CLAIMS

1. A method of synthesising a compound, or salt thereof, including the steps of:

   (a) subjecting a glutarimide to a reduction to convert one of the carbonyl oxygen atoms into a hydroxyl group or reacting the glutarimide with a carbon nucleophile to form a cyclic amide;

   (b) exposing the product of step (a), wherein that step was a reduction of the glutarimide, to an acidic environment to form a cyclic amide;

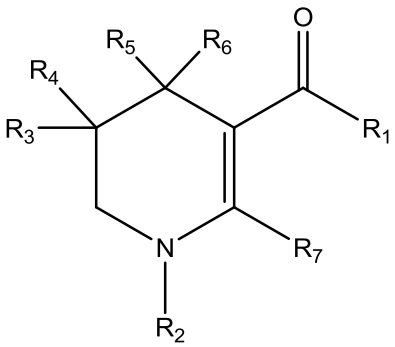
   (c) reducing the cyclic amide of step (a) or step (b) to form a corresponding enamine; and

   (d) subjecting the enamine product of step (c) to an acylation,

to thereby form the compound or salt thereof.

2. The method of claim 1 wherein the compound is a cyclic enaminoketone compound, or salt thereof.

3. The method of claim 1 or claim 2 wherein the compound is a compound of formula I, or a salt thereof:



formula I

wherein, R_1 is selected from the group consisting of C_1 to C_{12} alkyl, C_2 to C_{12} alkenyl, C_2 to C_{12} alkynyl, aryl, heteroaryl, C_3 to C_7 cycloalkyl, C_3 to C_7 cycloalkenyl, C_2 to C_9 alkanoyl and carbamoyl all of which groups may be substituted or unsubstituted;

R_2 is selected from the group consisting of C_1 to C_{12} alkyl, aryl, heteroaryl, C_3 to C_7 cycloalkyl and C_3 to C_7 cycloalkenyl, all of which groups may be substituted or unsubstituted;

R_3 and R_4 are independently selected from the group consisting of hydrogen, hydroxyl, C_1 to C_6 alkyl, C_1 to C_6 alkoxy and C_1 to C_6 alkanoyl, each of which groups may be substituted or unsubstituted, and wherein R_3 and R_4 may together form a substituted or unsubstituted five or six membered ring;

R_5 and R_6 are independently selected from the group consisting of hydrogen, C_1 to C_6 alkyl and C_1 to C_6 alkoxy, each of which groups may be substituted or unsubstituted, and wherein R_5 and R_6 may together form a substituted or unsubstituted five or six membered ring; and

R_7 is selected from the group consisting of hydrogen, C_1 to C_{12} alkyl, C_2 to C_{12} alkenyl, C_2 to C_{12} alkynyl, aryl, heteroaryl, C_3 to C_7 cycloalkyl, C_3 to C_7 cycloalkenyl, C_2 to C_9 alkanoyl and carbamoyl all of which groups may be substituted or unsubstituted.

4. The method of any one of the preceding claims wherein R_1 is selected from the group consisting of C_1 to C_9 alkyl, C_2 to C_9 alkenyl, C_2 to C_9 alkynyl, C_2 to C_6 alkanoyl and C_2 to C_6 carbamoyl, benzyl, benzoyl and phenyl.

~~5. The method of any one of the preceding claims wherein R_1 is selected from the group consisting of methyl, ethyl, propyl, isopropyl, *n*-butyl, *sec*-butyl, isobutyl, *tert*-butyl, pentyl, isoamyl and hexyl including straight chain and branched forms thereof.~~

~~6.~~5. The method of any one of the preceding claims wherein R_2 is selected from the group consisting of C_1 to C_9 alkyl, benzyl, phenyl, heteroaryl and C_3 to C_7 cycloalkyl.

~~7. The method of any one of the preceding claims wherein R_2 is selected from the group consisting of methyl, ethyl, propyl, isopropyl, *n*-butyl, *sec*-butyl, isobutyl, *tert*-butyl, pentyl, isoamyl, hexyl, heptyl, octyl and nonyl including straight chain and branched forms thereof~~

~~8.~~6. The method of any one of the preceding claims wherein R_3 and R_4 are independently selected from the group consisting of hydrogen, hydroxyl, C_1 to C_6 alkyl, C_1 to C_6 alkoxy and C_1 to C_6 alkanoyl.

