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This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)

Additional inventors are being named on the _____ separately numbered sheets attached hereto

TITLE OF THE INVENTION (500 characters max)

SOLID STATE FORMS OF (-)-(1R,2S)-2-AMONO-4-METHYLENE-CYCLOPENTANECARBOXYLIC ACID

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ENCLOSED APPLICATION PARTS (*check all that apply*)

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[X] Other (specify): Express Mail Certificate

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Respectfully submitted, Flynn Barrazon (53,970)

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Provisional Application Cover Sheet (1 page)
Specification and Claims (20 pages)
Application Data Sheet
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SOLID STATE FORMS OF (-)-(1*R*,2*S*)-2-AMINO-4-METHYLENE-CYCLOPENTANECARBOXYLIC ACID

The present invention relates to the solid state forms of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid (in the further text of the application designated by its generic name "icofungipen"), processes for their preparation, pharmaceutical forms containing the solid state forms as an active ingredient, and methods of using the solid state forms.

Icofungipen is an active pharmaceutical ingredient used in the treatment of fungal infections. The product was described for the first time in European patent application EP 0571870 B1. EP 0571870 B1 is hereby incorporated by reference in its entirety.

It has now been surprisingly found that by crystallization of icofungipen from organic solvents or their mixtures at a temperature of –20 °C to 80 °C solid state form α has been prepared.

Also, it has now been surprisingly found that by crystallization of icofungipen from organic solvents or their mixtures and water at a temperature of –20 °C to 80 °C solid state form α has been prepared.

Suitable organic solvents that may be used in accordance with the present invention include: methyl acetate, ethyl acetate, propyl acetate, isopropyl acetate, butyl acetate, *sec*-butyl acetate, *tert*-butyl acetate, acetone, methyl ethyl ketone, diethyl ketone, methanol, ethanol, propanol, isopropanol, *n*-butanol, *sec*-butanol, *tert*-butanol, cyclopentane, cyclohexane, cyclohexanone, cyclohexanol, dibutyl ether and N,N-dimethylacetamide.

Also, it has now been surprisingly found that by sublimation of icofungipen, solid state form α has been prepared.

Also, it has now been surprisingly found that by heating solid state form α of icofungipen, high temperature solid state form α1 of icofungipen has been prepared.

Also, it has now been surprisingly found that by cooling solid state form α of icofungipen, low temperature solid state form α2 of icofungipen has been prepared.

Also, it has now been surprisingly found that by spray drying a water solution of icofungipen, solid state form β has been prepared.

Also, it has now been surprisingly found that by lyophilization of a frozen water solution of icofungipen, solid state form β has been prepared.

Also, it has now been surprisingly found that by heating solid state form β of icofungipen solid state form β1 has been prepared.

An object of this invention is to provide solid state form α of icofungipen.

Another object of this invention is to provide solid state form β of icofungipen.

A further object of this invention is to provide pharmaceutical compositions such as tablets, capsules, suppositories, sachets, injections or spray containing solid state form α of icofungipen, solid state form β of icofungipen, or any mixtures of solid state forms α and β icofungipen as an active ingredient, without any additives or in combination with one or more pharmaceutically acceptable additives such as sugar, starch derivatives, cellulose, cellulose derivatives, mold release agents and anti-adhesive agents and optionally agents for flowability regulation.

Still, a further object of this invention is to provide compounds or any mixture of said compounds, prepared according to the processes of the present invention, useful for the treatment

and prevention of all diseases which are regarded as treatable or avoidable by the use of icofungipen, in particular, the compounds according to the invention that can be employed in the treatment of fungal infections.

Solid state form α of icofungipen, prepared according to Example 1 of the present invention, is characterized by a characteristic x-ray powder diffraction pattern comprising 9.2±0.2°, 14.0±0.2°, 15.8±0.2°, 17.5±0.2, 20.4±0.2°, 21.7±0.2°, 28.6±0.2°, and 32.0±0.2° degrees two-theta.

