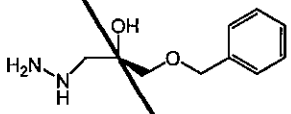
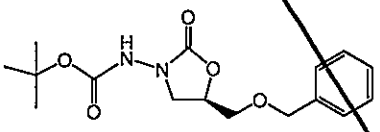
CLAIMS

1. (R)-Nifuratel.
2. (R)-Nifuratel for use in the treatment of external genital infections, vaginal infections, urinary infections, gastrointestinal infections or respiratory infections.
3. (R)-Nifuratel for use in the treatment according to claim 1, characterized in that said infection is due either to bacteria or to protozoa.
4. (R)-Nifuratel for use in the treatment according to claim 1, characterized in that it is administered to a mammalian, preferably to a human.
5. (R)-Nifuratel for use in the treatment according to claim 4, characterized in that it is administered at dosage regimen comprised between 0.001 and 1000 mg/Kg/day.
6. A pharmaceutical formulation containing (R)-Nifuratel and at least a pharmaceutically acceptable excipient or adjuvant.
7. A process for the manufacture of (R)-Nifuratel which comprises the following steps:

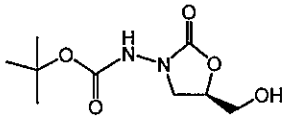
   (a) reacting (R)-2-(benzyloxymethyl)oxirane with hydrazine to obtain compound **1**;



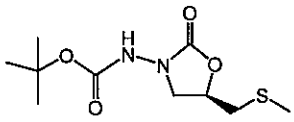
   (b) converting compound **1** into compound **2**;



   (c) de-benzylating compound **2** to obtain compound **3**;



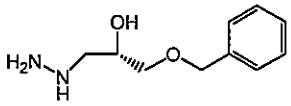
(d) converting compound **3** into compound **4**;



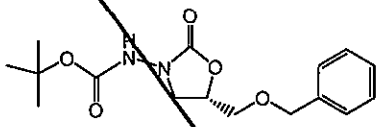
(e) converting compound **4** into (R)-Nifuratel.

8. A process for the manufacture of (S)-Nifuratel which comprises the following steps:

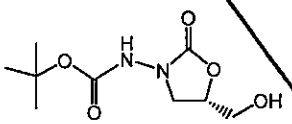
(a) reacting (S)-2-(benzyloxymethyl)oxirane with hydrazine to obtain compound **1;**



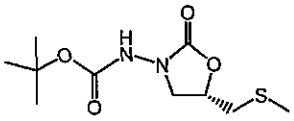
(b) converting compound **1** into compound **2**;



(c) de-benzylating compound **2** to obtain compound **3**;



(d) converting compound **3** into compound **4**;



(e) converting compound **4** into (S)-Nifuratel.

9. A process according to claims 7 or 8, characterized in that step (a) is performed between 30 and 100°C, preferably at about 90°C.

10. A process according to claims 7 or 8, characterized in that step (a) is performed in a polar solvent, such as water or, preferably, in neat conditions.
11. A process according to claims 7 or 8, characterized in that step (b) is performed by reacting compound **1** with a C_1-C_4-dialkyl carbonate, preferably diethyl carbonate, in presence of a catalytic amount of an alkaline or alkaline-earth metal C_1-C_4 alkoxide, preferably sodium methoxide or sodium ethoxide, followed by protection of the free amino group as a carbamate, preferably tert-butyl-carbamate.
12. A process according to claim 11, characterized in that the reaction of compound **1** with diethyl carbonate is performed on neat or in a polar organic solvent, preferably methanol, THF or DMF.
13. A process according to claim 11, characterized in that protection of the free amino group is achieved by reaction with a C_1-C_4 alkyl chloroformate or C_1-C_4 alkyl carbonate, preferably methyl-chloroformate, ethyl-chloroformate or di-tert-butyl dicarbonate.
14. A process according to claim 11, characterized in that protection of the free amino group is performed in a polar organic solvent, preferably THF or DMF, preferably at a temperature lower than 100 °C, more preferably from 60 to 90 °C.
15. A process according to claims 7 or 8, characterized in that step (c) is performed at room temperature with H_2 at a suitable pressure, preferably from 15 to 45 psi, in presence of a suitable de-benzylating catalyst, such as palladium or platinum on carbon, preferably 10% palladium on carbon, in a alcohol, preferably a C_1-C_4 alcohol, more preferably methanol or ethanol.
16. A process according to claims 7 or 8, characterized in that step (c) is performed under hydrogen transfer conditions, preferably by heating compound **2** at a suitable temperature, preferably from 60 to 90°C, in presence of ammonium formate and a suitable de-benzylating catalyst, preferably a catalytic amount of 10% palladium on carbon, in a suitable

