2A	170°C	Zn^{+2}	5.3	TEA
2B	170°C	Phosphorous acid	6.1	TEA
3	170°C	Zn^{+2}	4.5	TEA

Where TEA stands for Triethanolamine

Table II

Example Number	Temperature as Tmax	Catalyst Used	Relative Reaction Performance ж	Alkanolamine Used **
4B	175°C	Phosphorous acid	1.00	MDEA
4C	175°C	Zn^{+2}	0.62	MDEA
4D	175°C	Zn^{+2}	1.01	MDEA
4E	175°C	Zn^{+2}	1.07	MDEA
4F	175°C	Zn^{+2}	1.51	MDEA

ЖNumbers larger than 1.00 are faster reaction rates.

** Where MDEA stands for Methyldiethanolamine.

[0049] The invention is now described in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, to practice the same. It is to be understood that the foregoing describes preferred embodiments of the invention and that modifications may be made therein without departing from the spirit or scope of the invention as set forth in the appended claims.

CLAIMS

What Is Claimed Is:

1. A method for decreasing the reaction time between an alkanolamine and a fatty acid alkyl ester, a fatty acid, or a mixture thereof by contacting with a divalent zinc catalyst.

2. The method of claim 1, wherein the alkanolamine is selected from the group consisting of ethanolamine, diethanolamine, triethanolamine, triisopropanolamine, alkyldiethanolamines, alkyldiisopropanolamines, isopropanolamine, diisopropanolamine, dialkylmonoethanolamines, dialkylmonoisopropanolamines, and combinations thereof.

3. The method of claim 1, wherein the alkanolamine is triethanolamine.

4. The method of claim 1, wherein the fatty acid alkyl ester is selected from the group consisting of triglycerides, vegetable oils, fatty acid methylesters, fatty acid ethylesters, derivatives thereof, and combinations thereof.

5. The method of claim 1, wherein the divalent zinc catalyst comprises zinc oxide, zinc carbonate, or a zinc salt.

6. The method of claim 5, wherein the zinc salt is zinc diphosphinate, zinc triflate or zinc acetate.

7. The method of claim 6, wherein the zinc diphosphinate catalyst is formed *in situ*.

8. An esteramine produced by the method of claim 1.

9. The method of claim 1, wherein the method occurs at a temperature within the range of about 60°C to about 300°C.

10. The method of claim 1, wherein the method occurs in the presence of an inert atmosphere.

11. The method of claim 10, wherein the inert atmosphere is nitrogen.

12. The method of claim 9, wherein the temperature is in the range of about 130° C to about 190° C.

13. The method of claim 1, wherein the fatty acid is an alkyl acid having from about 2 to about 30 carbon atoms.

14. The method of claim 13, wherein the alkyl acid has from about 5 to about 25 carbon atoms.

15. The method of claim 1, wherein the zinc catalyst is present in an amount greater than 1 ppm based on the total weight of the reactants.

16. The method of claim 15, wherein the zinc catalyst is present in an amount of about 20 ppm to about 5000 ppm based on the total weight of the reactants.

17. The method of claim 15, wherein the zinc catalyst is present in an amount of about 100 ppm to about 200 ppm based on the total weight of the reactants.

18. A method for decreasing the reaction time between an alkanolamine and a fatty acid ester, a fatty acid or a mixture thereof to produce esteramines, the method comprising:

providing an alkanolamine;

providing a fatty acid ester, a fatty acid or a mixture thereof;

reacting the alkanolamine and the fatty acid ester, fatty acid or mixture thereof in the presence of a divalent zinc catalyst to form at least one esteramine.

19. The method of claim 18, wherein the alkanolamine is selected from the group consisting of ethanolamine, diethanolamine, triethanolamine, triisopropanolamine, alkyldiethanolamines, alkyldiisopropanolamines, isopropanolamine, diisopropanolamine, dialkylmonoethanolamines, dialkylmonoisopropanolamines, and combinations thereof.

