adipic acid. In another embodiment, the polyhydroxycarboxylic acid may comprise mucic acid.

In another aspect, there is provided a method for synthesizing an ester of adipic acid, the method comprising the steps of: (a) subjecting mucic acid to a deoxydehydration catalyst to form an ester of muconic acid; and (b) performing a hydrogen transfer reaction on the ester of muconic acid to form the ester of adipic acid.

In aanother aspect, there is provided a method for synthesizing a saturated carboxylic acid, the method comprising the steps of; (a) subjecting a polyhydroxycarboxylic acid to a deoxydehydration catalyst to remove hydroxyl groups; (b) performing a hydrogen transfer reaction to form the ester of a saturated polycarboxylic acid; (c) hydrolysing the ester to form the saturated carboxylic acid.

**Definitions**

The following words and terms used herein shall have the meaning indicated:

The term "concurrent", for the purposes of the present disclosure, refers to two or more reactions occurring at the

8. The method according to claim 7, wherein the at least one intermediate compound produced is an ester of an unsaturated polycarboxylic acid after step (a).

9. The method according to claim 8, wherein the ester of an unsaturated polycarboxylic acid is further subjected to step (b) to produce the ester of a saturated polycarboxylic acid.

10. The method according to claim 8 or 9, wherein the ester of an unsaturated polycarboxylic acid comprises esters of muconic acid.

11. The method according to claim 10, wherein the ester of muconic acid is selected from the group consisting of propyl muconate, dipropyl muconate, butyl muconate, dibutyl muconate, pentyl muconate, dipentyl muconate, octyl muconate, dioctyl muconate and any mixture thereof.

12. The method according to claim 11, wherein the ester of muconic acid is selected from the group consisting of prop-2-yl muconate, diprop-2-yl muconate, but-1-yl muconate, dibut-1-yl muconate, pent-3-yl muconate, dipent-3-yl muconate, oct-3-yl muconate, dioct-3-yl muconate and any mixture thereof.

13. The method according to any one of the preceding claims, wherein the ester of a saturated polycarboxylic acid is an ester of adipic acid.

14. The method according to claim 13, wherein the ester of adipic acid is selected from the group consisting of adipic acid monopropyl ester, adipic acid dipropyl ester, adipic acid monobutyl ester, adipic acid dibutyl ester, adipic acid

monopentyl ester, adipic acid dipentyl ester, adipic acid monooctyl ester, adipic acid dioctyl ester and any mixture thereof.

15. The method according to claim 14, wherein the ester of adipic acid is selected from the group consisting of adipic acid monoprop-3-yl ester, adipic acid diprop-3-yl ester, adipic acid monobut-1-yl ester, adipic acid dibut-1-yl ester, adipic acid monopent-3-yl etser, adipic acid dipen-3-yl ester, adipic acid monocot-3-yl ester, adipic acid dioct-3-yl ester and any mixture thereof.

16. The method according to any one of the preceding claims, wherein the polyhydroxycarboxylic acid is mucic acid.

17. The method according to any one of the preceding claims, wherein the deoxydehydration catalyst in step (a) is a rhenium catalyst or a rhenium catalyst with a co-catalyst.

18. The method according to claim 17, wherein the rhenium catalyst is perrhenic acid, methyltrioxorhenium or rhenium(III) oxide.

19. The method according to claim 18, wherein the co-catalyst is a BrØnsted acid.

20. The method according to claim 18, wherein the co-catalys is a proton type liquid or solid acid.

21. The method according to claim 20, wherein the BrØnsted acid is *para*-toluene sulfonic acid or sulfuric acid.

31. The method according to claim 30, wherein the alcohol solvent in step (a) is selected from the group consisting of propanol, butanol, pentanol, hexanol, heptanol, octanol and any mixture thereof.

32. The method according to claim 31, wherein the alcohol solvent is selected from the group of 2-propanol, 1-butanol, 3-pentanol, 3-octanol and any mixture thereof.

33. The method according to claim 30, wherein the alcohol solvent in step (b) is 3-pentanol.

34. The method according to any one of claims 6 to 9, wherein step (a) is performed at a temperature in the range of 90 °C to 180 °C and step (b) is performed at a temperature in the range of 120 °C to 200 °C.

35. The method according to any one of claims 6 to 9, wherein step (a) is performed for a duration of 4 hours to 24 hours and step (b) is performed for a duration of 6 hours to 24 hours.

36. A method for synthesizing an ester of adipic acid, the method comprising the steps of;

(a) subjecting mucic acid to a dehydration catalyst to form an ester of muconic acid; and

(b) performing a hydrogen transfer reaction on the ester of muconic acid to form the ester of adipic acid.

37. A method for synthesizing a saturated carboxylic acid, the method comprising the steps of;

(a) subjecting a polyhydroxycarboxylic acid to a deoxydehydration catalyst to remove hydroxyl groups;

(b) performing a hydrogen transfer reaction to form the ester of a saturated polycarboxylic acid; and

(c) hydrolysing the ester to form the saturated carboxylic acid.