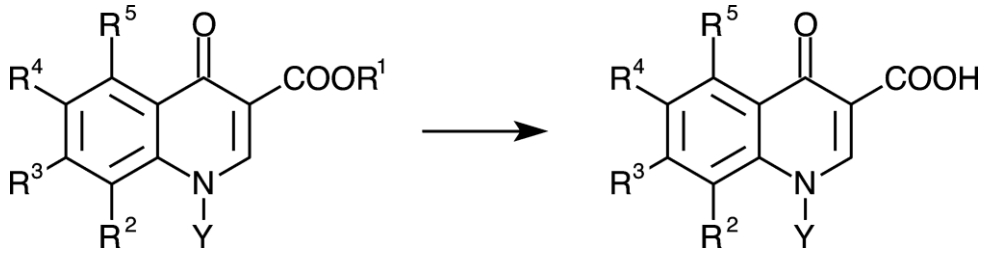
Claims

1. A ~~Method~~ method for ~~the~~ hydrolysis of one or more quinolonecarboxylic esters of ~~the general~~ formula (II) to obtain one or more quinolonecarboxylic acids of ~~the general~~ formula (I):



(II) (I)

wherein in formula (II) R^1 is C_1-C_4-alkyl and

concordantly in formulae (I) and (II):

R^2 is hydrogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, halogen, nitro or cyano,

R^3 and R^4 are each a halogen,

R^5 is hydrogen, C_1-C_4-alkyl, halogen or nitro, and

Y is C_1-C_6-alkyl, cyclopropyl or phenyl, each of which can optionally be substituted by halogen,

wherein R^2 and Y together can also be a $-CH_2-CH_2-O-$ or $-CH(CH_3)-CH_2-O-$ bridge bonded to the nitrogen atom by a carbon atom and

wherein at least one of the radicals R^2 ~~and~~ to R^5 is fluorine,

comprising ~~the step of~~:

A) reacting one or more compounds of ~~the~~ formula (II) with a mixture comprising acetic acid, sulfuric acid and water

~~**characterized in that**~~wherein

in ~~step~~ A), ≥ 30 to ≤ 40 mol of acetic acid, ≥ 0.3 to ≤ 1 mol of sulfuric acid and ≥ 0.9 to ≤ 2.5 mol of water are used per mole of compounds of ~~the~~ formula (II).

2. The ~~Method~~ method according to Claim 1, wherein in ~~step~~ A) ≥ 95 mol% of the compounds of ~~the~~ formula (II) used are converted to one or more compounds of ~~the~~ formula (I).

3. The ~~Method~~ method according to Claim 1 ~~or 2~~, wherein the reaction in ~~step~~ A) is carried out at a temperature of ≥ 90 to ≤ 99°C.

4. The ~~Method~~ method according to Claim 1 ~~any of Claims 1 to 3~~, wherein concordantly in formulae (I) and (II):

R^2 is hydrogen, methyl, methoxy, fluorine, chlorine, nitro or cyano,

R^3 is fluorine or chlorine,

R^4 is fluorine,

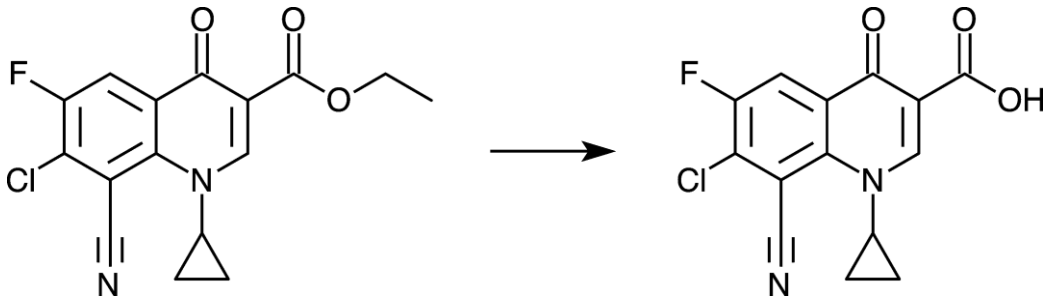
R^5 is hydrogen, methyl, fluorine, chlorine or nitro,

Y is methyl, ethyl, isopropyl, cyclopropyl, fluorocyclopropyl, 4-fluorophenyl or 2,4-difluorophenyl

and in formula (I) R^1 is methyl or ethyl.

