liquid phase process for the direct hydrolysis of a fatty acid ester to the corresponding fatty acid and alcohol in the presence of a catalyst, wherein the fatty acid in the liquid phase is contacted with steam in the presence of a compound of a metal that is capable of forming a soap with a large hydration shell as a catalyst.

In the EP Patent 0 675 867 B1 of The Procter & Gamble Company, it is disclosed a process of preparing fatty acids from preferably methyl esters via acid-catalyzed hydrolysis by using specific ratios of water/-ester/acid catalyst (surface active) to form a single phase reaction mixture wherein the initial stoichiometric ratio of water to ester is at least 1:1 , and wherein the initial molar ratio of any residual amount of carboxylic acid to ester is less than 1:1, preferably less than 0,5:1 especially when said carboxylic acid contains less than 6 carbon atoms.

WO 2018/007022 discloses a conversion process by hydrolysis of FAME (fatty acids methyl esters) and water which allows to obtain fatty acids and byproducts as alcohol (mainly methanol). A portion of the free fatty acids already produced is recycled back into the reaction mixture, which results in self-acceleration of the hydrolysis reaction.

In view of the above, it is evident the need for a method and a process to produce fatty acids from methyl esters, in a simple and economic way, in autocatalytic conditions, without the addition of catalyst.

5

Summary of the invention

As previously stated, the hydrolysis reaction is an equilibrium reaction, therefore in order to shift the conversion in favor of the products it is necessary to

10. The autocatalytic process according to any one of preceding claims where the temperatures of phases after the separation reaction have been selected in the range 50-150°C, better 80-110°C.

11. The autocatalytic process according to any one of preceding claim where the hydrolysis reaction pressures have been selected in the range 10-100 Bar.g, better 40-60 Bar.g.

12. The autocatalytic process according to any one of preceding claims where the distillation pressures of produced fatty acids have been selected in the range 0-2000 mBar.a, better 50-400 mBar.a.

13. The autocatalytic process according to claim 1 where the light cut obtained by distillation, being a mixture of not reacted C8-10 methyl-esters, is recycled to the reaction steps.

14. The autocatalytic process according to any one of the previous claims where the achieved purity of C8-10 Fatty acids is higher than 99% w/w, better higher than 99.5% w/w.

15. The use of an apparatus as defined for the process according to claims 1-14 for producing fatty acids from fatty acids methyl esters with an overall conversion higher than 90% characterized in that it comprises a plurality of hydrolysis reactors in series to carry out the hydrolysis of fatty acids methyl esters auto catalytically, in purely thermal conditions, wherein each hydrolysis reactor is

immediately followed by a Liquid vapor separators in order to separate, after each hydrolysis reaction step, aqueous phase, that is discharged, and organic phase, that is fed as reactant in the subsequent hydrolysis reactor, to increase the amount of fatty acids in the solution.

16. The use of the apparatus for producing fatty acids from fatty acids methyl esters with an overall conversion higher than 90% according to claim 15, characterized in that it further comprises a distillation column to carry out a liquid/liquid separation of organic phase coming out from the last separator.

17. The use of the apparatus for producing fatty acids from fatty acids methyl esters according to claim 16 wherein the distillation column is under vacuum at a total pressure in the range 0-0.5 bar.

18. The use of the apparatus for producing fatty acids from fatty acids methyl esters according to claim 16 wherein the distillation column is under vacuum at a total pressure of 0,02 bar.

19. The use of the apparatus of any one of claims 15-16 characterized in that the hydrolysis reaction process units are integrated with at least a methanol rectification column to produce pure methanol and recover the excess of water to be recirculated back to the reaction units.

20. The use of the apparatus of any one of claims 15-19 comprising means to select the hydrolysis reaction temperature and the separation temperature.

21. The use of the apparatus of any one of claims 15-19 wherein the hydrolysis reactor is a sealed high pressure stainless steel reactor.