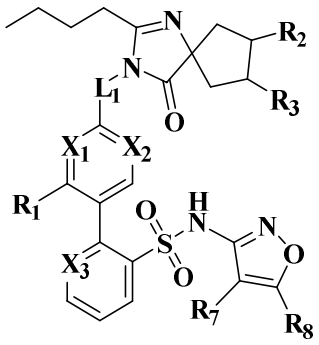
Claims

1. An acid salt of a compound as represented by general formula (I):



(I)

wherein

L_1 is $-CH_2$ or $-CD_2-$;

X_1 is N or CR^1;

X_2 is N or CR^2;

X_3 is N or CR^3;

R^1, R^2 and R^3 are each independently selected from hydrogen, deuterium, halogen, amino, hydroxyl, cyano, C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl containing 1 to 3 N, O or S atoms, C_{6-10} aryl or 5- to 10-membered heteroaryl containing 1 to 3 N, O or S atoms, and the C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl containing 1 to 3 N, O or S atoms, C_{6-10} aryl or 5- to 10-membered heteroaryl containing 1 to 3 N, O or S atoms is optionally further substituted with one or more substituents selected from deuterium, halogen, amino, hydroxyl, cyano, oxo, thio, C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl containing 1 to 3 N, O or S atoms, C_{6-10} aryl or 5- to 10-membered heteroaryl containing 1 to 3 N, O or S atoms;

R_1 is selected from hydrogen, C_{1-3} alkyl or $-(CH_2)_{n1}O(CH_2)_{n2}R_{A2}$, and the C_{1-3} alkyl is optionally further substituted with one or more substituents selected from deuterium, halogen, amino, hydroxyl, cyano, oxo, thio, C_{1-3} alkyl, C_{2-4} alkenyl, C_{2-4} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy or C_{3-6} cycloalkyl;

R_{A2} is selected from C_{1-3} alkyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{3-6} cycloalkyl, 4- to 7-membered heterocyclyl, C_{3-6} cycloalkyl C_{1-3} alkyl or 4- to 7-membered heterocyclyl C_{1-3} alkyl;

R_2 and R_3 are each independently selected from hydrogen, deuterium, halogen, amino, hydroxyl, cyano, C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl containing 1 to 3 N, O or S atoms, C_{6-10} aryl or 5- to 10-membered heteroaryl containing 1 to 3 N, O or S atoms, and the C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl containing 1 to 3 N, O or S atoms, C_{6-10} aryl or 5- to 10-membered heteroaryl containing 1 to 3 N, O or S atoms is optionally further substituted with one or more substituents selected from deuterium, halogen, amino, hydroxyl, cyano, oxo, thio, C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl containing 1 to 3 N, O or S atoms, C_{6-10} aryl or 5- to 10-membered heteroaryl containing 1 to 3 N, O or S atoms;

alternatively, R_2 and R_3, together with the atom to which they are attached, form C_{3-8} cycloalkyl or 3- to 8-membered heterocyclyl;

R_7 or R_8 is each independently selected from hydrogen, deuterium, halogen, amino, hydroxyl, cyano, C_{1-3} alkyl, C_{2-3} alkenyl, C_{2-3} alkynyl, C_{1-3} deuteroalkyl, C_{1-3} haloalkyl, C_{1-3} hydroxyalkyl, C_{1-3} alkoxy, C_{1-3} alkylthio, C_{1-3} haloalkoxy, C_{3-8} cycloalkyl, 3- to 8-membered heterocyclyl, C_{6-10} aryl or 5- to 10-membered heteroaryl;

n1 and n2 are each independently 0, 1, 2 or 3;

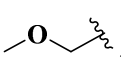
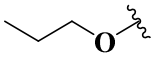
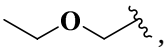
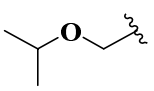
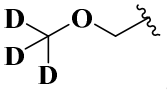
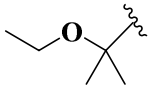
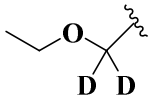
when L_1 is -CH_2-, and R_2 and R_3 are both hydrogen, R_7 and R_8 are not both -CH_3;

when L_1 is -CH_2-, and R_2 and R_3 are both hydrogen, R_1 is not hydrogen;

the acid in the acid salt is selected from hydrochloric acid, sulfuric acid, nitric acid, hydrobromic acid, hydrofluoric acid, hydroiodic acid, phosphoric acid, 2,5-dihydroxybenzoic acid, 1-hydroxy-2-naphthoic acid, acetic acid, dichloroacetic acid, trichloroacetic acid, acetohydroxamic acid, adipic acid, benzenesulfonic acid, 4-chlorobenzenesulfonic acid, benzoic acid, 4-acetamidobenzoic acid, 4-aminobenzoic acid, capric acid, caproic acid, caprylic acid, cinnamic acid, citric acid, cyclohexanesulfamic acid, camphorsulfonic acid, aspartic acid, camphoric acid, gluconic acid, glucuronic acid, glutamic acid, isoascorbic acid, lactic acid, malic acid, mandelic acid, pyroglutamic acid, tartaric acid, dodecyl sulfate, dibenzoyltartaric acid, ethane-1,2-disulfonic acid, ethylsulfonic acid, formic acid, fumaric acid, galactosonic acid, gentisic acid, glutaric acid, 2-ketoglutaric acid, glycolic acid, hippuric acid, isethionic acid, lactobionic acid, ascorbic acid, aspartic acid, lauric acid, camphoric acid, maleic acid, malonic acid, methanesulfonic acid, 1,5-naphthalene disulfonic acid, naphthalene-2-sulfonic acid, nicotinic acid, oleic acid, orotic acid, oxalic acid, palmitic acid, pamoic acid, propanoic acid, salicylic acid,

4-aminosalicylic acid, sebacic acid, stearic acid, butanedioic acid, thiocyanic acid, pamoic acid, formic acid, undecylenic acid, trifluoroacetic acid, benzenesulfonic acid, p-toluenesulfonic acid or L-malic acid; preferably methanesulfonic acid, benzenesulfonic acid, isethionic acid, ethylsulfonic acid, hydrochloric acid, sulfuric acid, p-toluenesulfonic acid, phosphoric acid or hydrobromic acid.

2. The acid salt of the compound as represented by formula (I) according to claim 1, wherein R^1, R^2 and R^3 are each independently selected from hydrogen, deuterium, halogen, amino, hydroxyl, methyl, ethyl or propyl;

R_1 is selected from hydrogen, $-CH_3$, $-CH_2CH_3$, , , , , ,  or ;

