Model Solution and Compendium-type Report for Paper A

Disclaimer:
This model solution has been adapted by **epi** to assist candidates who sat the Mock e-EQE. It was prepared before the Mock e-EQE to represent a possible answer of a successful candidate, and, where marks are indicated, does not reflect a marking scheme that would be applied by the relevant Examination Committee. As such, **epi** cannot be held accountable for any discrepancies between a marking scheme of an Examination Committee and the model solution.

Note: The epi Mock Paper A and report is based on Paper A(CHEM)2010

Introduction

Paper A was concerned with bioactive glass compositions that are very good for *in vivo* creation of bones, ie the generation of bone tissue in the body. The glass compositions described in the client´s letter can easily be formed into fibres in contrast to the compositions of the prior art. The advantage of using fibres is that their well-defined structure allows for very regular bone growth. This is in contrast to powders used in the prior art.

The client's letter describes that the good fibre formation is due to the presence of potassium oxide in certain, well-defined, amounts. The application further describes the prior art bioactive glass composition from which the present invention is a further development.

The fibres can be used as such, as bundles or woven into fabrics, like a net. The fibres can also be cut into small, regular particles. In this form they can be used as a coating to be applied to prostheses. Also dental implants can be coated with these particles. The particles can also be formed into a paste, that can be injected in places where bone growth is needed. This paste is obtained by mixing the fibres with a binder. A typical binder is a solution of a gelatine in water.

The letter also contains an indication that the client also would like to obtain protection for the product *per se* without any reference to the medical application or to bioactivity.

Two prior art documents are cited. The first document is a general background document about bioactive glass compositions. Also the gelatine-containing binder for making a paste is described in this document. The general prior art composition mentioned in the client's letter is the composition disclosed in this document.

The second document discloses the compositions of the examples. However, the document does not mention that this composition can be formed into fibres or suggest any uses for the glass. The document mentions that experiments around the specific compositions are being performed. The candidates were supposed to realise that the specific compositions were not novel.

The closest prior art to the invention is document D1. The technical problem solved by the invention vis-a-vis D1 is to improve absorbability of glass components and bone regeneration.

The challenge of this paper was to identify the subject-matter for a rather high number of independent claims. Another challenge was to correctly draft medical use claims.

Independent claims:

A total of 70 marks were available for the independent claims.

Candidates were expected to draft the following independent claim directed to the fibre, for which a maximum of 25 marks could be awarded.

1 *Glass fibre, the fibre having a diameter of less than 50 µm and comprising the following components:*
sand 40 – 55 wt.%
phosphorus oxide 4-8 wt.%
quicklime 10-40 wt%

sodium oxide up to 28 wt%
potassium oxide 2-9 wt.%.

The candidates were expected to define the composition starting from the prior art composition described in the client's letter. The invention is based on replacing sodium oxide from this standard glass with potassium oxide. There would also be no reason to conclude from the client's letter that the same result would be obtained by adding potassium oxide to any other bioactive glass composition. There is no indication that any composition having 2-9 wt.% potassium oxide would solve any problem. Definition of the fibres merely by the presence of 2-9 wt.% potassium oxide, without defining the other components of the bioactive glass composition, leads to a deduction of up to 12 marks.

Claim not defining an upper diameter of the fibres could be defended in view of the client's wish to also protect products outside the bioactive field. Such a claim could, therefore, attract full marks. Also claims with an upper limit of 50 µm obtain full marks.

Including a lower limit of 10 µm for the fibres was seen as an unnecessary limitation, since it is not presented as essential and it seems to be a constraint imposed by the use of specific machine for drawing fibres. Such limitation results in the deduction of 2 marks.

Drafting the claim to glass fibres as a product-by-process claim was not necessary in the present case. This lead to a deduction of up to 10 marks.

Defining the amount of sodium oxide to be up to 30 wt.% was not correct. It was clear from the paper that part of the sodium oxide was replaced by potassium oxide. Since this amount of potassium oxide was at least 2 wt%, the amount of sodium oxide needed to be changed to *up to 28 wt.%.* Omission of this amendment could lead to a deduction up to 5 marks.

Other definitions taking into account this change in the amount of sodium oxide are, of course, also awarded full marks. For example, the following definition was also acceptable: *sodium oxide and potassium oxide up to 30 wt.%, with potassium oxide in total 2-9 wt.%.*

It was not necessary to limit the claim to **bioactive** glass fibres. Even though this is only a slight limitation on the claim (it merely defines the suitability of the fibres for bioactive application), this was considered to go against the wishes of the client, since page 1, 2nd paragraph mentions that the client also wants his claims directed to non-bioactive applications. This could lead to a deduction of 2 marks.

Drafting a claim to the composition *per se*, in which the specific compositions of document 2 are excluded, is not appropriate. This formulation also excludes all examples presented in the client's letter, leading to a claim that was not awarded any marks.

Drafting the combination of a non-patentable composition claim with a claim to the fibres could only get 10 marks for the fibre claim.

Presenting a set of claims that does not fulfil the requirements of Rule 43(2) EPC cannot result in getting full marks.

***2** Fibre bundle, net or gauze consisting of the fibres according to claim 1.*

A total of 9 marks was available for this claim. When there were three separate claims, each of them directed to one product, the three claims were also awarded 9 marks in total, but If the claim(s) are not directed to all three products, each product missing led to a deduction of 3 marks. Drafting this claim as a use claim and not to the products *per se* results in loss of up to 5 marks.

