

Examiners' Report Paper A 2013 (Chemistry)

General considerations

The invention as described in the client's letter was concerned with artificial snow granules. They are made of specific superabsorbing polymers. The client's letter described the problems of availability of snow in ski resorts and also describes how a company in the neighbouring village is providing artificial snow on their slopes. A brochure, D1, provided by the client showed that indeed the village promises snow all winter due to the use of a new type of artificial snow. This brochure did not show any composition of the snow. The client wrote in his letter that analysis of the snow shows that there is no trace of silicon or fluorine in the artificial snow.

D2 is an article about superabsorbing polymers, methods of making them and their uses. The general superabsorbing polymers of the present application are disclosed in this document. The use as artificial snow is also mentioned.

The superabsorbing polymers described in the client's letter are homo- or copolymers of acrylic acid and methacrylic acid or salts thereof. These polymers were made using a reverse-phase polymerisation process. In order to achieve water-absorption possibilities, the polymer needed to be cross-linked. The amount of cross-linking agent had to be within the range of from 0.05 to 2% by weight. These polymers were identical to the polymers described in D2.

The granules described in the client's letter had to be treated with a fluorine-containing polymer and/or silicone oil. This treatment made sure the individual particles do not stick together. Furthermore, this treatment resulted in better gliding properties of the granules.

The superabsorbing polymers described in the client's letter must have a certain roundness. This is described by a known parameter called the sphericity coefficient. This sphericity coefficient must have a value of at least 0.8. From table 3 it was apparent that when the polymers have a sphericity coefficient below 0.8 the gliding properties (kinematic friction factor) are not good enough for making snow.

It was clear from the client's letter that the sphericity coefficient can be tailored by choosing the amount of cross-linking agent (see example 3). The person skilled in the art was able to determine the amount of cross-linking agent required for the obtention of the required sphericity coefficient by routine experimentation. Since the sphericity coefficient was a well-known parameter, the snow granule can be defined using this parameter.

Since the product could be defined by clear features, definition as a product-by-process claim was not appropriate. The granules had to be the granules that have not yet absorbed water, because that is the product to be sold. Further independent claims had to be directed to the method of making the granules, to a method of making snow and to snow granules. A use claim directed to the use of the granule for making snow was also a possible independent claim.

The client's letter provided many fallback positions for dependent claims. The best fallback positions were given in the example set of claims, below. Features known from the prior art were not good form fallback positions.

No marks were awarded for any claims subsequent to the 15th claim since the client stated that claim fees will not be paid.

The introduction of the description had to include a description of documents 1 and 2 and define the problem solved. Irrelevant matter had to be deleted.

1. Independent claims

The set of claims had to fulfil the requirements of Rule 43(2) EPC. If two independent claims for the same object were filed, only the worst claim received marks irrespective of the claim order. If, for example, there was a good product claim (worth 35 marks) and a product-by-process claim (worth 25 marks), only the product by process claim was awarded marks.

1.1. The main product claim could read as follows:

Granule comprising cross-linked superabsorbing polymer of a homo- or copolymer of acrylic acid and methacrylic acid or salts thereof, the polymer being cross-linked with linear alkane diols with 2 to 5 carbon atoms in an amount of 0.05 to 2% by weight, the polymer being coated with more than 0.1 % by weight based on the total amount superabsorbing polymer of a fluorine containing polymer and/or silicone oil and the granule having a sphericity coefficient of at least 0.8. **35 marks**