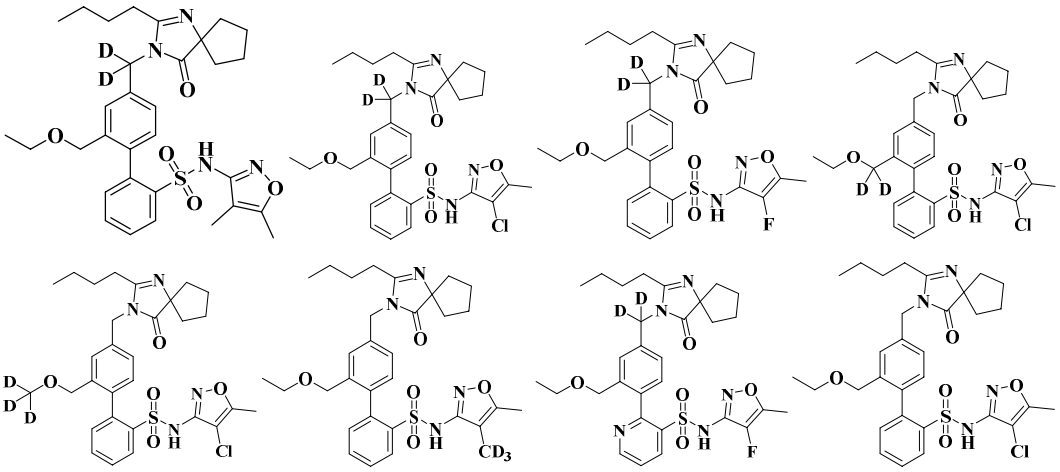
R_2 or R_3 is each independently selected from hydrogen, deuterium, fluorine, chlorine, bromine, methyl, ethyl or propyl;

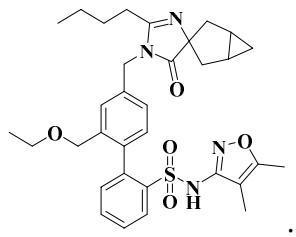
alternatively, R_2 and R_3, together with the atom to which they are attached, form cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl;

R_7 is selected from deuterium, fluorine, chlorine, bromine, methyl, ethyl, propyl, deuterated methyl, dideuterated methyl or trideuterated methyl;

R_8 is selected from methyl, ethyl or propyl.

3. The acid salt of the compound as represented by formula (I) according to claim 1, wherein the compound is selected from:



or  .

4. The acid salt of the compound as represented by formula (I) according to claim 1, wherein the compound is

   4'-((2-butyl-4-oxo-1,3-diazospiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4,5-dimethylisoxazol-3-yl)-2'-(ethoxymethyl)-[1,1'-biphenyl] -2-sulfonamide;

   4’-((2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4-chloro-5-methylisoxazol-3-yl)-2’-(ethoxymethyl)-[1,1’-biphenyl]-2-sulfonamide;

   4’-((2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4-fluoro-5-methylisoxazol-3-yl)-2’-(ethoxymethyl)-[1,1’-biphenyl]-2-sulfonamide;

   4'-((2-butyl-4-oxo-1,3-diazospiro[4.4]non-1-en-3-yl)methyl)-N-(4-chloro-5-methylisoxazol-3-yl)-2'-(ethoxydeuteromethyl)-[1,1'-biphenyl]-2-sulfonamide;

   2-[4-[(2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl]-2-(ethoxymethyl)phenyl]-N-(4-chloro-5-methyl-isoxazol-3-yl)benzenesulfonamide; or

   4'-((2'-butyl-5'-oxaspiro[bicyclo[3.1.0]hexane-3,4'-imidazole] -1'(5'H)-yl)methyl)-N-(4,5 -dimethylisoxazol-3-yl)-2'-(ethoxymethyl)-[1,1'-biphenyl] -2-sulfonamide;

   the acid in the acid salt is selected from methanesulfonic acid, ethylsulfonic acid, hydrochloric acid, sulfuric acid, p-toluenesulfonic acid, benzenesulfonic acid, isethionic acid or hydrobromic acid.

5. The acid salt of the compound as represented by formula (I) according to claim 1, wherein the number of acid molecules is 0.2 to 3; preferably 0.2, 0.5, 1, 1.5, 2, 2.5 or 3; more preferably 0.5, 1, 2 or 3, further preferably 1;

   preferably, the acid salt is a hydrate or an anhydrate; when the acid salt is a hydrate, the number of water molecules is 0.2 to 3; preferably 0.2, 0.5, 1, 1.5, 2, 2.5 or 3; more preferably 0.5, 1, 2 or 3.

6. The acid salt of the compound as represented by formula (I) according to claim 1, wherein the acid salt is in a crystal form;

   preferably the crystal form of the acid salt of the compound 4'-((2-butyl-4-oxo-1,3-diazospiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4,5-dimethylisoxazol-3-yl)- 2'-(ethoxymethyl)-[1,1'-biphenyl] -2-sulfonamide;

the crystal form of the acid salt of 4’-((2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4-chloro-5-methylisoxazol-3-yl)-2’-(ethoxymethyl)-[1,1’-biphenyl]-2-sulfonamide;
the crystal form of the acid salt of 4’-((2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4-fluoro-5-methylisoxazol-3-yl)-2’-(ethoxymethyl)-[1,1’-biphenyl]-2-sulfonamide;
the crystal form of the acid salt of 2-[4-[(2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl]-2-(ethoxymethyl)phenyl]-N-(4-chloro-5-methyl-isoxazol-3-yl)benzenesulfonamide;
the crystal form of the acid salt of 4'-((2'-butyl-5'-oxaspiro[bicyclo[3.1.0]hexane-3,4'-imidazole] -1'(5'H)-yl)methyl)-N-(4,5 -dimethylisoxazol-3-yl)-2'-(ethoxymethyl)-[1,1'-biphenyl] -2-sulfonamide;
more preferably the crystal form of methanesulfonic acid salt, the crystal form of ethylsulfonic acid salt, the crystal form of hydrochloride salt, the crystal form of sulfuric acid salt, the crystal form of p-toluenesulfonic acid salt, the crystal form of benzenesulfonic acid salt, the crystal form of isethionic acid salt or the crystal form of hydrobromic acid salt.

7. The acid salt of the compound as represented by formula (I) according to claim 6, wherein the crystal form of the acid salt of the compound 4’-((2-butyl-4-oxo-1,3-diazaspiro[4.4]non-1-en-3-yl)methyl-d2)-N-(4-chloro-5-methylisoxazol-3-yl)-2’-(ethoxymethyl)-[1,1’-biphenyl]-2-sulfonamide is:
crystal form A of the hydrochloride salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 9.2±0.2°; or a diffraction peak at 2θ = 9.0±0.2°; or a diffraction peak at 2θ = 8.2±0.2°; or a diffraction peak at 2θ = 10.8±0.2°; or a diffraction peak at 2θ = 16.8±0.2°; or a diffraction peak at 2θ = 18.8±0.2°; or a diffraction peak at 2θ = 20.2±0.2°; or a diffraction peak at 2θ = 20.6±0.2°; or a diffraction peak at 2θ = 20.9±0.2°; or a diffraction peak at 2θ = 23.2±0.2°; or a diffraction peak at 2θ = 25.3±0.2°; or a diffraction peak at 2θ = 24.0±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;
preferably, the crystal form A of the hydrochloride salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 9.2±0.2°, 9.0±0.2° or 8.2±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 10.8±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2°, 20.9±0.2° or 23.2±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ = 9.2±0.2° or 9.0±0.2°;
9.2±0.2° or 8.2±0.2°;
9.0±0.2° or 8.2±0.2°;
9.2±0.2°, 9.0±0.2° or 8.2±0.2°;

9.2±0.2°, 8.2±0.2° or 10.8±0.2°;

9.0±0.2°, 8.2±0.2° or 10.8±0.2°;

9.2±0.2°, 9.0±0.2°, 8.2±0.2° or 10.8±0.2°;

9.2±0.2°, 8.2±0.2°, 10.8±0.2° or 16.8±0.2°;

9.0±0.2°, 8.2±0.2°, 10.8±0.2° or 16.8±0.2°;