~~9. The method of any one of the preceding claims wherein R_3 and R_4 are independently selected from the group consisting of hydrogen, methyl, ethyl, propyl, isopropyl, *n*-butyl, *sec*-butyl, isobutyl, *tert*-butyl, pentyl, isoamyl and hexyl, including straight chain and branched forms thereof.~~

~~10.~~7. The method of any one of the preceding claims wherein R_5, R_6 and R_7 are independently selected from the group consisting of hydrogen, C_1 to C_6 alkyl, C_1 to C_6 alkanoyl and C_1 to C_6 alkoxy.

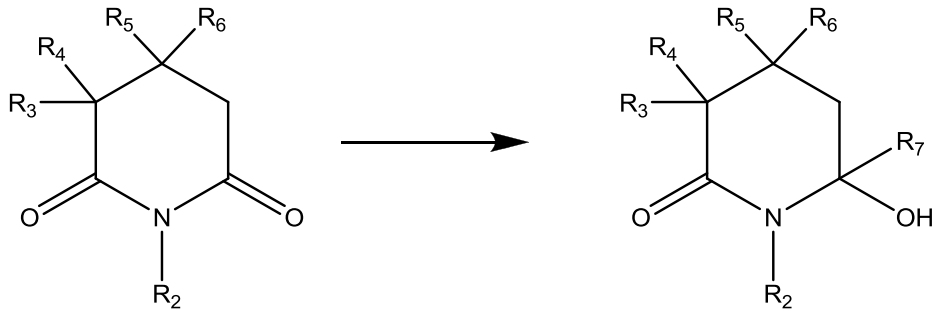
~~11. The method of any one of the preceding claims wherein R_5, R_6 and R_7 are independently selected from the group consisting of hydrogen, methyl, ethyl, propyl, isopropyl, *n*-butyl, *sec*-butyl, isobutyl, *tert*-butyl, pentyl, isoamyl and hexyl, including straight chain and branched forms thereof.~~

~~12.~~8. The method of any one of the preceding claims wherein the compound of formula I is selected from the group consisting of 1-(1-isobutyl-4,4-dimethyl-1,4,5,6-tetrahydropyridin-3-yl)propan-1-one, 1-(1-*tert*-butyl-4,4-dimethyl-1,4,5,6-tetrahydropyridin-3-yl)octan-1-one and acidic salts thereof.

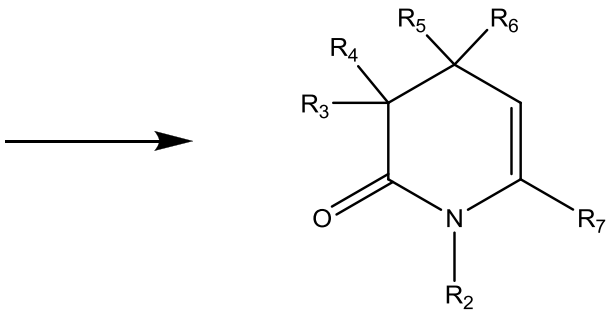
~~13.~~9. The method of any one of the preceding claims further comprising the step of forming an acid addition salt of the compound of formula I.

~~14. The method of claim 13 wherein the acid addition salt is a hydrochloride salt.~~

~~15.~~10. The method of any one of the preceding claims wherein step (a) involves reducing a compound of formula II to give a compound of formula III or reacting a compound of formula II with a carbon nucleophile to give a compound of formula IV:



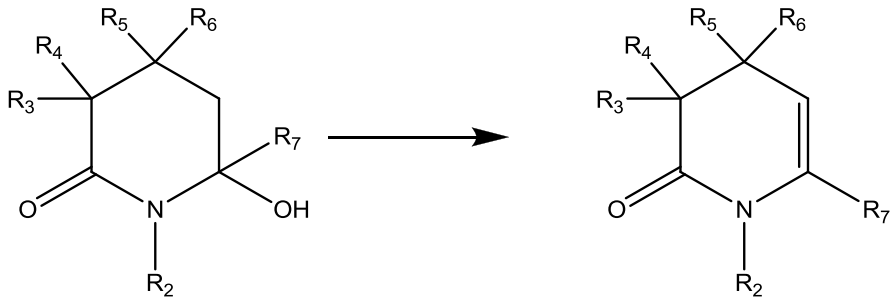
formula II formula III



formula IV

wherein R_2 to R_7, independently, are as defined in any one of the previous claims.