In addition, single crystals of a solid state form α of icofungipen were prepared and accordingly single crystal x-ray diffraction data were collected from a Bruker Nonius FR591/Kappa CCD diffractometer using CuKα radiation. Basic crystallographic data for the solid state form α of icofungipen are represented in Table 1.

TABLE 1. Crystallographic data for the solid state form α of icofungipen

Chemical formula	$C_7H_{11}NO_2$
Empirical formula weight	141.17
Temperature	293(1) K
Crystal size	0.2 x 0.2 x 0.4 mm
Crystal system, space group	Monoclinic, $P\,2_1$
Unit cell dimension	$a = 6.38(18)$ Å
	$b = 5.98(18)$ Å
	$c = 9.69(19)$ Å
	$\beta = 96.6(2)$ °
	367 (1) Å^3
Z	2
Calculated density	1.28(2)cm^{-3}

Solid state form α of icofungipen, prepared according to Example 1 of the present invention, is characterized by a DSC thermogram comprising one endothermic maximum at about 176 °C (onset at about 174 °C) (heating rate of 10 °C/min).

Solid state form α of icofungipen, prepared according to Example 1 of the present invention, is characterized by a Raman spectrum comprising characteristic absorption bands at 3076, 2979, 2921, 2900, 1542, 1427, 826, 545, and 403 cm^{-1}.

Solid state form α of icofungipen, prepared according to Example 1 of the present invention, is characterized by solid-solid transformation into high temperature solid state form α1 of icofungipen when heated above about 176 °C.

High temperature solid state form α1 of icofungipen, prepared according to Example 3 of the present invention, is characterized by a characteristic x-ray powder diffraction pattern comprising 8.2±0.2°, 14.0±0.2°, 14.4±0.2°, 15.3±0.2°, 17.4±0.2°, 20.4±0.2°, 28.2±0.2°, and 30.9±0.2° degrees two-theta.

High temperature solid state form α1 of icofungipen, prepared according to Example 4 of the present invention, is characterized by a DSC thermogram comprising one endothermic maximum at about 237 °C (onset at about 233 °C) (heating rate of 10 °C/min).

Solid state form α of icofungipen, prepared according to Example 1 of the present invention, is characterized by solid-solid transformation into low temperature solid state form α2 of icofungipen when cooled to about -173 °C.

In addition, low temperature solid state form α2 of icofungipen was prepared according to Example 5 of the present invention, and single crystal x-ray diffraction data of low temperature solid state form α2 of icofungipen were collected from a Bruker Nonius

FR591/Kappa CCD diffractometer using CuKα radiation. Basic crystallographic data for the solid state form α2 of icofungipen are represented in Table 2.

TABLE 2. Crystallographic data for the solid state form α2 of icofungipen

Chemical formula	$C_7H_{11}NO_2$
Empirical formula weight	141.17
Temperature	100(1) K
Crystal size	0.12 x 0.15 x 0.22 mm
Crystal system, space group	Monoclinic, $P\,2_1$
Unit cell dimension	$a = 6.34(1)$ Å
	$b = 5.95(1)$ Å
	$c = 9.51(1)$ Å
	$\beta = 96.5(1)$ °
	356 (1) Å^3
Z	2
Calculated density	1.32 (1)g cm^{-3}

Solid state form β of icofungipen, prepared according to Example 6, of the present invention, is characterized by a characteristic x-ray powder diffraction pattern comprising 9.0±0.2°, 14.4±0.2°, 15.6±0.2°, 17.5±0.2°, 20.3±0.2°, 20.8±0.2°, 22.2±0.2°, 23.6±0.2°, 27.3±0.2°, 28.9±0.2°, and 30.5±0.2° degrees two-theta.