9.2±0.2°, 9.0±0.2°, 8.2±0.2°, 10.8±0.2° or 16.8±0.2°;

9.2±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2° or 18.8±0.2°;

9.0±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2° or 18.8±0.2°;

9.2±0.2°, 9.0±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2° or 18.8±0.2°;

9.2±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2°, 18.8±0.2° or 20.2±0.2°;

9.0±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2°, 18.8±0.2° or 20.2±0.2°;

9.2±0.2°, 9.0±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2° or 20.6±0.2°;

9.2±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2° or 20.9±0.2°;

9.0±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2° or 20.9±0.2°;

more preferably, the crystal form A of the hydrochloride salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 9.2±0.2°, 9.0±0.2°, 8.2±0.2°, 10.8±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2°, 20.9±0.2°, 23.2±0.2°, 25.3±0.2° or 24.0±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

9.2±0.2°, 9.0±0.2°, 16.8±0.2° or 18.8±0.2°;

9.2±0.2°, 8.2±0.2°, 16.8±0.2° or 18.8±0.2°;

9.2±0.2°, 9.0±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2° or 20.6±0.2°;

9.2±0.2°, 8.2±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2° or 20.6±0.2°;

9.2±0.2°, 9.0±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2°, 20.9±0.2° or 23.2±0.2°;

9.2±0.2°, 8.2±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2°, 20.9±0.2° or 23.2±0.2°;

9.2±0.2°, 9.0±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2°, 20.9±0.2°, 23.2±0.2°, 25.3±0.2° or 24.0±0.2°;

9.2±0.2°, 8.2±0.2°, 16.8±0.2°, 18.8±0.2°, 20.2±0.2°, 20.6±0.2°, 20.9±0.2°, 23.2±0.2°, 25.3±0.2° or 24.0±0.2°;

further preferably, the crystal form A of the hydrochloride salt has an X-ray powder diffraction pattern substantially as shown in FIG. 1;

even further preferably, the crystal form A of the hydrochloride salt has a DSC pattern as shown in FIG. 2;

crystal form B of the hydrochloride salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 10.4±0.2°; or a diffraction peak at 2θ = 7.3±0.2°; or a diffraction peak at 2θ = 14.1±0.2°; or a diffraction peak at 2θ = 14.6±0.2°; or a diffraction peak at 2θ = 17.0±0.2°; or a diffraction peak at 2θ = 19.3±0.2°; or a diffraction peak at 2θ = 21.9±0.2°; or a diffraction peak at 2θ = 24.8±0.2°; or a diffraction peak at 2θ = 11.0±0.2°; or a diffraction peak at 2θ = 13.1±0.2°; or a diffraction peak at 2θ = 20.3±0.2°; or a diffraction peak at 2θ = 22.1±0.2°; or a diffraction peak at 2θ = 24.1±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;

preferably, the crystal form B of the hydrochloride salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 10.4±0.2°, 7.3±0.2° or 14.1±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2° or 13.1±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ = 10.4±0.2° or 7.3±0.2°;

10.4±0.2° or 14.1±0.2°;

7.3±0.2° or 14.1±0.2°;

10.4±0.2°, 7.3±0.2° or 14.1±0.2°;

10.4±0.2°, 14.1±0.2° or 14.6±0.2°;

7.3±0.2°, 14.1±0.2° or 14.6±0.2°;

10.4±0.2°, 7.3±0.2°, 14.1±0.2° or 14.6±0.2°;

10.4±0.2°, 14.1±0.2°, 14.6±0.2° or 17.0±0.2°;

7.3±0.2°, 14.1±0.2°, 14.6±0.2° or 17.0±0.2°;

10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2° or 17.0±0.2°;

10.4±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2° or 19.3±0.2°;

7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2° or 19.3±0.2°;

10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2° or 19.3±0.2°;

10.4±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2° or 21.9±0.2°;

7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2° or 21.9±0.2°;

10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2° or 24.8±0.2°;

10.4±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2° or 11.0±0.2°;

7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2° or 11.0±0.2°;

10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 24.8±0.2° or 11.0±0.2°;

10.4±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 11.0±0.2° or 13.1±0.2°;

7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 11.0±0.2° or 13.1±0.2°;
more preferably, the crystal form B of the hydrochloride salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2°, 13.1±0.2°, 20.3±0.2°, 22.1±0.2° or 24.1±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =
10.4±0.2°, 7.3±0.2°, 17.0±0.2° or 19.3±0.2°;
10.4±0.2°, 14.1±0.2°, 17.0±0.2° or 19.3±0.2°;
10.4±0.2°, 7.3±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2° or 24.8±0.2°;
10.4±0.2°, 14.1±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2° or 24.8±0.2°;
10.4±0.2°, 7.3±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2° or 13.1±0.2°;
10.4±0.2°, 14.1±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2° or 13.1±0.2°;
10.4±0.2°, 7.3±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2°, 13.1±0.2°, 20.3±0.2° or 22.1±0.2°;
10.4±0.2°, 14.1±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2°, 13.1±0.2°, 20.3±0.2° or 22.1±0.2°;
10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2° or 13.1±0.2°;
10.4±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2°, 13.1±0.2° or 20.3±0.2°;
7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 24.8±0.2°, 11.0±0.2°, 13.1±0.2° or 20.3±0.2°;
10.4±0.2°, 7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 24.8±0.2°, 11.0±0.2°, 13.1±0.2° or 20.3±0.2°;
10.4±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 11.0±0.2°, 13.1±0.2°, 20.3±0.2° or 22.1±0.2°;
7.3±0.2°, 14.1±0.2°, 14.6±0.2°, 17.0±0.2°, 19.3±0.2°, 21.9±0.2°, 11.0±0.2°, 13.1±0.2°, 20.3±0.2° or 22.1±0.2°;
further preferably, the crystal form B of the hydrochloride salt has an X-ray powder diffraction pattern substantially as shown in FIG. 3;
even further preferably, the crystal form B of the hydrochloride salt has a DSC pattern as shown in FIG. 4;
crystal form C of the hydrochloride salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 8.6±0.2°; or a diffraction peak at 2θ = 7.9±0.2°; or a diffraction

peak at 2θ = 14.7±0.2°; or a diffraction peak at 2θ = 14.9±0.2°; or a diffraction peak at 2θ = 6.3±0.2°; or a diffraction peak at 2θ = 17.4±0.2°; or a diffraction peak at 2θ = 10.3±0.2°; or a diffraction peak at 2θ = 12.4±0.2°; or a diffraction peak at 2θ = 23.8±0.2°; or a diffraction peak at 2θ = 24.8±0.2°; or a diffraction peak at 2θ = 16.0±0.2°; or a diffraction peak at 2θ = 18.2±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;

preferably, the crystal form C of the hydrochloride salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 8.6±0.2°, 7.9±0.2° or 14.7±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 14.9±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2°, 23.8±0.2° or 24.8±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ =

8.6±0.2° or 7.9±0.2°;

8.6±0.2° or 14.7±0.2°;

7.9±0.2° or 14.7±0.2°;

8.6±0.2°, 7.9±0.2° or 14.7±0.2°;

8.6±0.2°, 14.7±0.2° or 14.9±0.2°;

7.9±0.2°, 14.7±0.2° or 14.9±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2° or 14.9±0.2°;

