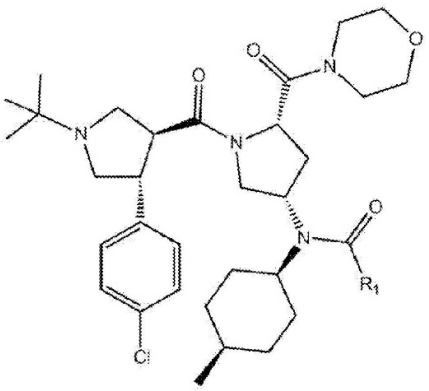
CLAIMS

1. A crystalline form IV of a compound of the following formula 1, a pharmaceutically acceptable salt thereof, or a solvate thereof,

wherein the X-ray powder diffraction pattern has 3 or more characteristic peaks selected from among peaks with the following diffraction angles (2θ values) of: 7.76±0.2°, 9.69±0.2°, 10.12±0.2°, 10.63±0.2°, 11.93±0.2°, 12.72±0.2°, 14.57±0.2°, 16.07±0.2°, 17.65±0.2°, 18.24±0.2°, 19.10±0.2°, 19.62±0.2°, 20.09±0.2°, 21.19±0.2°, 21.62±0.2°, 22.02±0.2°, 22.25±0.2°, 22.61±0.2°, 23.59±0.2°, 24.26±0.2°, 24.78±0.2°, 25.29±0.2°, 26.15±0.2°, 28.52±0.2°, 29.38±0.2°, and 29.98±0.2°:

[Formula 1]



wherein R_1 is C_2-C_5 alkyl.

2. The crystalline form IV of claim 1, wherein the pharmaceutically acceptable salt of the compound of formula 1

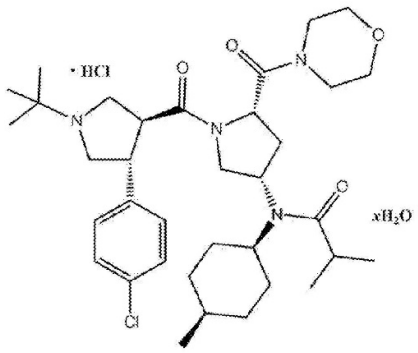
is selected from the group consisting of: hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, hydrobromic acid, and hydroiodic acid, of the compound.

3. The crystalline form IV of claim 1, which is a crystalline form of a solvate of the compound of formula 1.

4. The crystalline form IV of claim 3, wherein the solvate is a hydrate.

5. The crystalline form IV of claim 4, which is a crystalline form of a compound of the following formula 4:

[Formula 4]



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6. A method for preparing the crystalline form IV described in any one of claims 1-5, the method comprising the steps of:

preparing a mixed solution by dissolving the compound of formula 1 in a crystallization solvent; and

obtaining crystals from the mixed solution.

7. The method for preparing the crystalline form IV of claim 6, wherein the crystallization solvent includes water, a polar aprotic organic solvent, or a mixture thereof.

8. The method for preparing the crystalline form IV of claim 7, wherein the polar aprotic organic solvent includes ethyl acetate, methyl isobutyl ketone, dimethyl sulfoxide, tetrahydrofuran, acetone, dimethylformamide, acetonitrile, or a mixture thereof.

9. The method for preparing the crystalline form IV of claim 7, wherein the crystallization solvent is a mixed solvent in which water and the polar aprotic solvent are mixed in a volume ratio of 35:1 to 1:35.

10. The method for preparing the crystalline form IV of claim 6, wherein the crystallization step includes a step for stirring the mixed solution.

11. A pharmaceutical composition comprising the crystalline form IV according to any one of claims 1-5 and a pharmaceutically acceptable carrier.

12. A pharmaceutical composition for use in agonizing the function of a melanocortin-4 receptor, the composition

comprising the crystalline form IV according to any one of claims 1-5 and a pharmaceutically acceptable carrier.

13. The pharmaceutical composition of claim 12 for use in preventing or treating obesity, diabetes, inflammation, or erectile dysfunction.

14. Use of the pharmaceutical composition of claim 12 in the manufacture of a medicament for preventing or treating obesity, diabetes, inflammation, or erectile dysfunction.

15. The crystalline form IV according to any one of claims 1-5 for use in preventing or treating obesity, diabetes, inflammation, or erectile dysfunction.

16. Use of the crystalline form IV according to any one of claims 1-5 in the manufacture of a medicament for preventing or treating obesity, diabetes, inflammation, or erectile dysfunction.