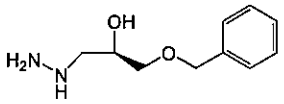
organic solvent, preferably a C_1-C_4 alcohol, more preferably methanol or ethanol.

17. A process according to claims 7 or 8, characterized in that step (d) is achieved by first functionalizing the hydroxy group of compound **3**, followed by reaction of the thus obtained-intermediate with an alkaline or alkaline-earth metal thiomethoxide.
18. A process according to claims 17, characterized in that functionalization of the hydroxy group is obtained by treating compound **3** with methanesulfonyl chloride, tosyl chloride, trifluoromethansulfonyl chloride or p-nitrobenzensulfonyl chloride, preferably methanesulfonyl chloride, in presence of a suitable base, such as triethylamine, in a suitable organic solvent, preferably an aprotic organic solvent such as methylene dichloride.
19. A process according to claims 17, characterized in that the thus-obtained intermediate is reacted with an alkaline or alkaline-earth metal thiomethoxide, preferably sodium thiomethoxide, in a polar organic solvent, preferably DMF, preferably at room temperature.
20. A process according to claims 7 or 8, characterized in that step (e) is achieved by a first compound **4** carbamate deprotection followed by reaction with 5-nitrofuran-2-carbaldehyde.
21. A process according to claim 20, characterized in that carbamate deprotection is achieved by reacting a solution of compound **4** in an aprotic organic solvent, preferably THF, with a solution of hydrogen chloride or trifluoro acetic acid in an organic aprotic solvent, preferably dioxane, preferably at room temperature.
22. A process according to claim 20, characterized in that the thus-obtained, intermediate is reacted with 5-nitrofuran-2-carbaldehyde in a polar organic solvent, preferably an alcohol, more preferably a C_1-C_4 alcohol, even more preferably ethanol.

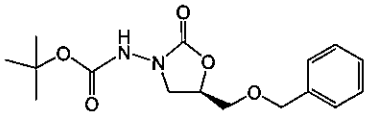
CLAIMS

1. A process for the manufacture of (R)-Nifuratel which comprises the following steps:

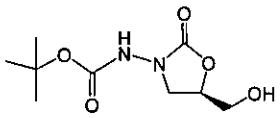
   (a) reacting (R)-2-(benzyloxymethyl)oxirane with hydrazine to obtain compound **1;**



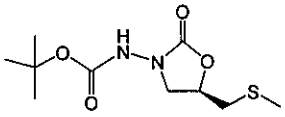
   (b) converting compound **1** into compound **2;**



   (c) de-benzylating compound **2** to obtain compound **3;**



   (d) converting compound **3** into compound **4;**



   (e) converting compound **4** into (R)-Nifuratel.

2. The process according to Claim 1, wherein step (a) is performed between 30 and 100°C.
3. The process according to Claim 2, wherein step (a) is performed at about 90°C.
4. The process according to Claim 1, wherein step (a) is performed in a polar solvent or under neat conditions.
5. The process according to Claim 4, wherein step (a) is performed in water.
6. The process according to Claim 1, wherein step (b) is performed by reacting compound **1** with a C_1-C_4-dialkyl carbonate in presence of a catalytic amount of an alkaline or alkaline-earth metal C_1-C_4 alkoxide, followed by protection of the free amino group as a carbamate.