8.6±0.2°, 14.7±0.2°, 14.9±0.2° or 6.3±0.2°;

7.9±0.2°, 14.7±0.2°, 14.9±0.2° or 6.3±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 14.9±0.2° or 6.3±0.2°;

8.6±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2° or 17.4±0.2°;

7.9±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2° or 17.4±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2° or 17.4±0.2°;

8.6±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2°, 17.4±0.2° or 10.3±0.2°;

7.9±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2°, 17.4±0.2° or 10.3±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2° or 12.4±0.2°;

8.6±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2° or 23.8±0.2°;

7.9±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2° or 23.8±0.2°;

more preferably, the crystal form C of the hydrochloride salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 14.9±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2°, 23.8±0.2°, 24.8±0.2°, 16.0±0.2° or 18.2±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

8.6±0.2°, 7.9±0.2°, 14.7±0.2° or 6.3±0.2°;

8.6±0.2°, 7.9±0.2°, 17.4±0.2° or 10.3±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 6.3±0.2°, 17.4±0.2° or 10.3±0.2°;

8.6±0.2°, 7.9±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2° or 23.8±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2° or 23.8±0.2°;

8.6±0.2°, 7.9±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2°, 23.8±0.2°, 24.8±0.2° or 16.0±0.2°;

8.6±0.2°, 7.9±0.2°, 14.7±0.2°, 6.3±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2°, 23.8±0.2°, 24.8±0.2° or 16.0±0.2°;

8.6±0.2°, 7.9±0.2°, 17.4±0.2°, 10.3±0.2°, 12.4±0.2°, 23.8±0.2°, 24.8±0.2°, 16.0±0.2° or 18.2±0.2°;

further preferably, the crystal form C of the hydrochloride salt has an X-ray powder diffraction pattern substantially as shown in FIG. 16;

crystal form A of the ethylsulfonic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 8.7±0.2°; or a diffraction peak at 2θ = 7.4±0.2°; or a diffraction peak at 2θ = 17.0±0.2°; or a diffraction peak at 2θ = 17.5±0.2°; or a diffraction peak at 2θ = 19.4±0.2°; or a diffraction peak at 2θ = 22.7±0.2°; or a diffraction peak at 2θ = 26.4±0.2°; or a diffraction peak at 2θ = 28.8±0.2°; or a diffraction peak at 2θ = 20.1±0.2°; or a diffraction peak at 2θ = 35.1±0.2°; or a diffraction peak at 2θ = 35.4±0.2°; or a diffraction peak at 2θ = 15.5±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;

preferably, the crystal form A of the ethylsulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 8.7±0.2°, 7.4±0.2° or 17.0±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 17.5±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2°, 20.1±0.2° or 35.1±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ = 8.7±0.2° or 7.4±0.2°;

8.7±0.2° or 17.0±0.2°;

7.4±0.2° or 17.0±0.2°;

8.7±0.2°, 7.4±0.2° or 17.0±0.2°;

8.7±0.2°, 17.0±0.2° or 17.5±0.2°;

7.4±0.2°, 17.0±0.2° or 17.5±0.2°;

8.7±0.2°, 7.4±0.2°, 17.0±0.2° or 17.5±0.2°;

8.7±0.2°, 17.0±0.2°, 17.5±0.2° or 19.4±0.2°;

7.4±0.2°, 17.0±0.2°, 17.5±0.2° or 19.4±0.2°;

8.7±0.2°, 7.4±0.2°, 17.0±0.2°, 17.5±0.2° or 19.4±0.2°;

8.7±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2° or 22.7±0.2°;

7.4±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2° or 22.7±0.2°;

8.7±0.2°, 7.4±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2° or 22.7±0.2°;

8.7±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2°, 22.7±0.2° or 26.4±0.2°;

7.4±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2°, 22.7±0.2° or 26.4±0.2°;

8.7±0.2°, 7.4±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2° or 28.8±0.2°;

8.7±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2° or 20.1±0.2°;

7.4±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2° or 20.1±0.2°;

more preferably, the crystal form A of the ethylsulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 8.7±0.2°, 7.4±0.2°, 17.0±0.2°, 17.5±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2°, 20.1±0.2°, 35.1±0.2°, 35.4±0.2° or 15.5±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

8.7±0.2°, 7.4±0.2°, 19.4±0.2° or 22.7±0.2°;

8.7±0.2°, 17.0±0.2°, 19.4±0.2° or 22.7±0.2°;

8.7±0.2°, 7.4±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2° or 28.8±0.2°;

8.7±0.2°, 17.0±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2° or 28.8±0.2°;

8.7±0.2°, 7.4±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2°, 20.1±0.2° or 35.1±0.2°;

8.7±0.2°, 17.0±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2°, 20.1±0.2° or 35.1±0.2°;

8.7±0.2°, 7.4±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2°, 20.1±0.2°, 35.1±0.2°, 35.4±0.2° or 15.5±0.2°;

8.7±0.2°, 17.0±0.2°, 19.4±0.2°, 22.7±0.2°, 26.4±0.2°, 28.8±0.2°, 20.1±0.2°, 35.1±0.2°, 35.4±0.2° or 15.5±0.2°;

further preferably, the crystal form A of the ethylsulfonic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 5;

crystal form B of the ethylsulfonic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 8.8±0.2°; or a diffraction peak at 2θ = 8.3±0.2°; or a diffraction peak at 2θ = 7.9±0.2°; or a diffraction peak at 2θ = 17.0±0.2°; or a diffraction peak at 2θ = 16.2±0.2°; or a diffraction peak at 2θ = 18.4±0.2°; or a diffraction peak at 2θ = 20.6±0.2°; or a diffraction peak at 2θ = 24.1±0.2°; or a diffraction peak at 2θ = 26.4±0.2°; or a diffraction peak at 2θ = 10.8±0.2°; or a diffraction peak at 2θ = 12.6±0.2°; or a diffraction peak at 2θ = 19.9±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;

preferably, the crystal form B of the ethylsulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 8.8±0.2°, 8.3±0.2° or 7.9±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 17.0±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2°, 26.4±0.2° or 10.8±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ =

8.8±0.2° or 8.3±0.2°;

8.8±0.2° or 7.9±0.2°;

8.3±0.2° or 7.9±0.2°;

8.8±0.2°, 8.3±0.2° or 7.9±0.2°

8.8±0.2°, 7.9±0.2° or 17.0±0.2°;

8.3±0.2°, 7.9±0.2° or 17.0±0.2°;

8.8±0.2°, 8.3±0.2°, 7.9±0.2° or 17.0±0.2°;

8.8±0.2°, 7.9±0.2°, 17.0±0.2° or 16.2±0.2°;

8.3±0.2°, 7.9±0.2°, 17.0±0.2° or 16.2±0.2°;

8.8±0.2°, 8.3±0.2°, 7.9±0.2°, 17.0±0.2° or 16.2±0.2°;

8.8±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2° or 18.4±0.2°;

8.3±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2° or 18.4±0.2°;

8.8±0.2°, 8.3±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2° or 18.4±0.2°;

8.8±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2°, 18.4±0.2° or 20.6±0.2°;

8.3±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2°, 18.4±0.2° or 20.6±0.2°;

8.8±0.2°, 8.3±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2° or 24.1±0.2°;

8.8±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2° or 26.4±0.2°;