In addition, single crystals of solid state form β of icofungipen were prepared, and accordingly single crystal X-ray diffraction data were collected from a Bruker Nonius FR591/Kappa CCD diffractometer using CuKα radiation. Basic crystallographic data for the solid state form β of icofungipen, are represented in Table 3.

TABLE 3. Crystallographic data for the solid state form β of icofungipen

Chemical formula	$C_7H_{11}NO_2$
Empirical formula weight	141.17
Temperature	100(1) K
Crystal size	0.10 x 0.10 x 0.52 mm
Crystal system, space group	Orthorhombic, $P\,2_12_12_1$
Unit cell dimension	a = 6.04(1) Å
	b = 6.42(1) Å
	c = 18.72(1) Å
	728 (1) Å^3
Z	4
Calculated density	1.29 (1)g cm^{-3}

Solid state form β of icofungipen, prepared according to Example 6 of the present invention, is characterized by a DSC thermogram comprising one endothermic maximum at about 85 °C (onset at about 83 °C) (heating rate of 10 °C/min).

Solid state form β of icofungipen, prepared according to Example 6 of the present invention, is characterized by a Raman spectrum comprising characteristic absorption bands at 3074, 2981, 2950, 2911, 1658, 1431, 1315, 818, 605, 541, and 422 cm^{-1}.

Solid state form β of icofungipen, prepared according to Example 6 of the present invention, is characterized by solid-solid transformation into high temperature solid state form β1 of icofungipen when heated above about 85 °C.

High temperature solid state form β1 of icofungipen, prepared according to Example 8 of the present invention, is characterized by a characteristic x-ray powder diffraction pattern

comprising 5.9±0.2°, 8.6(2) ±0.2°, 14.4±0.2°, 15.6±0.2°, 16.2±0.2°, 17.4±0.2°, 18.9±0.2°, 20.4±0.2°, 20.8±0.2°, 22.2±0.2°, 28.9±0.2°, and 30.6(2)±0.2° degrees two-theta.

High temperature solid state form β1 of icofungipen, prepared according to Example 8 of the present invention, is characterized by a DSC thermogram comprising one endothermic maximum at about 236 °C (onset at about 232 °C) (heating rate of 10 °C/min).

EXAMPLES

The present invention is next described by means of the following examples. The use of these and other examples anywhere in the specification is illustrative only, and in no way limits the scope and meaning of the invention or of any exemplified form. Likewise, the invention is not limited to any particular preferred embodiments described herein. Indeed, modifications and variations of the invention may be apparent to those skilled in the art upon reading this specification, and can be made without departing from its spirit and scope. The invention is therefore to be limited only by the terms of the appended claims, along with the full scope of equivalents to which the claims are entitled.

Example 1 (Form α)

Icofungipen (0.20 g) was dissolved in 96 % ethanol (25 mL). After cooling to room temperature, the solution was left at the same temperature for 24 hours to yield solid state form α of icofungipen.

The x-ray powder diffraction patterns were obtained by x-ray diffraction on a powder sample by methods known in the art. X-ray powder diffraction patterns were collected from a Philips X'PertPRO powder diffractometer using CuKα radiation.

The differential scanning calorimeter thermograms were obtained by methods known in the art using a DSC Mettler Toledo 822 Star^e. The weight of the samples was about 5 mg. The temperature range of the scans was 25 °C – 250 °C at a rate of 10 °C/min. Samples were purged with nitrogen gas at a flow rate of 80 mL/min. Standard 40 μL aluminum crucibles with pierced lids were used.

The FT-Raman spectra were obtained by methods known in the art using a spectrophotometer Bruker, model Equinox 55 with a Bruker FT-raman module 106/S. Radiation of 1064 nm from a Nd:YAG laser was used for excitation. Spectra were obtained in the range from 4000 to 0 cm^{-1} at 4 cm^{-1} resolution, and 50 mW laser power at the sample.

Example 2 (Form α)

Icofungipen (2.00 g) was sublimated for 2 hours at 140 °C and below 2 mbar to yield solid state form α of icofungipen.