20. The method of claim 18, wherein the alkanolamine is triethanolamine.

21. The method of claim 18, wherein the fatty acid alkyl ester is selected from the group consisting of triglycerides, vegetable oils, fatty acid methylesters, fatty acid ethylesters, derivatives thereof, and combinations thereof.

22. The method of claim 18, wherein the divalent zinc catalyst comprises zinc oxide, zinc carbonate, or a zinc salt.

23. The method of claim 22, wherein the zinc salt is zinc diphosphinate, zinc triflate or zinc acetate.

24. The method of claim 23, wherein the zinc diphosphinate catalyst is formed *in situ*.

25. The method of claim 18, wherein the reacting occurs at a temperature within the range of about 60°C to about 300°C.

26. The method of claim 18, wherein the method occurs in the presence of an inert atmosphere.

27. The method of claim 26, wherein the inert atmosphere is nitrogen.

28. The method of claim 18, wherein the reacting occurs at a temperature within the range of about 130°C to about 190°C.

29. The method of claim 18, wherein the fatty acid is an alkyl acid having from about 2 to about 30 carbon atoms.

30. The method of claim 29, wherein the alkyl acid has from about 5 to about 25 carbon atoms.

31. The method of claim 18, wherein the zinc catalyst is present in an amount greater than 1 ppm based on the total weight of the reactants.

32. The method of claim 18, wherein the zinc catalyst is present in an amount of about 20 ppm to about 5000 ppm based on the total weight of the reactants.

33. The method of claim 18, wherein the zinc catalyst is present in an amount of about 100 ppm to about 200 ppm based on the total weight of the reactants.

34. The method of claim 18, wherein the alkanolamine and fatty acid ester, fatty acid or mixture thereof are present in a molar ratio of 0.5/1 to about 3/1, where the alkanolamine represents the denominator in the ratio.

CLAIMS

What Is Claimed Is:

1. A method for decreasing the reaction time between an alkanolamine and a fatty acid or a mixture thereof to produce esteramines, the method comprising:

reacting an alkanolamine and a fatty acid in the presence of a divalent zinc catalyst to form at least one esteramine, wherein the divalent zinc catalyst is present in an amount effective to decrease the reaction time compared to the reaction conducted with a Brønsted catalyst.

2. The method of claim 1, wherein the alkanolamine is selected from the group consisting of ethanolamine, diethanolamine, triethanolamine, triisopropanolamine, alkyldiethanolamines, alkyldiisopropanolamines, isopropanolamine, diisopropanolamine, dialkylmonoethanolamines, dialkylmonoisopropanolamines, and combinations thereof.

3. The method of claim 1, wherein the alkanolamine is triethanolamine.

4. The method of claim 1, wherein the divalent zinc catalyst comprises zinc oxide, zinc carbonate, or a zinc salt.

5. The method of claim 4, wherein the zinc salt is zinc diphosphinate, zinc triflate, or zinc stearate.

6. The method of claim 5, wherein the zinc diphosphinate catalyst is formed *in situ*.

7. The method of claim 1, wherein the reacting occurs at a temperature within the range of about 60°C to about 300°C.

8. The method of claim 1, wherein the method occurs in the presence of an inert atmosphere.

9. The method of claim 8, wherein the inert atmosphere is nitrogen.

10. The method of claim 1, wherein the reacting occurs at a temperature within the range of about 130°C to about 190°C.

11. The method of claim 1, wherein the fatty acid is an alkyl acid having from about 2 to about 30 carbon atoms.

12. The method of claim 11, wherein the alkyl acid has from about 5 to about 25 carbon atoms.

13. The method of claim 1, wherein the zinc catalyst is present in an amount greater than 1 ppm based on the total weight of the reactants.

14. The method of claim 1, wherein the zinc catalyst is present in an amount of about 20 ppm to about 5000 ppm based on the total weight of the reactants.

15. The method of claim 1, wherein the zinc catalyst is present in an amount of about 100 ppm to about 200 ppm based on the total weight of the reactants.

16. The method of claim 1, wherein the alkanolamine and the fatty acid are present in a molar ratio of 0.5/1 to about 3/1, where the alkanolamine represents the denominator in the ratio.