8.3±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2° or 26.4±0.2°;

more preferably, the crystal form B of the ethylsulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 8.8±0.2°, 8.3±0.2°, 7.9±0.2°, 17.0±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2°, 26.4±0.2°, 10.8±0.2°, 12.6±0.2° or 19.9±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

8.8±0.2°, 8.3±0.2°, 16.2±0.2° or 18.4±0.2°;

8.8±0.2°, 7.9±0.2°, 16.2±0.2° or 18.4±0.2°;

8.8±0.2°, 8.3±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2° or 24.1±0.2°;

8.8±0.2°, 7.9±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2° or 24.1±0.2°;

8.8±0.2°, 8.3±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2°, 26.4±0.2° or 10.8±0.2°;

8.8±0.2°, 7.9±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2°, 26.4±0.2° or 10.8±0.2°;

8.8±0.2°, 8.3±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2°, 26.4±0.2°, 10.8±0.2°, 12.6±0.2° or 19.9±0.2°;

8.8±0.2°, 7.9±0.2°, 16.2±0.2°, 18.4±0.2°, 20.6±0.2°, 24.1±0.2°, 26.4±0.2°, 10.8±0.2°, 12.6±0.2° or 19.9±0.2°;

further preferably, the crystal form B of the ethylsulfonic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 6;

crystal form A of the p-toluenesulfonic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 5.8±0.2°; or a diffraction peak at 2θ = 6.2±0.2°; or a diffraction peak at 2θ = 18.6±0.2°; or a diffraction peak at 2θ = 23.2±0.2°; or a diffraction peak at 2θ = 29.1±0.2°; preferably comprising any 1, or 1-2, or 2-3 of the aforementioned diffraction peaks, more preferably comprising any 1, 2, 3, 4 or 5;

preferably, the crystal form A of the p-toluenesulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising at least a diffraction peak at 2θ = 5.8±0.2°, optionally further comprising at least one diffraction peak at 2θ = 6.2±0.2°, 18.6±0.2°, 23.2±0.2° or 29.1±0.2°, preferably comprising 1, 2, 3 or 4; for example, at 2θ =

5.8±0.2°;

5.8±0.2° or 6.2±0.2°;

5.8±0.2° or 18.6±0.2°;

5.8±0.2° or 23.2±0.2°;

5.8±0.2° or 29.1±0.2°;

5.8±0.2°, 6.2±0.2° or 18.6±0.2°;

5.8±0.2°, 18.6±0.2° or 23.2±0.2°;

5.8±0.2°, 23.2±0.2° or 29.1±0.2°;

5.8±0.2°, 6.2±0.2°, 18.6±0.2° or 23.2±0.2°;

5.8±0.2°, 18.6±0.2°, 23.2±0.2° or 29.1±0.2°;

5.8±0.2°, 6.2±0.2°, 18.6±0.2°, 23.2±0.2° or 29.1±0.2°;

more preferably, the crystal form A of the p-toluenesulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 5.8±0.2°, 6.2±0.2°, 18.6±0.2°, 23.2±0.2° or 29.1±0.2°, preferably comprising any 4, 5 or 6 of the aforementioned diffraction peaks; for example, at 2θ =

5.8±0.2°, 6.2±0.2°, 23.2±0.2° or 29.1±0.2°;

5.8±0.2°, 6.2±0.2°, 18.6±0.2° or 29.1±0.2°;

further preferably, the crystal form A of the p-toluenesulfonic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 7;

crystal form A of the methanesulfonic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 8.1±0.2°; or a diffraction peak at 2θ = 8.4±0.2°; or a diffraction peak at 2θ = 4.1±0.2°; or a diffraction peak at 2θ = 20.8±0.2°; or a diffraction peak at 2θ = 22.3±0.2°; or a diffraction peak at 2θ = 18.9±0.2°; or a diffraction peak at 2θ = 24.5±0.2°; or a diffraction peak at 2θ = 20.0±0.2°; or a diffraction peak at 2θ = 24.3±0.2°; or a diffraction peak at 2θ = 11.1±0.2°; or a diffraction peak at 2θ = 12.6±0.2°; or a diffraction peak at 2θ = 16.5±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;
preferably, the crystal form A of the methanesulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 8.1±0.2°, 8.4±0.2° or 4.1±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 20.8±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2°, 24.3±0.2° or 11.1±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ =
8.1±0.2° or 8.4±0.2°;
8.1±0.2° or 4.1±0.2°;
8.4±0.2° or 4.1±0.2°;
8.1±0.2°, 8.4±0.2° or 4.1±0.2°;
8.1±0.2°, 4.1±0.2° or 20.8±0.2°;
8.4±0.2°, 4.1±0.2° or 20.8±0.2°;
8.1±0.2°, 8.4±0.2°, 4.1±0.2° or 20.8±0.2°;
8.1±0.2°, 4.1±0.2°, 20.8±0.2° or 22.3±0.2°;
8.4±0.2°, 4.1±0.2°, 20.8±0.2° or 22.3±0.2°;
8.1±0.2°, 8.4±0.2°, 4.1±0.2°, 20.8±0.2° or 22.3±0.2°;
8.1±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2° or 18.9±0.2°;
8.4±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2° or 18.9±0.2°;
8.1±0.2°, 8.4±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2° or 18.9±0.2°;
8.1±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2°, 18.9±0.2° or 24.5±0.2°;
8.4±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2°, 18.9±0.2° or 24.5±0.2°;
8.1±0.2°, 8.4±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2° or 20.0±0.2°;
8.1±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2° or 24.3±0.2°;
8.4±0.2°, 4.1±0.2°, 20.8±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2° or 24.3±0.2°;
more preferably, the crystal form A of the methanesulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 8.1±0.2°, 8.4±0.2°,

4.1±0.2°, 20.8±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2°, 24.3±0.2°, 11.1±0.2°, 12.6±0.2° or 16.5±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

8.1±0.2°, 8.4±0.2°, 22.3±0.2° or 18.9±0.2°;

8.1±0.2°, 4.1±0.2°, 22.3±0.2° or 18.9±0.2°;

8.1±0.2°, 8.4±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2° or 20.0±0.2°;

8.1±0.2°, 4.1±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2° or 20.0±0.2°;

8.1±0.2°, 8.4±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2°, 24.3±0.2° or 11.1±0.2°;

8.1±0.2°, 4.1±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2°, 24.3±0.2° or 11.1±0.2°;

8.1±0.2°, 8.4±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2°, 24.3±0.2°, 11.1±0.2°, 12.6±0.2° or 16.5±0.2°;

8.1±0.2°, 4.1±0.2°, 22.3±0.2°, 18.9±0.2°, 24.5±0.2°, 20.0±0.2°, 24.3±0.2°, 11.1±0.2°, 12.6±0.2° or 16.5±0.2°;

further preferably, the crystal form A of the methanesulfonic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 8;

even further preferably, the crystal form A of the methanesulfonic acid salt has a DSC pattern as shown in FIG. 9;

crystal form A of the sulfuric acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 8.3±0.2°; or a diffraction peak at 2θ = 20.9±0.2°; or a diffraction peak at 2θ = 18.5±0.2°; or a diffraction peak at 2θ = 24.4±0.2°; or a diffraction peak at 2θ = 10.0±0.2°; or a diffraction peak at 2θ = 11.0±0.2°; or a diffraction peak at 2θ = 12.6±0.2°; or a diffraction peak at 2θ = 16.3±0.2°; or a diffraction peak at 2θ = 19.9±0.2°; or a diffraction peak at 2θ = 20.4±0.2°; or a diffraction peak at 2θ = 21.9±0.2°; or a diffraction peak at 2θ = 26.7±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;

preferably, the crystal form A of the sulfuric acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 8.3±0.2°, 20.9±0.2° or 18.5±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 24.4±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2°, 19.9±0.2° or 20.4±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ = 8.3±0.2° or 20.9±0.2°;