The x-ray powder diffraction patterns of the sample thus obtained corresponded to the x-ray powder diffraction patterns of the solid state form α of icofungipen obtained according to Example 1.

The DSC thermogram of the sample thus obtained corresponded to the DSC thermogram of the solid state form α of icofungipen obtained according to Example 1.

Example 3 (Form α1)

Solid state form α of icofungipen (0.15 g) was heated above 176 °C by methods known in the art using a Philips X'PertPRO powder diffractometer with an Anton Paar TTK-450

Temperature Camera. The temperature of the sample was controlled with an Anton Paar Temperature Control Unit TCU 100. This process resulted in forming high temperature solid state form α1 of icofungipen.

Example 4 (Form α1)

Solid state form α of icofungipen (0.05 g) was heated above 176 °C by methods known in the art using a DSC Mettler Toledo 822 Star^e, and yielded high temperature solid state form α1 of icofungipen. The temperature range of the scans was 25 °C – 250 °C at a rate of 10 °C/min. Samples were purged with nitrogen gas at a flow rate of 80 mL/min. Standard 40 μL aluminum crucibles with pierced lids were used.

Example 5 (Form α2)

Solid state form α of icofungipen in form of single crystal was cooled to about -173 °C by methods known in the art using a Bruker Nonius FR591/Kappa CCD diffractometer and an Oxford Cryo Unit, and yielded low temperature solid state form α2 of icofungipen. Single crystal x-ray diffraction data were collected using CuKα radiation.

Example 6 (Form β)

Icofungipen (2.00 g) was dissolved in water (50 ml). The solution was filtrated, cooled to about -25 °C, and lyophilized under high vacuum at below 0.37 mbar for 48 hours to yield solid state form β of icofungipen.

The x-ray powder diffraction patterns were obtained by X-ray diffraction on a powder sample by methods known in the art. X-ray powder diffraction patterns were collected from a Philips X'PertPRO powder diffractometer using CuKα radiation.

The differential scanning calorimeter thermograms were obtained by methods known in the art using a DSC Mettler Toledo 822 Star^e. The weight of the samples was about 5 mg. The temperature range of the scans was 25 °C – 250 °C at a rate of 10 °C/min. Samples were purged with nitrogen gas at a flow rate of 80 mL/min. Standard 40 μL aluminum crucibles with pierced lids were used.

The FT-Raman spectra were obtained by methods known in the art using a spectrophotometer Bruker, model Equinox 55 with a Bruker FT-raman module 106/S. Radiation of 1064 nm from a Nd:YAG laser was used for excitation. Spectra were obtained in the range from 4000 to 0 cm^{-1} at 4 cm^{-1} resolution, and 50 mW laser power at the sample.

Example 7 (Form β)

Icofungipen (2.00 g) was dissolved in water (50 ml). Solution was filtrated, and spray dried for 1 hour to yield solid state form β of icofungipen.

The x-ray powder diffraction patterns of the sample thus obtained corresponded to the x-ray powder diffraction patterns of the solid state form β of icofungipen obtained according to Example 6.

The DSC thermogram of the sample thus obtained corresponded to the DSC thermogram of the solid state form β of icofungipen obtained according to Example 6.

Example 8 (Form β1)

Solid state form β of icofungipen (0.15 g) was heated above 176 °C by methods known in the art using a Philips X'PertPRO powder diffractometer with an Anton Paar TTK-450 Low-Temperature Camera. The temperature of the sample was controlled with an Anton Paar Temperature Control Unit TCU 100. This process resulted in forming high temperature solid state form β1 of icofungipen. X-ray powder diffraction patterns were collected using CuKα radiation.

