing reasons why the particular document is selected rather than the other one.

The difference or differences have then to be identified (2 marks), the technical effects associated with the differences and the evidence for the effects should be identified (10 marks) and the problem as well as the solution has to be defined (8 marks).

The disclosure of document D1 differs from that claimed in that precious metal nanoparticles and at least 0.1 wt.% of the catalyst in reduced form of a polymer with a heterocyclic group are present in the catalyst.

The application contains examples according to the invention (polymers in the required concentration were used in examples 1, 4, 5, 7 and 8) and examples 2, 3 and 6, which employed no polymer or less than 0.1 wt.% of the polymer. A comparison of these examples shows that the addition of at least 0.1 wt.% of polyvinylpyrrolidone to the catalyst has the effect of both reducing the time needed to obtain the product with the required melting point (increased activity) and reduces the amount of trans-isomers in the product. The application in paragraphs [013] and [016] can be cited as evidence that all precious metals and all polymers with heterocyclic groups should have a similar effect. The effect of using nanoparticles is not clearly demonstrated in the application, but according to the applicant also contributes to the results obtained.

The problem in view of document D1 can therefore be defined as providing a process for hydrogenating edible oils able to obtain a product with a desired melting point and a low level of trans-isomers in a short time (with a high activity). It is important that the problem defined mentions the melting point, the content of trans-isomers and the time needed to obtain this product as these results are interrelated.

The solution to the problem is to use a catalyst containing both precious metal nanoparticles and at least 0.1 wt.% of a polymer containing heterocyclic groups.

It is finally necessary to present arguments explaining why the claimed subject-matter is not obvious (10 marks). It is necessary to argue why the claimed subject-matter is not obvious either on the basis of document D1 alone or a combination of documents D1 and D2. It should be stressed that document D1 does not provide any reason to use nanoparticles and that although it mentions adding polyvinylpyrrolidone it states that this polymer has no effect on the reaction. The document therefore cannot provide any hint that the use of higher concentrations of this polymer would result in the significant improvements observed. In respect of a combination of documents D1 and D2 it can be argued that document D2 at most hints at a preference for using precious metal

nanoparticles when seeking to reduce the time needed to obtain a desired product. The document does not mention and cannot suggest the beneficial effects of the use of the polymer. It should therefore be concluded that the claimed subject-matter involves an inventive step.

If an additional independent claim is formulated (for example directed to the catalyst used or to the hydrogenated oil produced), then 8 of the available marks for inventive step are reserved for discussing this claim.

EXAMINATION COMMITTEE I

Candidate No. _____

Paper B (Chemistry) 2014 - Marking Sheet

Category		Maximum possible	Marks awarded	
Claims	Independent claim	22		
	Dependent claims	8		
Arguments	Amendments	12		
	Clarity	2		
	Novelty	18		
	Inventive Step	38		
Total		100		

Examination Committee I agrees on marks and recommends the following grade to the Examination Board:

PASS
(50-100)

COMPENSABLE FAIL
(45-49)

FAIL
(0-44)

24 June 2014

Chairman of Examination Committee I