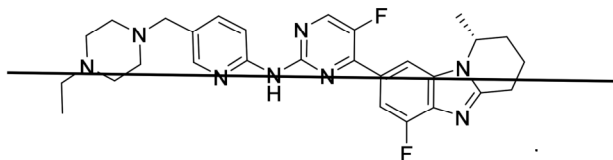


Claims

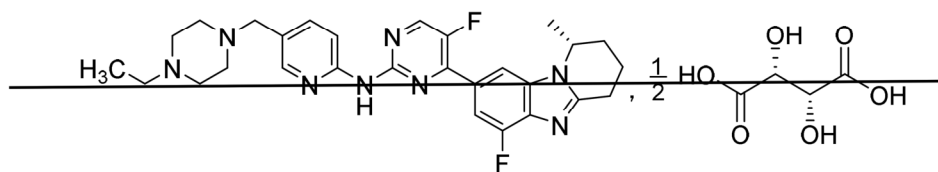
1. A salt of a compound as shown in Formula I or a crystal form of the salt:



Formula I.

2. The salt or the crystal form of the salt according to claim 1, wherein, the salt is tartaric acid salt, wherein, the tartaric acid salt is L-tartaric acid salt.

3. The salt or the crystal form of the salt according to claim 2, wherein, the tartaric acid salt has a structure as shown in Formula II:



Formula II.

4. A crystal form of a compound as shown in Formula II.

5. The crystal form according to claim 4, wherein, the X-ray powder diffraction pattern of the crystal form has characteristic peaks at the diffraction angle 2θ of $4.4 \pm 0.2^\circ$, $23.6 \pm 0.2^\circ$ and $26.9 \pm 0.2^\circ$.

6. The crystal form according to claim 5, wherein, the X-ray powder diffraction pattern of the crystal form has characteristic peaks at the diffraction angle 2θ of $4.4 \pm 0.2^\circ$, $8.7 \pm 0.2^\circ$, $10.8 \pm 0.2^\circ$, $18.4 \pm 0.2^\circ$, $23.6 \pm 0.2^\circ$ and $26.9 \pm 0.2^\circ$.

7. The crystal form according to claim 6, wherein, the X-ray powder diffraction pattern of the crystal form has characteristic peaks at the diffraction angle 2θ of $4.4 \pm 0.2^\circ$, $8.7 \pm 0.2^\circ$, $10.8 \pm 0.2^\circ$, $15.9 \pm 0.2^\circ$, $18.4 \pm 0.2^\circ$, $23.6 \pm 0.2^\circ$ and $26.9 \pm 0.2^\circ$.

8. The crystal form according to claim 4, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 1.

9. The crystal form according to claim 4, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 12.

10. The crystal form according to claim 4, wherein, the crystal form is prepared by following steps:

1) suspending (R)-N-(5-((4-ethylpiperazin-1-yl)methyl)pyridin-2-yl)-5-fluoro-4-(6-fluoro-1-methyl-1,2,3,4-tetrahydrobenzo[4,5]imidazo[1,2-a]pyridin-8-yl)pyrimidin-2-amine (the compound as shown in Formula I) in water and /or a water-soluble organic solvent, obtaining a suspension;

2) heating the suspension to 50 °C or more;

3) keeping the temperature at 50 °C or more, adding L-tartaric acid to the suspension, and carrying out an acidification treatment, obtaining a clear solution;

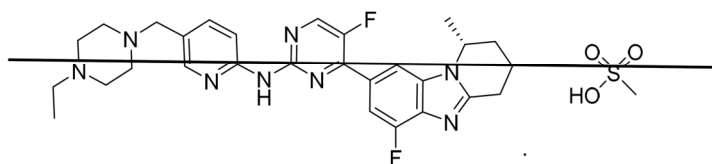
4) cooling the clear solution to room temperature, filtering while stirring, drying the filter cake, obtaining the crystal form according to claim 4.