Example 9 (Form β1)

Solid state form β of icofungipen (0.05 g) was heated above 85 °C by methods known in the art using a DSC Mettler Toledo 822 Star^e, and yielded high temperature solid state form β1 of icofungipen. The temperature range of the scans was 25 °C – 250 °C at a rate of 10 °C/min. Samples were purged with nitrogen gas at a flow rate of 80 mL/min. Standard 40 μL aluminum crucibles with pierced lids were used.

WHAT IS CLAIMED IS:

1. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid characterized by the monoclinic space group $P\ 2_1$, and displaying unit cell parameters comprising: crystal axis lengths of $a = 6.38(18)$ Å, $b = 5.98\ (18)$ Å, and $c = 9.69\ (19)$ Å, and an angle between the crystal axes of $\beta = 96.60(1)°$.

2. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid having characteristic x-ray powder diffraction peaks, designated by 2Θ and expressed in degrees, at 9.2±0.2°, 14.0±0.2°, 15.8±0.2°, 17.5±0.2, 20.4±0.2°, 21.7±0.2°, 28.6±0.2°, and 32.0±0.2°.

3. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid having a characteristic DSC endothermic maximum at about 176 °C (onset at about 174 °C) (heating rate of 10 °C/min).

4. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid having characteristic FT-Raman absorption bands at 3076, 2979, 2921, 2900, 1542, 1427, 826, 545, and 403 cm^{-1}.

5. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid characterized in that when heated above about 176 °C, transfer to high temperature solid state form α1 is characterized by the following data:

x-ray powder diffraction peaks, designated by 2Θ and expressed in degrees, at 8.2±0.2°, 14.0±0.2°, 14.4±0.2°, 15.3±0.2°, 17.4±0.2°, 20.4±0.2°, 28.2±0.2°, and 30.9±0.2°; and

a DSC characteristic endothermic maximum at about 237 °C (onset at about 233 °C) at heating rate of 10 °C/min.

6. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid characterized in that when cooled to about -173 °C, transfer to low temperature solid state form α2 is characterized by the following data:

monoclinic space group *P*2 with unit cell parameters comprising: crystal axis lengths of a = 6.34(1) Å, b = 5.95 (1) Å, and c = 9.51 (1) Å, and an angle between the crystal axes of β = 96.5 (1)°.

7. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, characterized in that it does not contain water.

8. A solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, characterized in that it does not contain solvent.

9. A process for the preparation of the solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 1 to 6, characterized in that a solution of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid and organic solvents or mixtures of organic solvents is subjected to crystallization at a temperature of –20 °C to 80 °C.

10. A process for the preparation of the solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 1 to 6, characterized in that a solution

of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclo-pentanecarboxylic acid and organic solvents or mixtures of organic solvents and water is subjected to crystallization at a temperature of –20 °C to 80 °C.

11. A process for the preparation of the solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 1 to 6, characterized in that (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid is subjected to a sublimation.

12. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a polymorphic purity greater than 95.0 % .

13. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a polymorphic purity greater than 99.0 % .

14. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a polymorphic purity greater than 99.5 % .

15. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a polymorphic purity greater than 99.9 % .

16. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, which is polymorphic pure.

17. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a purity of greater than about 90.0 %.

18. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a purity of greater than about 95.0 %.

19. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a purity of greater than about 99.0 %.

20. The solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6, having a purity of greater than about 99.9 %.

21. A pharmaceutical composition comprising the solid state form α (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 1 to 6, and one or more pharmaceutically acceptable carriers or excipients.

22. A method of treating fungal infections in a human, comprising administering to a patient in need of such treatment an effective amount of the solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 1 to 6.

23. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid characterized by the orthorhombic space group $P\ 2_12_12_1$, and displaying unit cell parameters comprising: crystal axis lengths of $a = 6.04(1)$ Å, $b = 6.42(1)$ Å, and $c = 18.72(1)$ Å.

24. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid having characteristic x-ray powder diffraction peaks, designated by 2Θ and expressed in degrees, at 9.0±0.2°, 14.4±0.2°, 15.6±0.2°, 17.5±0.2°, 20.3±0.2°, 20.8±0.2°, 22.2±0.2°, 23.6±0.2°, 27.3±0.2°, 28.9±0.2°, and 30.5±0.2°.

25. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid having a characteristic DSC endothermic maximum at about 85 °C (onset at about 83 °C) (heating rate of 10 °C/min).

26. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid having characteristic FT-Raman absorption bands at 3074, 2981, 2950, 2911, 1658, 1431, 1315, 818, 605, 541, and 422 cm^{-1}.

27. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid characterized in that when heated above about 85 °C, transfer to high temperature solid state form β1 is characterized by the following data:

x-ray powder diffraction peaks, designated by 2Θ and expressed in degrees, at 5.9±0.2°, 8.6(2) ±0.2°, 14.4±0.2°, 15.6±0.2°, 16.2±0.2°, 17.4±0.2°, 18.9±0.2°, 20.4±0.2°, 20.8±0.2°, 22.2±0.2°, 28.9±0.2°, and 30.6(2)±0.2°; and

a DSC characteristic endothermic maximum at about 236 °C (onset at about 232 °C) at heating rate of 10 °C/min.

28. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, characterized in that it does not contain water.

29. A solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, characterized in that it does not contain solvent.

30. A process for the preparation of the solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 10 to 14, characterized in that (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid is subjected to spray drying.

31. A process for the preparation of the solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 10 to 14, characterized in that a frozen solution of (-)-(1*R*,1*S*)-2-amino-4-methylene-cyclopentanecarboxylic acid and water is subjected to a lyophilization.

32. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a polymorphic purity greater than 95.0 % .

33. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a polymorphic purity greater than 99.0 % .

34. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a polymorphic purity greater than 99.5 % .

35. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a polymorphic purity greater than 99.9 % .

36. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, which is polymorphic pure.

37. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a purity of greater than about 90.0 %.

38. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a purity of greater than about 95.0 %.

39. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a purity of greater than about 99.0 %.

40. The solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25, having a purity of greater than about 99.9 %.

41. A pharmaceutical composition comprising the solid state form β (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 21 to 25, and one or more pharmaceutically acceptable carriers or excipients.

42. A method of treating fungal infections in a human, comprising administering to a patient in need of such treatment an effective amount of the solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid according to claims 21 to 25.

43. A pharmaceutical composition comprising any mixture of the solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 1 to 6, and the solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 21 to 25, and one or more pharmaceutically acceptable carriers or excipients.

44. A method of treating fungal infections in a human, comprising administering to a patient in need of such treatment an effective amount of any mixture of the solid state form α of (-)-(1*R*,1*S*)-2-amino-4-methylene-cyclopentanecarboxylic acid of claim 1 to claim 6, and the solid state form β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid according to claims 21 to 25.

ABSTRACT

The present invention relates to solid state forms α and β of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentanecarboxylic acid, to the processes for their preparation, to pharmaceutical compositions containing the solid state forms of (-)-(1*R*,1*S*)-2-amino-4-methylenecyclopentane-carboxylic acid as active ingredients, and to methods of treatment using the same.

Application Data Sheet

Application Information

Application Type::	Provisional
Subject Matter::	Utility
Suggested Group Art Unit::	N/A
CD-ROM or CD-R?::	None
Sequence submission?::	None
Computer Readable Form (CRF)?::	No
Title::	SOLID STATE FORMS OF (-)-(1R,2S)-2-AMONO-4-METHYLENE-CYCLOPENTANECARBOXYLIC ACID
Attorney Docket Number::	03818/0201818-US0
Request for Early Publication?::	No
Request for Non-Publication?::	No
Small Entity?::	No
Petition included?::	No
Secrecy Order in Parent Appl.?::	No

Correspondence Information

Correspondence Customer Number::	07278

Representative Information

Representative Customer Number::	07278

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