

Candidate's Answer Paper
(Examination Paper B - Chemistry)

Reply to communication under Article 96(2) R91(2)

This is the reply to the above-mentioned communication relating to the patent application n^o

List of relevant prior art

Document I suggests the use as emulsifiers of esters obtained from polyglycerols having from 2 to 10 glycerol units, and fatty acids having a short chain-length (hexanoic and octanoic are exemplified).

Document II describes a calorie reduced and shelf-stable edible emulsion (a butter like spread with slightly foamed consistency) prepared using from 6 to 8% by weight of polyglycerol fatty acid ester or esters.

Document III describes a shaving foam prepared by foaming polyglycerol fatty acid esters (in particular triglycerol monostearate) in an aqueous phase together with other ingredients such as water insoluble powders, perfumes and preservatives. The esters are employed in an amount of from 1.5 to 7.5%, preferably from 2.5 to 5% based on the total weight.

Document IV describes an edible emulsion suitable for preparing spreads delivered from a pressurized dispenser.

As emulsifiers, polyglycerol esters of fatty acids, in particular triglycerol mono and diesters of stearic (C18), palmitic (C16) and arachidic acid (C20) were described, as well as esters of these acids with tetra-, hexa- and deca-glycerol. The emulsifier is used in an amount of from 4 to 9% and 5% by weight is disclosed in the example.

The emulsion expelled from the aerosol container has a whipped butter consistency and retains a slightly foamed texture for an extended period.

Document V describes the conversion of polyols with fatty acids in presence of short chain soaps and caustic soda solution. Glycerol and soybean are especially mentioned.

Having regard the above-mentioned prior art and the objection of the Examiner in his communication, a new set of claims is hereinbelow proposed.

Claims

1. A process for the preparation of fatty acid esters by reacting a polyglycerol having from 3 to 10 glycerol units linked to each other by ether groups in a polyglycerol chain with a straight-chain fatty acid having from 12 to 26 carbon atoms being in the liquid state at the reaction temperature, in the presence of a fatty acid soap comprising at least 8% by weight of the total amount of the fatty acids bound to the soap, of fatty acids having a chain length lower than 15 carbon atoms, and a catalyst, wherein the molar ratio of

soap to polyglycerol is between 0.1:1 and 2.5:1, and the molar ratio of to polyol is between 10:1 to 20:1.

2. The process according to claim 1, characterised in that the molar ratio of soap to polyglycerol is 1.6:1.
3. The process according to claim 1, characterised in that the reaction temperature is in the range of from 100° to 180°C.
4. A process for converting a polyglycerol ester having from 3 to 10 glycerol units linked to each other by ether groups in a polyglycerol chain, one or more of the hydroxyl groups in the said chain being esterified with saturated or unsaturated straight-chain fatty acid residues each having 12 to 26 carbon atoms into a finely divided form, characterised in that the ester in molten form is passed through a spray dryer into cold air in such a way that, on emerging from the spray nozzle, the material solidifies into fine particles, the air temperature being lower than 30°C.
5. A fully expanded foam composition comprising a polyglycerol ester having from 3 to 10 glycerol units linked to each other by ether groups in a polyglycerol chain, one or more of the hydroxyl groups in said chain being esterified with saturated or unsaturated straight chain fatty acid residues having 12 to 26 carbon atoms in an amount of from 0.3 to 5% by weight of total composition, a hydrophilic vegetable gum in an amount of from 0.2 to 3.5% by weight and a conventional edible additive.
6. An ice-cream substitute composition comprising the polyglycerol ester as described in claim 5, a hydrophilic vegetable gum, a bodying agent and other non aqueous ingredients, characterised in that the polyglycerol ester is present in an amount of from 0.5 to 1%, the hydrophilic vegetable gum is present in an amount of from 0.2 to 0.5%, the bodying agent is present in an amount lower than 45% and the other non aqueous ingredients are present in an amount lower than 55%, all percentages being by weight of the total composition.
7. The ice-cream substitute composition according to claim 6 characterised in that said polyglycerol ester is selected in the group of triglycerol mono-stearate and hexaglycerol distearate.
8. A process to obtain the fully expanded foam composition of claim 5, characterised in that the hydrophilic vegetable gum is added to the foam composition after that all other ingredients have been mixed and whipped to achieve the maximum expansion value.

Basis for new set of claims

- Claim 1: Basis for this claim can be found in old claims 2 and 3 and in the description page 3 lines 25-28, and page 3 lines 33-34 as well as in example 1.
- Claim 2: Basis can be found on page 3, line 34 to page 4 line 2 of the description as well as in example 1 (120:75 = 1.6:1).
- Claim 3: Basis can be found on page 4 lines 9-11 of the description.
- Claim 4: Basis can be found in old claim 4 together with old claim 1 (to which

old claim 4 depended) and in the description page 4 lines 26-31.

