Claims

1. A process for preparing fatty acid esters and/or fatty acid ester mixtures of short-chain monohydric alcohols having 1 to 5 carbon atoms, comprising

   (a) the transesterification of fatty acid glycerides with short-chain monohydric alcohols having 1 to 5 carbon atoms in the presence of at least one basic catalyst to form a reaction mixture which comprises the fatty acid ester and/or the fatty acid ester mixture, and

   (b) the treatment of at least a portion of the reaction mixture formed in the transesterification in step (a) with methanesulfonic acid.

2. The process according to claim 1, wherein, in step (a), on completion of transesterification and before performance of step (b), the residence time of the reaction mixture is selected such that a phase separation into a fatty acid ester phase and a glycerol phase takes place.

3. The process according to claim 1 or 2, wherein the transesterification in step (a) is performed in more than one stage.

4. The process according to claim 3, wherein the transesterification in step (a) is performed in two stages.

5. The process according to claim 4, wherein 60% to 90% of the total amount of alcohol and catalyst used is used in the first stage, and 10% to 40% of the total amount of alcohol and catalyst used is used in the second stage.

6. The process according to any one of claims 1 to 5, wherein the fatty acid glycerides used are naturally occurring vegetable and animal fats and oils selected from soybean oil, palm oil, palm kernel oil, coconut oil, sunflower oil, rapeseed oil, linseed oil, castor oil, peanut oil, olive oil, evening primrose oil and carob seed oil, and mixtures thereof.

7. The process according to any one of claims 1 to 6, wherein the short-chain monohydric alcohol used is methanol or ethanol.

8. The process according to any one of claims 1 to 7, wherein the basic catalysts used are basic alkali metal or alkaline earth metal compounds selected from sodium hydroxide, potassium hydroxide, sodium and potassium alkoxides of the short-chain monohydric alcohols having 1 to 5 carbon atoms or mixtures thereof.

9. The process according to any one of claims 1 to 8, wherein the basic catalyst is used in an amount of 0.5 to 5% by weight, based on the mass of the fatty acid glyceride used.

10. The process according to any one of claims 1 to 9, wherein the amount of methanesulfonic acid in step (b) is such that it is at least equivalent to the amounts of basic catalyst used in step (a).

11. The process according to any one of claims 2 to 10, wherein, on completion of transesterification in step (a), the fatty acid ester phase is formed, removed and treated with methanesulfonic acid in step (b).

12. The process according to any one of claims 1 to 11, wherein the methanesulfonic acid is used in the form of a 50 to 99% aqueous acid for the treatment in step (b).

13. The process according to any one of claims 1 to 12, wherein performance of process step (b) is preceded by removal of the excess alcohol from step (a).

14. The process according to any one of claims 1 to 13, which is performed as a continuous process.

15. The use of methanesulfonic acid in the preparation of fatty acid alkyl esters or mixtures thereof using basic catalysts in the transesterification of fatty acid glycerides.

Claims

1. A process for preparing a fatty acid ester of a short-chain monohydric alcohol having 1 to 5 carbon atoms, comprising:

(a) transesterifying a fatty acid glyceride with a short-chain monohydric alcohol having 1 to 5 carbon atoms in the presence of at least one basic catalyst to form a reaction mixture which comprises the fatty acid ester of a short-chain monohydric alcohol having 1 to 5 carbon atoms; and

(b) treating at least a portion of the reaction mixture formed in the transesterifying (a) with methanesulfonic acid.

2. The process of claim **1**, wherein, in (a), on completion of transesterification and before performance of the treating (b), a residence time of the reaction mixture is such that a phase separation into a fatty acid ester phase and a glycerol phase takes place.

3. The process of claim **1**, wherein the transesterifying in (a) is performed in more than one stage.

4. The process of claim **3**, wherein the transesterifying in (a) is performed in two stages.

5. The process of claim **4**, wherein 60% to 90% of a total amount of alcohol and catalyst employed is employed in the first stage, and 10% to 40% of the total amount of alcohol and catalyst employed is employed in the second stage.

6. The process of claim **1**, wherein the fatty acid glyceride is at least one naturally occurring vegetable fat, vegetable oil, animal fat, or animal oil selected from the group consisting of soybean oil, palm oil, palm kernel oil, coconut oil, sunflower oil, rapeseed oil, linseed oil, castor oil, peanut oil, olive oil, evening primrose oil, and carob seed oil.

7. The process of claim **1**, wherein the short-chain monohydric alcohol is methanol or ethanol.

8. The process of claim **1**. wherein the basic catalyst is at least one basic alkali metal or alkaline earth metal compound selected from the group consisting of sodium hydroxide, potassium hydroxide, a sodium alkoxide of the short-chain monohydric alcohol having 1 to 5 carbon atoms, and a potassium alkoxide of the short-chain monohydric alcohol having 1 to 5 carbon atoms.

9. The process of claim **1**, wherein the basic catalyst is employed in an amount of 0.5 to 5% by weight, based on a mass of the fatty acid glyceride present.

10. The process of claim **1**, wherein an amount of the methanesulfonic acid in (b) is such that it is at least equivalent to an amount of the basic catalyst in the transesterifying (a).

11. The process of claim **2**, wherein, on completion of the transesterifying in (a), the fatty acid ester phase is formed, removed, and treated with the methanesulfonic acid in (b).

12. The process of claim **1**, wherein the methanesulfonic acid is employed in the form of a 50 to 99% aqueous acid for the treating in (b).

13. The process of claim 1, wherein performance of process the treating (b) is preceded by removal of excess alcohol from the transesterifying (a).

14. The process of claim **1**, which is performed as a continuous process.

15. The process of claim **2**, wherein the transesterifying in (a) is performed in more than one stage.

16. The process of claim **15**, wherein the transesterifying in (a) is performed in two stages.

17. The process of claim **16**, wherein 60% to 90% of a total amount of alcohol and catalyst employed is employed in the first stage, and 10% to 40% of the total amount of alcohol and catalyst employed is employed in the second stage.

18. The process of claim **2**, wherein the fatty acid glyceride is at least one naturally occurring vegetable fat, vegetable oil, animal fat, or animal oil selected from the group consisting of soybean oil, palm oil, palm kernel oil, coconut oil, sunflower oil, rapeseed oil, linseed oil, castor oil, peanut oil, olive oil, evening primrose oil. and carob seed oil.

19. The process of claim **2**, wherein the short-chain monohydric alcohol is methanol or ethanol.

20. The process of claim 1, wherein the short-chain monohydric alcohol is methanol, the basic catalyst is potassium methoxide or sodium methoxide, and the methanesulfonic acid is in the form of a 50 to 99% aqueous solution.