A total of 35 marks were available for this claim. 10 marks were lost if the claim was formulated as a product obtainable by a process. It was possible to formulate the claim as a claim to the product as such. It was important that the claim is directed to the granules that have not absorbed water, since this is the product that is sold. A claim to the granules containing water only received marks for artificial snow and not for the granule. A claim directed to a granule comprising any superabsorbing polymer lost 10 marks, because there is no support for such a claim. From paragraph [016] it was clear that other superabsorbing polymers are not compatible with the coating. The claim, therefore, had to be limited to polyacrylates/methacrylates. It was essential to specify the presence of cross-linking agent, its type and its amount. A claim requiring no cross-linking at all lost 10 marks. When the claim did not define the amount of cross-linking agent, 3 marks were lost. Also the type of cross-linking agent was essential, if this limitation was not present 3 marks were deducted. A claim to a granule that was not coated with a fluorine containing polymer or silicone oil lost 25 marks, since such a claim cannot be inventive over D2. The fluorine-containing polymer or silicone oil had to be used in an amount of more than 0.1 wt.% and 10 marks were lost if this limitation was not present. The upper limit was not essential. Claims with and without this limitation received the same marks. Claims limited to specific fluorine/silicone compounds lost 5 marks. It was clear from the paper that it is essential that the granules have a sphericity coefficient of at least 0.8 and 10 marks were lost if this limitation was not present. Claims limited to the particle size of 20 to 500 µm lost 5 marks. Even though the snow is not very good outside this range, it was still considered a reasonable product. Other unnecessary limitations lost 5 marks per limitation. Claims which were not novel were not awarded any marks.

1.2. The following method claim was expected:

Method for making a superabsorbing granule comprising the following steps

- (i) polymerisation of an aqueous solution of one or more monomers chosen from the group of acrylic acid, methacrylic acid or salts thereof in a reverse-phase suspension polymerisation in the presence of an aliphatic organic solvent and a water-soluble initiator in an amount of 0.1 to 2.0 wt.% based on the amount of monomer;
- (ii) cross-linking the polymer obtained in step (i) by using cross-linking agent of linear alkane diols with 2 to 5 carbon atoms in an amount of 0.05 to 2% by weight based on the amount of polymer, the amount of cross-linking agent being chosen in such a way as to obtain a sphericity coefficient of at least 0.8;
- (iii) coating the particles with at least 0.1% by weight based on the amount of polymer of a fluorine-containing polymer and/or silicone oil by coating the granules with an aliphatic hydrocarbon solution in which the fluorine-containing polymer and/or silicone oil is dissolved. **10 marks**

A total of 10 marks were available for this claim. Cross-linking, the amount of cross-linking agent and the type of cross-linking agent were all essential. Claims that did not define any cross-linking agent lost 6 marks. Claims in which the presence of a cross-linking agent was defined but which did not define the type or amount of cross-linking agent lost 2 marks for each missing feature. The sphericity coefficient needed also to be defined in the claim, since the reaction conditions do not automatically achieve that. 3 marks were lost if this was not defined. Any further non-necessary limitation resulted in the deduction of 2 marks as did the absence of an essential feature.

As an alternative to the above-mentioned process claim, a claim could also be drafted for a process for making the granules in which one starts from the granules, which are then coated. Such a claim also attracted 10 marks as long as the granule contained all the essential features. Only 10 marks were available for the two claims even if both claims are present. Only referring to coating the above-mentioned granule resulted in no marks being awarded, since then the already coated granule is coated which does not make technical sense.

1.3. The following claim is directed to the method of making snow.

Method of making artificial snow comprising contacting the granules of claim 1 with water until the granules have absorbed at least 5 times the weight of water based on the weight of the granule followed by refrigeration. **10 marks**

10 marks were available for this claim. A claim which did not specify the amount of water lost 7 marks. The absence of a refrigeration step led to a deduction of 5 marks.

1.4. Also a claim to artificial snow granules was expected:

Artificial snow comprising the granules as defined in claim 1 containing at least 5 times the weight of water based on the weight of the granule. **10 marks**

10 marks were available for this claim. A claim which did not specify the amount of water lost 7 marks. A claim drafted in the form of a product-by-process claim also received full marks.

1.5. Finally a use claim could be formulated.

Use of the granule of claim 1 for making artificial snow. **5 marks**

Another possible use claim is the following:

Use of fluorine-containing polymer/silicone oil for improving gliding properties of artificial snow.

Such a claim was worth 5 marks. Only a total of 5 marks was available for the use claims.

2. Dependent claims

The paper showed quite a few preferred embodiments that could form the basis for dependent claims. Dependent claims should be directed to features that provide additional advantages, they need to be defensible and hence features that were also present in the prior art documents did not attract any marks. Such dependent claims did not attract any marks. A total of 15 marks are available for dependent claims.

The following dependent claims attracted marks.