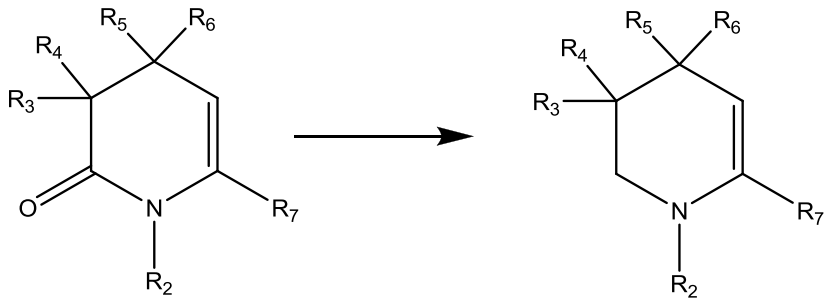
~~16.~~11. The method of claim ~~15~~ 10 wherein, when step (a) is a reduction, step (b) involves exposing the compound of formula III to an acidic environment to form give a compound of formula IV:



formula III formula IV

wherein R_2 to R_7, independently, are as defined in any one of the previous claims.

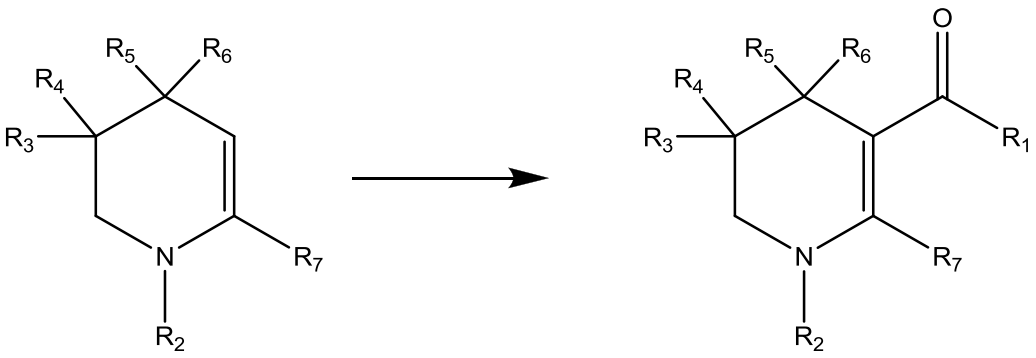
~~17.~~12. The method of claim ~~16~~ 11 wherein step (c) involves reducing the compound of formula IV, from step (a) or step (b), to give a compound of formula V:



formula IV formula

wherein R_2 to R_7, independently, are as defined in any one of the previous claims.

~~18.~~13. The method of claim ~~17~~ 12 wherein step (d) involves subjecting the compound of formula V to an acylation to provide a compound of formula I, or a salt thereof:



formula V formula I

wherein R_1 to R_7, independently, are as defined in any one of the previous claims.

~~19.~~14. The method of any one of the preceding claims wherein the reduction in step (a) is performed using an aluminium hydride reducing agent.

~~20.~~15. The method of any one of the preceding claims wherein the exposure to an acidic environment in step (b) occurs during work up of the reaction mixture of the reduction reaction of step (a).

~~21. The method of any one of claim 1 to claim 18 wherein the carbon nucleophile reaction in step (a) is performed using an organometallic reagent.~~

~~22. The method of claim 21 wherein the organometallic reagent is a Grignard reagent of the formula R_8MgX wherein R_8 is C_1 to C_{12} alkyl and X is halogen.~~

~~23.~~16. The method of any one of the preceding claims wherein the reduction in step (c) is performed using an aluminium hydride reducing agent.

~~24.~~17. The method of any one of the preceding claims wherein an antioxidant is added to the product of step (c) to improve stability.