11. The crystal form according to any one of claims 4-10, wherein, the crystal form is prepared by following steps:

dissolving the compound as shown in Formula I in methanol at 50-70 °C to obtain a clear solution, dissolving L-tartaric acid in methanol, adding the solution of L-tartaric acid in methanol dropwise to the solution of the compound as shown in Formula I in methanol, filtering after stirring, drying a filter cake at 40-70 °C, obtaining the crystal form according to any one of claims 4-10.

12. A crystal form of L-tartaric acid salt of the compound as shown in Formula I, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 3.

13. A compound of Formula III or a crystal form thereof:



Formula III.

14. The crystal form according to claim 13, wherein, the crystal form is prepared by following steps:

1) suspending (R)-N-(5-((4-ethylpiperazin-1-yl)methyl)pyridin-2-yl)-5-fluoro-4-

(6-fluoro-1-methyl-1,2,3,4-tetrahydrobenzo[4,5]imidazo[1,2-a]pyridin-8-yl)pyrimidin-2-amine (the compound as shown in Formula I) in water and /or a water-soluble organic solvent, obtaining a suspension;

2) heating the suspension to 50 °C or more;

3) keeping the temperature at 50 °C or more, adding methanesulfonic acid to the

suspension, and carrying out an acidification treatment, obtaining a clear solution;

4) — cooling the clear solution to room temperature, filtering while stirring, drying the filter cake, obtaining the crystal form according to claim 13.

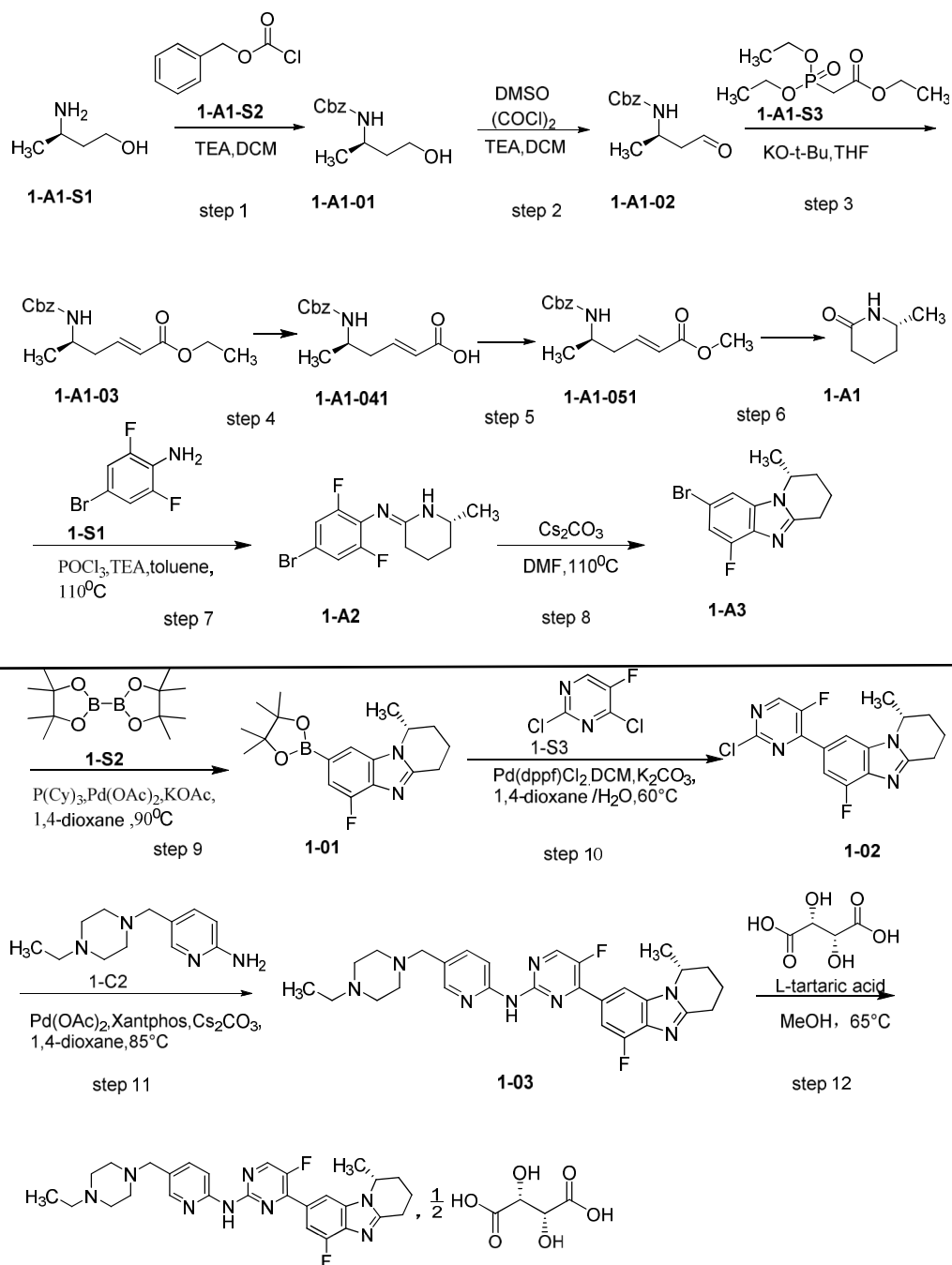
15. The crystal form according to claim 13, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 5.