8.3±0.2° or 18.5±0.2°;

20.9±0.2° or 18.5±0.2°;

8.3±0.2°, 20.9±0.2° or 18.5±0.2°;

8.3±0.2°, 18.5±0.2° or 24.4±0.2°;

20.9±0.2°, 18.5±0.2° or 24.4±0.2°;

8.3±0.2°, 20.9±0.2°, 18.5±0.2° or 24.4±0.2°;

8.3±0.2°, 18.5±0.2°, 24.4±0.2° or 10.0±0.2°;

20.9±0.2°, 18.5±0.2°, 24.4±0.2° or 10.0±0.2°;

8.3±0.2°, 20.9±0.2°, 18.5±0.2°, 24.4±0.2° or 10.0±0.2°;

8.3±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2° or 11.0±0.2°;

20.9±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2° or 11.0±0.2°;

8.3±0.2°, 20.9±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2° or 11.0±0.2°;

8.3±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2°, 11.0±0.2° or 12.6±0.2°;

20.9±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2°, 11.0±0.2° or 12.6±0.2°;

8.3±0.2°, 20.9±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2° or 16.3±0.2°;

8.3±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2° or 19.9±0.2°;

20.9±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2° or 19.9±0.2°;

more preferably, the crystal form A of the sulfuric acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 8.3±0.2°, 20.9±0.2°, 18.5±0.2°, 24.4±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2°, 19.9±0.2°, 20.4±0.2°, 21.9±0.2° or 26.7±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

8.3±0.2°, 20.9±0.2°, 10.0±0.2° or 11.0±0.2°;

8.3±0.2°, 18.5±0.2°, 10.0±0.2° or 11.0±0.2°;

8.3±0.2°, 20.9±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2° or 16.3±0.2°;

8.3±0.2°, 18.5±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2° or 16.3±0.2°;

8.3±0.2°, 20.9±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2°, 19.9±0.2° or 20.4±0.2°;

8.3±0.2°, 18.5±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2°, 19.9±0.2° or 20.4±0.2°;

8.3±0.2°, 20.9±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2°, 19.9±0.2°, 20.4±0.2°, 21.9±0.2° or 26.7±0.2°;

8.3±0.2°, 18.5±0.2°, 10.0±0.2°, 11.0±0.2°, 12.6±0.2°, 16.3±0.2°, 19.9±0.2°, 20.4±0.2°, 21.9±0.2° or 26.7±0.2°;

further preferably, the crystal form A of the sulfuric acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 10;

even further preferably, the crystal form A of the sulfuric acid salt has a DSC pattern as shown in FIG. 11;

crystal form A of the benzenesulfonic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 5.9±0.2°; or a diffraction peak at 2θ = 23.8±0.2°; or a diffraction peak at 2θ = 17.8±0.2°; or a diffraction peak at 2θ = 29.9±0.2°; preferably comprising any 1-3 or 2-4 of the aforementioned diffraction peaks, more preferably comprising any 1, 2, 3 or 4;

preferably, the crystal form A of the benzenesulfonic acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 5.9±0.2°, 23.8±0.2°, 17.8±0.2° or 29.9±0.2°, preferably comprising two, more preferably comprising three, further preferably comprising four; for example, at 2θ =

5.9±0.2°;

5.9±0.2° or 23.8±0.2°;

5.9±0.2° or 17.8±0.2°;

5.9±0.2° or 29.9±0.2°;

5.9±0.2°, 23.8±0.2° or 17.8±0.2°;

5.9±0.2°, 17.8±0.2° or 29.9±0.2°;

5.9±0.2°, 23.8±0.2°, 17.8±0.2° or 29.9±0.2°;

further preferably, the crystal form A of the benzenesulfonic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 12;

crystal form A of the isethionic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 9.9±0.2°; or a diffraction peak at 2θ = 19.9±0.2°; or a diffraction peak at 2θ = 8.3±0.2°; or a diffraction peak at 2θ = 20.5±0.2°; or a diffraction peak at 2θ = 18.2±0.2°; or a diffraction peak at 2θ = 23.9±0.2°; or a diffraction peak at 2θ = 10.6±0.2°; preferably comprising any 2-5, or 3-5, or 3-6, or 3-7 of the aforementioned diffraction peaks, more preferably comprising any 2, 3, 4 or 5;

preferably, the crystal form A of the isethionic acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 9.9±0.2°, 19.9±0.2° or 8.3±0.2°, preferably comprising two, more preferably comprising three; optionally further comprising at least one diffraction peak at 2θ = 20.4±0.2°, 18.3±0.2°, 23.9±0.2° or 10.6±0.2°, preferably comprising 2, 3 or 4; for example, at 2θ =

9.9±0.2° or 19.9±0.2°;

9.9±0.2° or 8.3±0.2°;

19.9±0.2° or 8.3±0.2°;

9.9±0.2°, 19.9±0.2° or 8.3±0.2°;

9.9±0.2°, 8.3±0.2° or 20.4±0.2°;

19.9±0.2°, 8.3±0.2° or 20.4±0.2°;

9.9±0.2°, 19.9±0.2°, 8.3±0.2° or 20.4±0.2°;

9.9±0.2°, 8.3±0.2°, 20.4±0.2° or 18.2±0.2°;

19.9±0.2°, 8.3±0.2°, 20.4±0.2° or 18.2±0.2°;

9.9±0.2°, 19.9±0.2°, 8.3±0.2°, 20.4±0.2° or 18.2±0.2°;

9.9±0.2°, 8.3±0.2°, 20.4±0.2°, 18.2±0.2° or 23.9±0.2°;

19.9±0.2°, 8.3±0.2°, 20.4±0.2°, 18.2±0.2° or 23.9±0.2°;

9.9±0.2°, 19.9±0.2°, 8.3±0.2°, 20.4±0.2°, 18.2±0.2° or 23.9±0.2°;

9.9±0.2°, 8.3±0.2°, 20.4±0.2°, 18.2±0.2°, 23.9±0.2° or 10.6±0.2°;

19.9±0.2°, 8.3±0.2°, 20.4±0.2°, 18.2±0.2°, 23.9±0.2° or 10.6±0.2°;

9.9±0.2°, 19.9±0.2°, 8.3±0.2°, 20.4±0.2°, 18.2±0.2°, 23.9±0.2° or 10.6±0.2°;

more preferably, the crystal form A of the isethionic acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 9.9±0.2°, 19.9±0.2°, 8.3±0.2°, 20.5±0.2°, 18.2±0.2°, 23.9±0.2° or 10.6±0.2°, preferably comprising any 4, 5 or 6 of the aforementioned diffraction peaks; for example, at 2θ =

9.9±0.2°, 19.9±0.2°, 20.4±0.2° or 18.2±0.2°;

9.9±0.2°, 8.3±0.2°, 20.5±0.2° or 18.2±0.2°;