~~25.~~18. The method of any one of the preceding claims wherein the acylation in step (d) is performed at a temperature below 20°C.

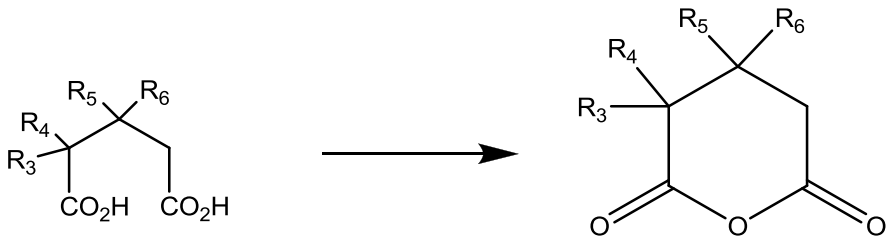
~~26. The method of claim 25 wherein the temperature is between 0°C to 10°C.~~

~~27. The method of claim 25 wherein the acylation is an alkanoylation.~~

~~28. The method of any one of the preceding claims wherein the acylation in step (d) is carried out in the presence of an antioxidant.~~

~~29.~~19. The method of any one of the preceding claims wherein the glutarimide starting material of step (a) is synthesised from a dicarboxylic acid via a cyclic anhydride.

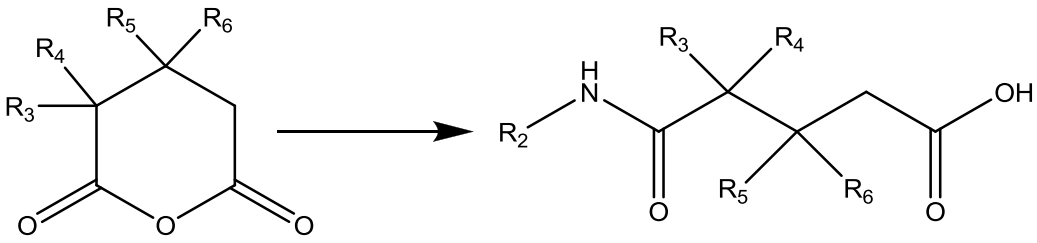
~~30.~~20. The method of claim ~~29~~ 19 wherein the reaction of the dicarboxylic acid to give the cyclic anhydride is a reaction of a dicarboxylic acid compound of formula VI to give a cyclic anhydride of formula VII:



formula VI formula VII

wherein, R_3, R_4, R_5 and R_6, independently, are as defined in any one of the previous claims.

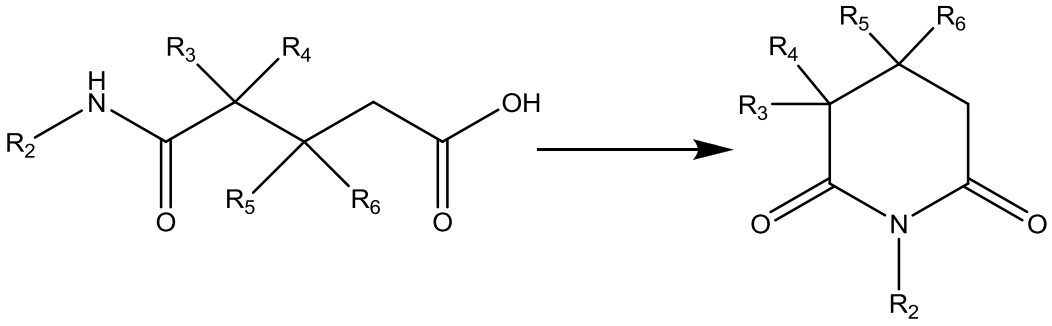
~~31.~~21. The method of claim ~~30~~ 20 wherein the cyclic anhydride of formula VII is subsequently reacted with an amine to give a compound of formula VIII:



formula VII formula VIII

wherein, R_2, R_3, R_4, R_5 and R_6, independently, are as defined in any one of the previous claims.