7. The process according to Claim 6, wherein the C_1-C_4-dialkyl carbonate is diethyl carbonate.
8. The process according to Claim 6, wherein the alkaline or alkaline-earth metal C_1-C_4 alkoxide is sodium methoxide or sodium ethoxide.
9. The process according to Claim 6, wherein the free amino group is protected as a tert-butyl-carbamate.
10. The process according to Claim 7, wherein the reaction of compound 1 with diethyl carbonate is performed under neat conditions or in a polar organic solvent.
11. The process according to Claim 10, wherein the polar organic solvent is methanol, THF or DMF.
12. The process according to Claim 6, wherein protection of the free amino group is achieved by reaction with a C_1-C_4 alkyl chloroformate or a C_1-C_4 alkyl carbonate.
13. The process according to Claim 12, wherein protection of the free amino group is achieved by reaction with methyl-chloroformate, ethyl-chloroformate or di-tert-butyl dicarbonate.
14. The process according to Claim 6, wherein protection of the free amino group is performed in a polar organic solvent.
15. The process according to Claim 14, wherein the polar organic solvent is THF or DMF.
16. The process according to Claim 14, wherein protection of the free amino group is performed at a temperature lower than 100 °C.
17. The process according to Claim 16, wherein the temperature is from 60 to 90 °C.
18. The process according to Claim 1, wherein step (c) is performed at room temperature with H_2 at a suitable pressure in presence of a suitable de-benzylating catalyst in an alcohol.
19. The process according to Claim 18, wherein the pressure is from 15 to 45 psi.
20. The process according to Claim 18, wherein the de-benzylating catalyst is palladium or platinum on carbon.
21. The process according to Claim 20, wherein the de-benzylating catalyst is 10% palladium on carbon.
22. The process according to Claim 18, wherein the alcohol is a C_1-C_4 alcohol.

23. The process according to Claim 22, wherein the alcohol is methanol or ethanol.
24. The process according to Claim 1, wherein step (c) is performed under hydrogen transfer conditions.
25. The process according to Claim 24, wherein compound **2** is heated at a suitable temperature in the presence of ammonium formate and a suitable de-benzylating catalyst in a suitable organic solvent.
26. The process according to Claim 25, wherein the temperature is from 60 to 90°C.
27. The process according to Claim 25, wherein the de-benzylating catalyst is 10% palladium on carbon.
28. The process according to Claim 25, wherein the organic solvent is a C_1-C_4 alcohol.
29. The process according to Claim 28, wherein the organic solvent is methanol or ethanol.
30. The process according to Claim 1, wherein step (d) is achieved by first functionalizing the hydroxy group of compound **3**, followed by reaction of the thus obtained-intermediate with an alkaline or alkaline-earth metal thiomethoxide.
31. The process according to Claim 30, wherein functionalization of the hydroxy group is obtained by treating compound **3** with methanesulfonyl chloride, tosyl chloride, trifluoromethansulfonyl chloride or p-nitrobenzensulfonyl chloride in presence of a suitable base in a suitable organic solvent.
32. The process according to Claim 31, wherein functionalization of the hydroxy group is obtained by treating compound **3** with methanesulfonyl chloride.
33. The process according to Claim 31, wherein the base is triethylamine.
34. The process according to Claim 31, wherein the organic solvent is an aprotic organic solvent.
35. The process according to Claim 34, wherein the aprotic organic solvent is methylene dichloride.
36. The process according to Claim 30, wherein the thus-obtained intermediate is reacted with an alkaline or alkaline-earth metal thiomethoxide in a polar organic solvent.

37. The process according to Claim 36, wherein the alkaline or alkaline-earth metal thiomethoxide is sodium thiomethoxide.
38. The process according to Claim 36, wherein the polar organic solvent is DMF.
39. The process according to Claim 36, wherein the reaction is carried out at room temperature.
40. The process according to Claim 1, wherein step (e) is achieved by a first compound **4** carbamate deprotection followed by reaction with 5-nitrofuran-2-carbaldehyde.
41. The process according to Claim 40, wherein the carbamate deprotection is achieved by reacting a solution of compound **4** in an aprotic organic solvent with a solution of hydrogen chloride or trifluoro acetic acid in an organic aprotic solvent.
42. The process according to Claim 41, wherein the aprotic organic solvent is THF.
43. The process according to Claim 41, wherein the organic aprotic solvent is dioxane.
44. The process according to Claim 41, wherein the reaction is carried out at room temperature.
45. The process according to Claim 40, wherein the thus-obtained intermediate is reacted with 5-nitrofuran-2-carbaldehyde in a polar organic solvent.
46. The process according to Claim 45, wherein the polar organic solvent is an alcohol.
47. The process according to Claim 46, wherein the alcohol is a C_1-C_4 alcohol.
48. The process according to Claim 47, wherein the alcohol is ethanol.