9.9±0.2°, 19.9±0.2°, 20.5±0.2°, 18.2±0.2°, 23.9±0.2° or 10.6±0.2°;

9.9±0.2°, 8.3±0.2°, 20.5±0.2°, 18.2±0.2°, 23.9±0.2° or 10.6±0.2°;

further preferably, the crystal form A of the isethionic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 13;

even further preferably, the crystal form A of the isethionic acid salt has a DSC pattern as shown in FIG. 14;

crystal form A of the hydrobromic acid salt, characterized by an X-ray powder diffraction pattern having a diffraction peak at 2θ = 30.0±0.2°; or a diffraction peak at 2θ = 22.3±0.2°; or a diffraction peak at 2θ = 25.9±0.2°; or a diffraction peak at 2θ = 29.7±0.2°; or a diffraction peak at 2θ = 17.0±0.2°; or a diffraction peak at 2θ = 35.7±0.2°; or a diffraction peak at 2θ = 33.3±0.2°; or a diffraction peak at 2θ = 23.4±0.2°; or a diffraction peak at 2θ = 28.6±0.2°; or a diffraction peak at 2θ = 28.8±0.2°; or a diffraction peak at 2θ = 18.1±0.2°; or a diffraction peak at 2θ = 26.6±0.2°; preferably comprising any 2 to 5, or 3 to 5, or 3 to 6, or 3 to 8, or 5 to 8, or 6 to 8 of the aforementioned diffraction peaks, more preferably comprising any 6, 7 or 8;

preferably, the crystal form A of the hydrobromic acid salt is characterized by an X-ray powder diffraction pattern comprising at least one or more diffraction peaks at 2θ = 30.0±0.2°, 22.3±0.2° or 25.9±0.2°, preferably comprising two, more preferably comprising three; optionally further

comprising at least one diffraction peak at 2θ = 29.7±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2°, 28.6±0.2° or 28.8±0.2°, preferably comprising 2, 3, 4 or 5; for example, at 2θ =

30.0±0.2° or 22.3±0.2°;

30.0±0.2° or 25.9±0.2°;

22.3±0.2° or 25.9±0.2°;

30.0±0.2°, 22.3±0.2° or 25.9±0.2°;

30.0±0.2°, 25.9±0.2° or 29.7±0.2°;

22.3±0.2°, 25.9±0.2° or 29.7±0.2°;

30.0±0.2°, 22.3±0.2°, 25.9±0.2° or 29.7±0.2°;

30.0±0.2°, 25.9±0.2°, 29.7±0.2° or 17.0±0.2°;

22.3±0.2°, 25.9±0.2°, 29.7±0.2° or 17.0±0.2°;

30.0±0.2°, 22.3±0.2°, 25.9±0.2°, 29.7±0.2° or 17.0±0.2°;

30.0±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2° or 35.7±0.2°;

22.3±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2° or 35.7±0.2°;

30.0±0.2°, 22.3±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2° or 35.7±0.2°;

30.0±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2°, 35.7±0.2° or 33.3±0.2°;

22.3±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2°, 35.7±0.2° or 33.3±0.2°;

30.0±0.2°, 22.3±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2° or 23.4±0.2°;

30.0±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2° or 28.6±0.2°;

22.3±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2° or 28.6±0.2°;

more preferably, the crystal form A of the hydrobromic acid salt is characterized by an X-ray powder diffraction pattern comprising one or more diffraction peaks at 2θ = 30.0±0.2°, 22.3±0.2°, 25.9±0.2°, 29.7±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2°, 28.6±0.2°, 28.8±0.2°, 18.1±0.2° or 26.6±0.2°, preferably comprising any 4, 5, 6, 8 or 10 of the aforementioned diffraction peaks; for example, at 2θ =

30.0±0.2°, 22.3±0.2°, 17.0±0.2° or 35.7±0.2°;

30.0±0.2°, 25.9±0.2°, 17.0±0.2° or 35.7±0.2°;

30.0±0.2°, 22.3±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2° or 23.4±0.2°;

30.0±0.2°, 25.9±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2° or 23.4±0.2°;

30.0±0.2°, 22.3±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2°, 28.6±0.2° or 28.8±0.2°;

30.0±0.2°, 25.9±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2°, 28.6±0.2° or 28.8±0.2°;

30.0±0.2°, 22.3±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2°, 28.6±0.2°, 28.8±0.2°, 18.1±0.2° or 26.6±0.2°;

30.0±0.2°, 25.9±0.2°, 17.0±0.2°, 35.7±0.2°, 33.3±0.2°, 23.4±0.2°, 28.6±0.2°, 28.8±0.2°, 18.1±0.2° or 26.6±0.2°;

further preferably, the crystal form A of the hydrobromic acid salt has an X-ray powder diffraction pattern substantially as shown in FIG. 15.

8. The acid salt of the compound as represented by formula (I) according to claim 7, wherein the crystal form A of the hydrochloride salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top ten relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 1 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form B of the hydrochloride salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top ten relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 3 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the ethylsulfonic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top ten relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 5 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form B of the ethylsulfonic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top ten relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 6 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the p-toluenesulfonic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top six relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 7 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the methanesulfonic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top four relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 8 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the sulfuric acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top ten relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 10 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the benzenesulfonic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top ten relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 12 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the isethionic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top seven relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 13 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form A of the hydrobromic acid salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top five relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 15 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°;

the crystal form C of the hydrochloride salt exhibits an X-ray powder diffraction pattern wherein the 2θ error between the diffraction peaks with the top five relative peak intensities and the diffraction peaks at the corresponding positions in FIG. 16 is ±0.2° to ±0.5°, preferably ±0.2° to ±0.3°, most preferably ±0.2°.

9. The acid salt of the compound as represented by formula (I) according to claim 7, wherein the crystal form of the acid salt is a hydrate or an anhydrate, and when the crystal form of the acid salt is a hydrate, the number of water molecules is 0.2 to 3, preferably 0.2, 0.5, 1, 1.5, 2, 2.5 or 3, more preferably 0.5, 1, 2 or 3; further, the water in the hydrate exists as channel water, or crystal water, or a combination thereof.

10. A method for preparing the acid salt of the compound as represented by formula (I) according to any one of claims 1 to 9, comprising the following steps:

1) weighing an appropriate amount of a free base and dissolving the free base in a benign solvent;

2) weighing an appropriate amount of a counter-ion acid and dissolving the counter-ion acid in an organic solvent, wherein the counter-ion acid is preferably used in an amount of 1.0 to 1.5 equivalents;

3) combining the aforementioned two solutions, and stirring the combined solution to allow precipitation, or dropwise adding a poor solvent followed by the stirring to allow precipitation; and