3 *Powder obtainable by chopping the fibres of claim 1 into a length of 10-100 µm.*

A total of 5 marks was available for this claim, It was clear from the paper that the length of the fibres was a requirement of the powder. Candidates who did not define the length of the chopped fibres lost up to 3 marks. Both claims with upper and lower limit for the fibre length and only upper limit attracted full marks. A definition not using the product-by-process wording was also acceptable, e.g., defining the powder as having particles with diameter of up to 50 µm and length of 10-100 µm.

4 *Paste containing the powder of claim 3 and a binder.*

Up to 5 marks were available for this claim. It was not necessary to limit the claim to the specific gelatine binder, such limitation resulted in the loss of 3 marks.

5 *Medical prosthesis coated with a powder as defined in claim 3.*

A total of 10 marks were available for this claim.

6 *Process for making a prosthesis according to claim 5 comprising coating a paste as defined in claim 4 or plasma spraying a powder as defined in claim 3 onto a prosthesis.*

Up to 6 marks were available for this claim.

7 *Glass composition comprising the following components:*
sand 40 – 55 wt.%
phosphorus oxide 4-8 wt.%
quicklime 10-40 wt%
sodium oxide up to 28 wt%
potassium oxide 2-9 wt.%
for use in medicine.

A total of 5 marks were available for this first medical use claim. Candidates who directed their claim to the first medical use of the glass fibre lost 2 marks, as such claim excluded the glass composition in other forms. Furthermore, it is more appropriate to direct the claim to glass composition, as Article 54(4) EPC refers to „compounds or compositions“.

Claims directed to the method of using the fibre or to the use of the fibre or to the method of treatment were excluded from patentability under Article 53(c) EPC. Formulation according to Article 54(4) EPC was necessary. Other equivalent formulations, such as „for use in therapy“ are acceptable.

8 *Glass composition comprising the following components:*
sand 40 – 55 wt.%
phosphorus oxide 4-8 wt.%
quicklime 10-40 wt%
sodium oxide up to 28 wt%
potassium oxide 2-9 wt.%
for use in a method of regenerating bone tissue.

Wording according to Article 54(5) EPC was necessary. Considerations relevant to the previous claim are applicable also here.

A total of 5 marks were available for this claim.

The applicant's letter indicated that for financial reasons the applicant was not prepared to pay any claims fees. As usual, no more than 15 claims were therefore expected. No marks were awarded for claims 16 and higher.

Dependent claims:

A total of 15 marks were available for the dependent claims.

The candidates were also expected to draft a few useful dependent claims. The following dependent claims were considered to provide good fallback positions:

1. *Fibre according to claim 1 which also contains boron oxide in an amount of 2-7 wt.%. (4 marks available).*

2. *Paste according to claim 5 wherein the binder is gelatine dissolved in water at a concentration of 0.5 to 2.0 g/ml water. (4 marks available).*

3. *Paste according to claim 2 wherein the glass is used at a concentration of 0.5 to 1.5 g/g of the gelatine solution (2 marks available)*

4. *Medical prosthesis according to claim 6 wherein the prosthesis is a dental implant or a hip implant. (2 marks available)*

For further dependent claims which represent reasonable fall-back positions a total of 3 marks was available.

Description:

For the description a total of 15 marks were available. Candidates were expected to introduce a short summary of document 1 and document 2 and to draft the introductory portion of the description. It was especially important that the problem the application set out to solve was clearly formulated.

The description must not be presented as a communication to the EPO, by for example stating that *claim 1 is novel over document 1 because…* It is stressed that candidates are expected to draft the introductory portion of a description and candidates lose some marks if their description is not drafted in that way.

Model claims:

1. Glass fibre, the fibre having a diameter of less than 50 µm and comprising the following components:
sand 40 – 55 wt.%
phosphorus oxide 4-8 wt.%
quicklime 10-40 wt%
sodium oxide up to 28 wt%
potassium oxide 2-9 wt.%.

2. Fibre according to claim 1 which also contains boron oxide in an amount of 2-7 wt.%.

3. Fibre bundle, net or gauze consisting of the fibres according to claim 1.

4. Powder obtainable by chopping the fibres of claim 1 into a length of 10-100 µm.

5. Paste containing the powder of claim 4 and a binder.

6. Paste according to claim 5 wherein the binder is gelatine dissolved in water at a concentration of 0.5 to 2.0 g/ml water.

7. Paste according to claim 6 wherein the glass is used at a concentration of 0.5 to 1.5 g/l of the gelatine solution.

8. Medical prosthesis coated with a powder as defined in claim 4.

9. Medical prosthesis according to claim 8 wherein the prosthesis is a dental implant or hip implant.

10. Medical prosthesis according to claim 9 in which the dental implant is coated at its root only.

11. Medical prosthesis according to claims 8 or 9 in which the prosthesis is made of titanium, stainless steel or alumina.

12. Process for making a prosthesis according to claim 8 comprising coating a paste as defined in claim 5 or plasma spraying a powder as defined in claim 4 onto a prosthesis.

13. Glass composition comprising the following components:
sand 40 – 55 wt.%
phosphorus oxide 4-8 wt.%
quicklime 10-40 wt%
sodium oxide up to 28 wt%
potassium oxide 2-9 wt.%
for use in medicine.

14. Glass composition comprising the following components:
sand 40 – 55 wt.%
phosphorus oxide 4-8 wt.%
quicklime 10-40 wt%
sodium oxide up to 28 wt%
potassium oxide 2-9 wt.%
for use in a method of regenerating bone tissue.

Marking Summary:

Independent claims	Glass fibre	25
	Derived products	29
	Process	6
	Medical uses	10
Dependent claims		15
Description		15
Total		100