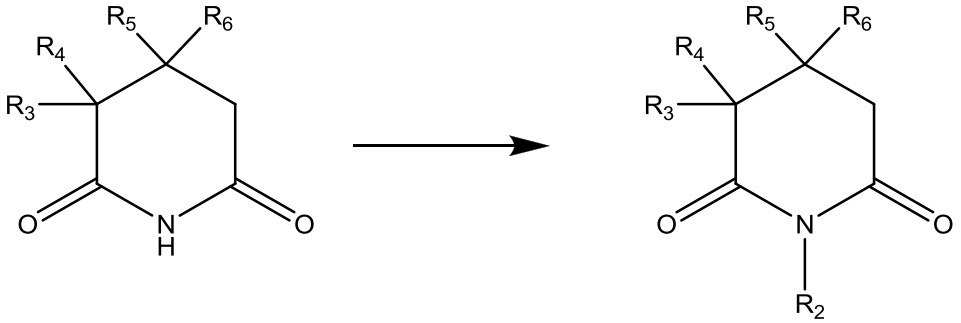
~~32.~~22. The method of claim ~~31~~ 21 wherein the compound of formula VIII is cyclised to provide the compound of formula II:



formula VIII formula II

wherein, R_2, R_3, R_4, R_5 and R_6, independently, are as defined in any one of the previous claims.

~~33.~~23. The method of any one of claim ~~15~~ 10 to claim ~~28~~ 18 wherein the compound of formula II is formed by reaction at the ring nitrogen of a compound of formula IX:

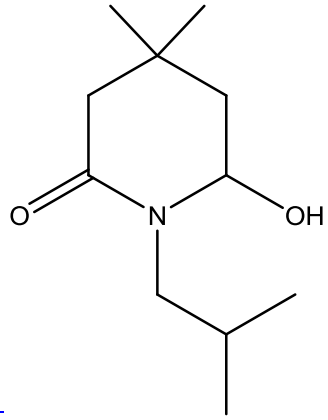


formula IX formula II

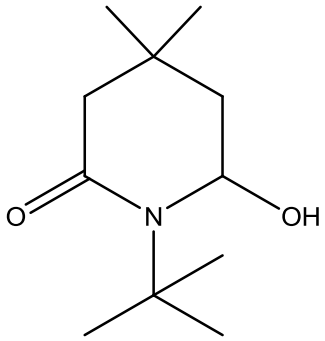
wherein, R_2, R_3, R_4, R_5 and R_6, independently, are as defined in any one of the previous claims.

~~34. The method of claim 33 wherein the reaction is an N-alkylation reaction.~~

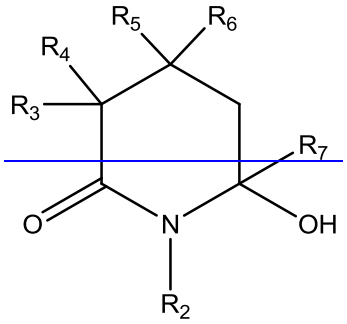
24. A compound~~-~~ selected from 6-hydroxy-1-isobutyl-4,4-dimethylpiperidin-2-one and 1-*tert*-butyl-6-hydroxy-4,4-dimethylpiperidine-2-one, as shown below:



or



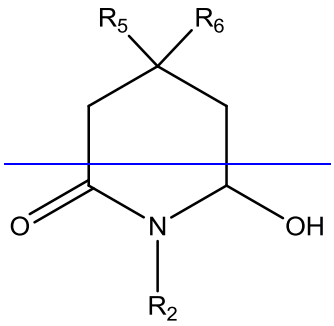
~~35. of formula III:~~



~~formula III~~

~~wherein, R_2, R_3, R_4, R_5, R_6 and R_7, independently, are as defined in any one of the previous claims~~.

~~36. The compound of claim 35 wherein the compound is a compound of formula IIIa:~~



formula IIIa

wherein, R_2, R_5 and R_6 are independently selected from C_1 to C_{12} alkyl, including straight chain and branched forms thereof.

37. A compound of formula I, or a salt thereof, when synthesised by the method of any one of claim 1 to claim 34.

38.25. A use of a compound of claim 35 or claim 3624 in the synthesis of a compound of formula I, or a salt thereof.

39. A method of synthesis of a compound of formula I comprising the transformation of a compound of formula III wherein the compounds of formula I and III are as defined in any one of the previous claims.