4) rapidly centrifuging the resultant or leaving the resultant to stand for blow drying to obtain a target product,

wherein

the benign solvent is selected from one or more of acetone, tetrahydrofuran, ethyl formate, ethyl acetate, 2-methyl-tetrahydrofuran, 2-butanone, n-butanol, 1,4-dioxane, isobutanol, N,N-dimethylformamide, N,N-dimethylacetamide, n-propanol or tert-butanol; preferably one or more of 2-methyl-tetrahydrofuran, ethyl acetate, 2-butanone, acetone or ethyl formate;
the organic solvent is selected from one or more of methanol, ethanol, ethyl acetate, dichloromethane, acetone, n-hexane, petroleum ether, benzene, toluene, chloroform, acetonitrile, carbon tetrachloride, dichloroethane, tetrahydrofuran, 2-methyl-tetrahydrofuran, 2-butanone, 3-pentanone, heptane, methyl tert-butyl ether, isopropyl ether, 1,4-dioxane, tert-butanol or N,N-dimethylformamide; preferably one or more of methanol, ethanol or acetonitrile;
the poor solvent is selected from one or more of heptane, water, methyl tert-butyl ether, cyclohexane, toluene, isopropyl ether or ethyl acetate; preferably one or more of water, methyl tert-butyl ether or isopropyl ether;
the counter-ion acid is selected from hydrochloric acid, sulfuric acid, nitric acid, hydrobromic acid, hydrofluoric acid, hydroiodic acid, phosphoric acid, 2,5-dihydroxybenzoic acid, 1-hydroxy-2-naphthoic acid, acetic acid, dichloroacetic acid, trichloroacetic acid, acetohydroxamic acid, adipic acid, benzenesulfonic acid, 4-chlorobenzenesulfonic acid, benzoic acid, 4-acetamidobenzoic acid, 4-aminobenzoic acid, capric acid, caproic acid, caprylic acid, cinnamic acid, citric acid, cyclohexanesulfamic acid, camphorsulfonic acid, aspartic acid, camphoric acid, gluconic acid, glucuronic acid, glutamic acid, isoascorbic acid, lactic acid, malic acid, mandelic acid, pyroglutamic acid, tartaric acid, dodecyl sulfate, dibenzoyltartaric acid, ethane-1,2-disulfonic acid, ethylsulfonic acid, isethionic acid, formic acid, fumaric acid, galactosonic acid, gentisic acid, glutaric acid, 2-ketoglutaric acid, glycolic acid, hippuric acid, isethionic acid, lactobionic acid, ascorbic acid, aspartic acid, lauric acid, camphoric acid, maleic acid, malonic acid, methanesulfonic acid, 1,5-naphthalene disulfonic acid, naphthalene-2-sulfonic acid, nicotinic acid, oleic acid, orotic acid, oxalic acid, palmitic acid, pamoic acid, propanoic acid, salicylic acid, 4-aminosalicylic acid, sebacic acid, stearic acid, butanedioic acid, thiocyanic acid, pamoic acid, formic acid, undecylenic acid, trifluoroacetic acid, p-toluenesulfonic acid or L-malic acid; preferably methanesulfonic acid, ethylsulfonic acid, hydrochloric acid, sulfuric acid, p-toluenesulfonic acid, benzenesulfonic acid, isethionic acid or hydrobromic acid;
alternatively, comprising the following steps:
1) weighing an appropriate amount of a free base and suspending the free base with a poor solvent;

2) weighing an appropriate amount of a counter-ion acid and dissolving the counter-ion acid in an organic solvent, wherein the counter-ion acid is preferably used in an amount of 1.0 to 1.5 equivalents;

3) adding the aforementioned solution to the aforementioned suspension and stirring the mixed solution for 2 hours;

4) rapidly centrifuging the resultant or leaving the resultant to stand for blow drying to obtain a salt of a compound as represented by general formula (I),

wherein

the poor solvent is selected from one or more of ethanol, ethyl acetate, ethyl formate, isopropanol, isopropyl acetate, methyl tert-butyl ether, dichloromethane, methanol, acetonitrile, chlorobenzene, benzene, toluene, n-butanol, isobutanol or 3-pentanone; preferably one or more of ethanol, ethyl acetate, isopropanol or isopropyl acetate;

the organic solvent is selected from one or more of methanol, ethanol, ethyl acetate, dichloromethane, acetone, n-hexane, petroleum ether, benzene, toluene, chloroform, acetonitrile, carbon tetrachloride, dichloroethane, tetrahydrofuran, 2-methyl-tetrahydrofuran, 2-butanone, 3-pentanone, heptane, methyl tert-butyl ether, isopropyl ether, 1,4-dioxane, tert-butanol or N,N-dimethylformamide; preferably one or more of methanol, ethanol or acetonitrile;

the counter-ion acid is selected from hydrochloric acid, sulfuric acid, nitric acid, hydrobromic acid, hydrofluoric acid, hydroiodic acid, phosphoric acid, 2,5-dihydroxybenzoic acid, 1-hydroxy-2-naphthoic acid, acetic acid, dichloroacetic acid, trichloroacetic acid, acetohydroxamic acid, adipic acid, benzenesulfonic acid, 4-chlorobenzenesulfonic acid, benzoic acid, 4-acetamidobenzoic acid, 4-aminobenzoic acid, capric acid, caproic acid, caprylic acid, cinnamic acid, citric acid, cyclohexanesulfamic acid, camphorsulfonic acid, aspartic acid, camphoric acid, gluconic acid, glucuronic acid, glutamic acid, isoascorbic acid, lactic acid, malic acid, mandelic acid, pyroglutamic acid, tartaric acid, dodecyl sulfate, dibenzoyltartaric acid, ethane-1,2-disulfonic acid, ethylsulfonic acid, isethionic acid, formic acid, fumaric acid, galactosonic acid, gentisic acid, glutaric acid, 2-ketoglutaric acid, glycolic acid, hippuric acid, isethionic acid, lactobionic acid, ascorbic acid, aspartic acid, lauric acid, camphoric acid, maleic acid, malonic acid, methanesulfonic acid, 1,5-naphthalene disulfonic acid, naphthalene-2-sulfonic acid, nicotinic acid, oleic acid, orotic acid, oxalic acid, palmitic acid, pamoic acid, propanoic acid, salicylic acid, 4-aminosalicylic acid, sebacic acid, stearic acid, butanedioic acid, thiocyanic acid, pamoic acid, formic acid, undecylenic acid, trifluoroacetic acid, p-toluenesulfonic acid or L-malic acid; preferably methanesulfonic acid, ethylsulfonic acid, hydrochloric acid, sulfuric acid, p-toluenesulfonic acid, benzenesulfonic acid, isethionic acid or hydrobromic acid.

11. A pharmaceutical composition, comprising a therapeutically effective amount of the acid salt of the compound as represented by formula (I) according to any one of claims 1 to 9, and one or more pharmaceutically acceptable carriers or excipients, wherein
preferably, the compound as represented by formula (I) has a weight percentage of 0.1% to 95%, preferably 0.5% to 85%, more preferably 1% to 60%, further preferably 10% to 50%, even further preferably 15% to 40%, yet further preferably 20% to 30%, most preferably 20% to 25%.
12. Use of the acid salt of the compound as represented by formula (I) according to any one of claims 1 to 9, and the pharmaceutical composition according to claim 11 in the preparation of a medicament for treating an angiotensin II-dependent or endothelin-dependent disease;
particularly, in the preparation of a medicament for treating a disease with dual angiotensin-dependent and endothelin-dependent mechanisms;
alternatively, in the preparation of a medicament for treating pain, sexual dysfunction, hypoxia and an ischemic disease, dementia, a neurological disease, a liver disease, cancer, hypertension, diabetes or a kidney disease, wherein the kidney disease is selected from diseases or conditions related to kidney, glomerular or glomerular mesangial cell function, preferably focal segmental glomerulosclerosis or IgA nephropathy.
13. The acid salt of the compound as represented by formula (I) according to any one of claims 1 to 9, and the pharmaceutical composition according to claim 11 for use in therapy.