A very good fallback position was provided by the combination of fluorine compound and silicone compound. 5 marks were available for such a dependent claim.

2 marks were available for a dependent claim directed to the copolymer of acrylic acid and methacrylic acid or salts thereof.

2 marks were available for the particle size of 20 to 500 μm .

2 marks were available for the preferred sphericity coefficient of more than 0.9.

2 marks were available for the preferred fluorine-containing polymer.

2 marks were available for the preferred amount of fluorine-containing polymer.

2 marks were available for the preferred silicones.

2 marks were available for the preferred coolants when dependent on the method for making snow granules.

3. Description

15 marks are available for the description.

6 marks were available for summarising D1 and D2 and 5 marks for defining the problem. Finally 4 marks were available for deleting irrelevant matter and making the description into a real introduction of an application.

Example set of claims:

1. Granule comprising cross-linked superabsorbing polymer of a homo- or copolymer of acrylic acid and methacrylic acid or salts thereof, the polymer being crosslinked with linear alkane diols with 2 to 5 carbon atoms in an amount of 0.05 to 2% by weight, the polymer being coated with more than 0.1% by weight based on the total amount superabsorbing polymer of a fluorine-containing polymer and/or silicone oil and the granule having a sphericity coefficient of at least 0.8.
2. Granule according to claim 1 in which the polymer has been coated with a combination of fluorine-containing polymer and silicone oil.
3. Granule according to any of claims 1 or 2 in which the superabsorbing polymer is a copolymer of acrylic acid and methacrylic acid or salts thereof.
4. Granule according to any of claims 1 to 3 in which the granule has a sphericity coefficient of more than 0.9.
5. Granule according to any of claims 1 to 4 in which the fluorine- containing polymer is present in an amount of 0.5 to 3 wt.%.
6. Granule according to any of claims 1 to 5 in which the fluorine-containing polymer is an acrylic homo- or copolymer obtained from a fluoroalkyl(meth)acrylate in which the fluoroalkyl group has 3 fluorine atoms and 2 to 4 carbon atoms.
7. Granule according to any of claims 1 to 6 in which the silicone oil has a viscosity of 100 to 1000 mm²/s at 25°C.
8. Granule according to any of claims 1 to 7, in which the granule has an average particle size of 20 to 500 µm.
9. Method for making a superabsorbing granule comprising the following steps
 - (i) polymerisation of an aqueous solution of one or more monomers chosen from the group of acrylic acid, methacrylic acid or salts thereof in a reverse-phase suspension polymerisation in the presence of an aliphatic organic solvent and a water-soluble initiator in an amount of 0.1 to 2.0 wt.% based on the amount of monomer;
 - (ii) cross-linking the polymer obtained in step (i) by using cross-linking agent of linear alkane diols with 2 to 5 carbon atoms in an amount of 0.05 to 2% by weight based on the amount of polymer, the amount of cross-linking agent being chosen in such a way as to obtain a sphericity coefficient of at least 0.8;
 - (iii) coating the particles with more than 0.1% by weight based on the amount of polymer of a fluorine-containing polymer and/or silicone oil by coating the granules with an aliphatic hydrocarbon solution in which the fluorine compound and/or silicone is dissolved.

10. Method of making artificial snow comprising contacting the granules of any one of claims 1 to 8 with water until the granules have absorbed at least 5 times the weight of water based on the weight of the granule, followed by refrigeration.
11. Method according to claim 10 in which the granules are refrigerated in a liquid coolant, preferably as liquid nitrogen, liquid air or liquid carbon dioxide.
12. Artificial snow granules comprising the granules of according to any one of claims 1 to 8 containing at least 5 times the weight of water based on the weight of the granule.
13. Use of the granule of any one of claims 1 to 8 for making artificial snow.

EXAMINATION COMMITTEE I

Candidate No. _____

Paper A (Chemistry) 2013 - Marking Sheet

Category		Maximum possible	Marks awarded	
Independent claims	Granule	35		
	Process	10		
	Snow	10		
	Method snow	10		
	Use	5		
Dependent claims		15		
Description		15		
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)

27 June 2013

Chairman of Examination Committee I