Claim 5: Basis can be found in example 3 as well as on page 5 until to page 6 line 5.

Claim 6: Basis can be found in example 2 as well as on page 6 lines 6-24.

Claim 7: Basis can be found in example 2 lines 1 and 21-24.

Claim 8: Example 3, page 9, lines 1-4. Description, page 5 line 32 to page 6 line 5.

Arguments

The Examiner is right in stating that polyglycerol esters as claimed in claim 1 were already known in view of Documents III and IV, as well as Document V anticipates the broad claim 2.

Claim 1: This claim refers to old claim 3 to which no objections to novelty were raised.

In order to satisfy the requirements of Art. 84 raised by the examiner on point 8 of its letter, I have inserted the proportion of fatty acids with chain length lower than 15 carbon atoms and the soap/polyglycerol molar ratio. The new claim 1 must be then also considered inventive in view of the limitation inserted. Starting from document V which is clearly the closest prior art a man skilled in the art can derive the further problem of increasing the yield of the process. The solution to this problem was related to the specific ratio of soap to polyol (molar ratio) as clearly disclosed in line 32 of page 3 to line 3 of page 4. No mention of this problem can be found in document V and the solution is clearly inventive (problem-solution approach).

Claim 2: The specific molar ratio claimed in this claim is defined as the optimum for obtaining an almost complete conversion (see example 1 lines 23-25). The same arguments of claim 1 apply.

Claim 3: This claim is based on a previous novel and inventive claim and, accordingly is as such novel and inventive.

Claim 4: No objections were raised on this claim as far as novelty and inventive step were concerned. Being old claim 4 dependent on old claim 1 I had to insert the definition of the polyglycerol ester in order to not contravene Art. 123(2).
The temperature of the cold air has been added in order to overcome the Examiner objection of point 8 of his letter.

Claim 5: Novelty
None of documents I to V described a fully expanded foam composition (also named topping) comprising the claimed compounds in the claimed amounts.

Inventive step

According to the problem-solution approach the closest prior art can be considered document III as far as the amount of esters is concerned, or document IV as far as the kind of emulsion is considered.

In any case, when we consider the problem of stability of a fully expanded foam composition as mentioned on page 5, lines 28-30, both these documents are silent. The problem overcome by the claimed composition is to obtain a stable cream topping, being fully expanded till to a 5 to 6 fold expansion value (see example 3, page 9, lines 1-6).

Claim 6: Novelty

None of documents I to V describes the ice-cream substitute composition comprising the claimed compounds in the claimed amounts.

Inventive step

Starting from the closest prior art, which in this case is document IV, there are several problems that are solved by the claimed composition, which arise when an ice-cream substitute is prepared according to the teaching of document IV.

In particular for frozen desserts a liquid melt is desired and an excess of stabilizer can prevent this (as stated on page 6, lines 20-22) leading to the formation of a stiff, pudding like melt (melt resistance). This problem has been solved by limiting the content of stabilizer (the hydrophilic vegetable gum) (see page 6 lines 17-24). Another problem relates to the difficulty to find out the right proportions of bodying agents and other non aqueous ingredients as well as to understand that the proportions of emulsifier must be lowered well below the lower limit described in the prior art (see page 6, lines 6-12).

The solution to this problem is neither suggested nor disclosed in any documents of the prior art. The lower limit suggested by document III for the emulsifier is 1.5%, still 50% higher than the higher limit proposed in the present claim. No mention of the melt resistance problem is present in any document of prior art. Accordingly, Claim 6 is also inventive.

Claim 7: This claim is based on a novel and inventive claim. Accordingly, this claim is per se novel and inventive. The insertion of this claim has the goal to specifically protect the two best results obtained with the claimed emulsifiers, as described in example 2.

Claim 8: An approach similar to that of claim 5 to which this claim depends, clearly shows the novelty and inventive step of this claim.

Note to the examiner

A divisional application could be filed having as main claim the following:

A process for the preparation of fatty acid esters by reacting a polyol having at least 3 hydroxyl groups with an ester of a straight-chain fatty acid being in the liquid state at the reaction temperature in the presence of a fatty acid soap comprising at least 8% by weight of the total amount of the fatty acids bound to the soap, of fatty acids having a chain length lower than 15 carbon atoms, and a catalyst, wherein the molar ratio of soap to polyol is between 0.1:1 and 2.5:1 and the molar ratio of ester to polyol is between 10:1 to 20:1.

Novelty and inventive step of this claim has been already discussed for claim 1 of the parent application.