5. The ~~Method~~ method according to Claim 1 ~~any of Claims 1 to 4~~, wherein formula (I) is 1-cyclopropyl-6,7,8-trifluoro-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid, 1-cyclopropyl-6,7-difluoro-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid, 1-cyclopropyl-6,7-difluoro-8-cyano-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid, 1-(2-fluoro)cyclopropyl-6,7-difluoro-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid, 1-cyclopropyl-8-chloro-6,7-difluoro-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid, 1-ethyl-6,7,8-trifluoro-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid or 1-cyclopropyl-6-fluoro-7-chloro-8-cyano-1,4-dihydro-4-oxo-3-quinolinecarboxylic acid.

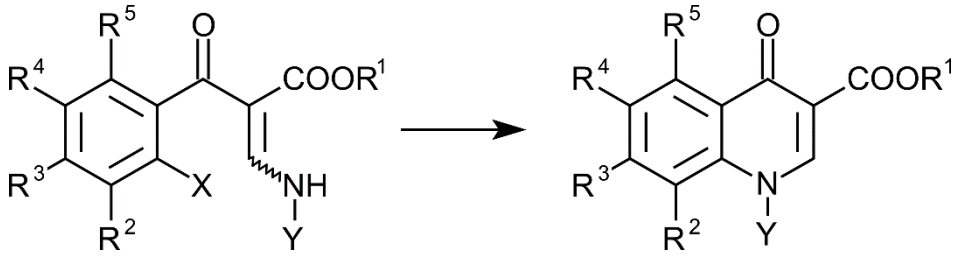
6. The ~~Method~~ method according to Claim 1 ~~any of Claims 1 to 5~~, wherein formulae (II) and (I) have the following definition according to ~~the~~ formulae (II-1) and (I-1) respectively:



(II-1) (I-1)

7. The ~~Method~~ method according to Claim 1 ~~any of Claims 1 to 6~~, wherein the one or more

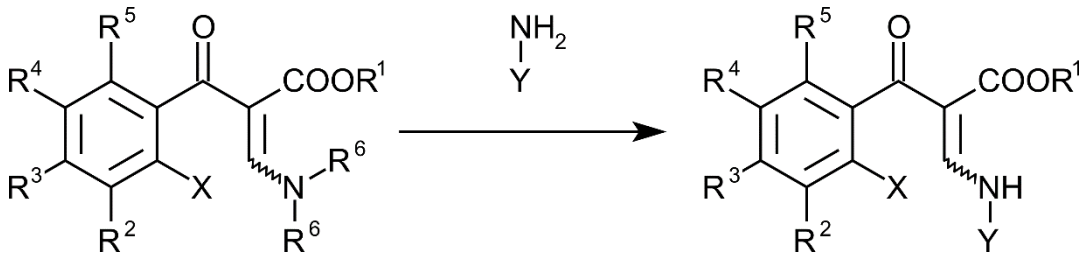
compounds of ~~the~~ formula (II) are obtainable by reacting one or more compounds of ~~the general~~ formula (III):



(III) (II)

wherein ~~R^1 to R^5 and Y have the aforementioned definitions and~~ X is halogen.

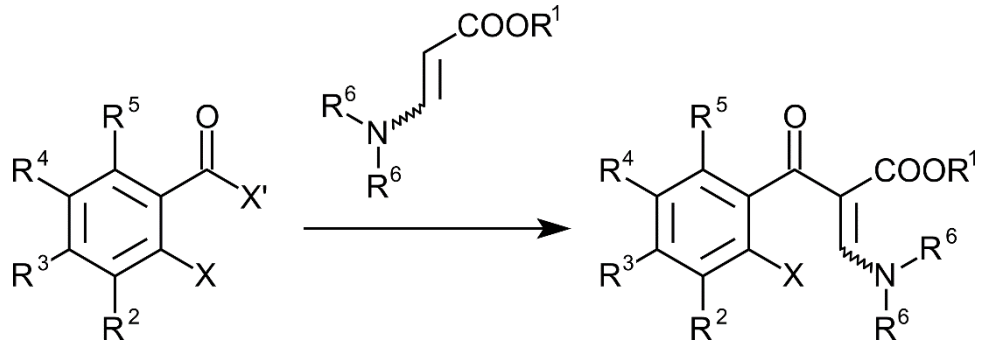
8. The ~~Method~~ method according to Claim 7, wherein the one or more compounds of ~~the~~ formula (III) are obtainable by reacting one or more compounds of ~~the general~~ formula (IV):



(IV) (III)

and wherein ~~R^1 to R^5, X and Y have the aforementioned definitions and~~ R^6 is C_1-C_4-alkyl-.

9. The ~~Method~~ method according to Claim 8, wherein the one or more compounds of ~~the~~ formula (IV) are obtainable by reacting one or more compounds of ~~the general~~ formula (V):



(V) (IV)

and wherein ~~R^1 to R^6, X and Y have the aforementioned definitions and~~ X' is halogen.