In sum, an improved process for making N-acyl amino acid salts is needed. In particular, the industry needs a process that avoids salt generation and the selectivity issues of other known routes. Preferably, the process would give a reduced proportion of di- and tripeptide by-products and would avoid the need to remove a process solvent. An ideal process would overcome the particular difficulties that complicate the preparation of N-acyl glycinates from fatty alkyl esters.

SUMMARY OF THE INVENTION

The ~~invention~~ present disclosure relates to improved processes for making an N-acyl amino acid salt from a fatty alkyl ester or a polyol ester. Each process uses at least one polyol selected from glycerin and propylene glycol in an amount effective to keep the reaction mixture fluid until conversion to the N-acyl amino acid salt reaches the desired level of completion.

In an aspect, o~~O~~ne process is provided, comprisinges reacting a fatty alkyl ester with an amino acid salt in the presence of glycerin or propylene glycol to produce an N-acyl amino acid salt and a C_1-C_4 alkanol. The alkanol is removed from the reaction mixture as it forms and the polyol is used in an amount effective to keep the reaction mixture fluid until conversion to the N-acyl amino acid salt reaches the desired level of completion. Another process comprises reacting a polyol ester selected from mono-, di- or triglycerides or fatty mono- or diesters of propylene glycol with the amino acid salt in the presence of added glycerin or propylene glycol to produce the N-acyl amino acid salt. In another aspect, there is provided a process which process which comprises reacting a polyol ester selected from mono-, di- or triglycerides or fatty mono- or diesters of propylene glycol with an amino acid salt in the presence of an added polyol selected from the group consisting of glycerin and propylene glycol to produce an N-acyl amino acid salt, wherein the polyol is added in an amount effective to keep the reaction mixture fluid until conversion to the N-acyl amino acid salt reaches the desired level of completion. In yet another aspect, there is provided a process which comprises reacting a fatty alkyl ester, a mono-, di- or triglyceride, or a fatty mono- or diester of propylene glycol with an amino acid salt in the presence of a polyol selected from the group consisting of glycerin and propylene glycol to produce an N-acyl amino acid salt

and optionally a C_1-C_4 alkanol, wherein any alkanol is removed from the reaction mixture as it forms, the polyol is used in an amount effective to keep the reaction mixture fluid until conversion to the N-acyl amino acid salt reaches the desired level of completion, and water is added to the reaction mixture when conversion of the amino acid salt to the N-acyl amino acid salt is in the range of 50 to 90 mole %.

We surprisingly found that an effective amount of glycerin or propylene glycol in the process minimizes or eliminates reaction mixture solidification or foaming at the reaction temperature, reduces color, and minimizes the level of di- and tripeptide by-products. Because the propylene glycol or glycerin can be left in the reaction product for some end uses, particularly personal care applications, the process obviates the need to remove and recover a process solvent.

In a related process, water is added to the reaction mixture when conversion of the amino acid salt to the N-acyl amino acid salt is in the range of 50 to 90 mole %. Water addition improves processability, unexpectedly advances conversion without producing excessive soap, and helps to ensure that the N-acyl amino acid salt will have low color and a small proportion of di- and tripeptide by-products.

13. The process of claim **1** wherein the reaction mixture has a final viscosity less than 10,000 cP at the reaction temperature.

~~14. An N-acyl amino acid salt made by the process of claim 1.~~

~~15. The N-acyl amino acid salt of claim 14 comprising less than 10 mole % of di- and tri-acylated by-products.~~

~~16. An N-acyl amino acid salt made by the process of claim 11.~~

~~17. The N-acyl amino acid salt of claim 16 comprising less than 10 mole % of di- and tri-acylated by-products.~~

~~18~~14. A process which comprises reacting a polyol ester selected from mono-, di- or triglycerides or fatty mono- or diesters of propylene glycol with an amino acid salt in the presence of an added polyol selected from the group consisting of glycerin and propylene glycol to produce an N-acyl amino acid salt, wherein the polyol is added in an amount effective to keep the reaction mixture fluid until conversion to the N-acyl amino acid salt reaches the desired level of completion.

~~19~~15. The process of claim ~~18~~ 14 wherein the triglyceride is isolated or prepared from a natural oil.

~~20~~16. The process of claim ~~18~~ 14 wherein the amino acid salt is an alkali metal salt of an amino acid selected from the group consisting of glycine, sarcosine, β-alanine, alanine, glutamic acid, and aspartic acid.

~~21~~17. The process of claim ~~18~~ 14 wherein the amino acid salt is an alkali metal salt of glycine.

~~22~~18. The process of claim ~~18~~ 14 wherein the reaction is performed in the presence of an alkaline catalyst.

~~23~~19. The process of claim ~~18~~ 14 wherein the reaction is performed at a temperature within the range of 100°C to 200°C.

~~24~~20. The process of claim ~~18~~ 14 wherein the polyol is used in an amount effective to keep the melting point of the reaction mixture at least 10°C below that of the reaction temperature at a conversion of amino acid salt to N-acyl amino acid salt greater than 70 mole %.

~~25~~21. The process of claim ~~18~~ 14 wherein the reaction is performed in the presence of a fatty alkyl ester.

~~26~~22. The process of claim ~~18~~ 14 wherein the reaction product comprises a mixture of the N-acyl amino acid salt and at least one monoglyceride.

~~27~~23. The process of claim ~~18~~ 14 wherein water is added to the reaction mixture when conversion of the amino acid salt to the N-acyl amino acid salt is in the range of 50 to 90 mole %.

~~28~~24. The process of claim ~~18~~ 15 wherein conversion of acyl groups of the polyol ester to the N-acyl amino acid salt is within the range of 30 mole % to 90 mole %.

~~29~~25. The process of claim ~~18~~ 14 wherein the reaction mixture has a final viscosity less than 10,000 cP at the reaction temperature.

~~30. An N-acyl amino acid salt made by the process of claim 18.~~

~~31. The N-acyl amino acid salt of claim 30 comprising less than 10 mole % of di- and tri-acylated by-products.~~

~~32~~26. A process which comprises reacting a fatty alkyl ester, a mono-, di- or triglyceride, or a fatty mono- or diester of propylene glycol with an amino acid salt in the presence of a polyol selected from the group consisting of glycerin and propylene glycol to produce an N-acyl amino acid salt and optionally a C_1-C_4 alkanol, wherein any alkanol is removed from the reaction mixture as it forms, the polyol is used in an amount effective to keep the reaction mixture fluid until conversion to the N-acyl amino acid salt reaches the desired level of completion, and water is added to the reaction mixture when conversion of the amino acid salt to the N-acyl amino acid salt is in the range of 50 to 90 mole %.