16. The crystal form according to claim 13, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 6.

17. The crystal form according to claim 13, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 7.

18. The crystal form according to claim 13, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 8.

19. A method for preparing L-tartaric acid salt of (R)-N-(5-((4-ethylpiperazin-1-yl)methyl)pyridin-2-yl)-5-fluoro-4-(6-fluoro-1-methyl-1,2,3,4-tetrahydrobenzo[4,5]imidazo[1,2-a]pyridin-8-yl)pyrimidin-2-amine (the compound as shown in Formula II), comprising:



20. A pharmaceutical composition, comprising a therapeutically effective amount of the crystal form according to any one of claims 4-12, and pharmaceutically acceptable excipients, auxiliaries and/or carriers.

5 21. A pharmaceutical composition, comprising a therapeutically effective amount of the compound and /or the crystal form thereof according to any one of claims 13-18, and pharmaceutically acceptable excipients, auxiliaries and/or carriers.

22. Use of the salt and /or the crystal form according to any one of claims 1-18 or the pharmaceutical composition according to any one of claims 20-21 in the manufacture of a

~~medicament for the treatment of a disease, disorder or condition in a patient, wherein, the disease, disorder or condition is mediated by CDK, such as CDK4 and /or CDK6.~~

~~23. The use according to claim 22, wherein the disease, disorder or condition is a cancer and /or proliferative disease.~~

5 ~~24. The use according to claim 22 or 23, wherein the disease, disorder or condition is breast cancer, lung cancer, melanoma, colon cancer, liver cancer, pancreatic cancer, brain cancer, kidney cancer, ovarian cancer, gastric cancer, skin cancer, bone cancer, glioma, lymphoma, neuroblastoma, hepatocellular carcinoma, papillary renal cell carcinoma and /or squamous cell carcinoma of the head and neck.~~

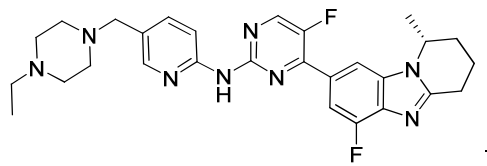
10 ~~25. A method of treating a disease mediated by CDK, such as CDK4 and /or CDK6, comprising administering the salt and /or the crystal form according to any one of claims 1-18 or the pharmaceutical composition according to any one of claims 20-21 to a subject.~~

~~26. The method according to claim 25, wherein the disease is a cancer and /or proliferative disease.~~

15 ~~27. The method according to claim 25 or 26, wherein the disease is breast cancer, lung cancer, melanoma, colon cancer, liver cancer, pancreatic cancer, brain cancer, kidney cancer, ovarian cancer, gastric cancer, skin cancer, bone cancer, glioma, lymphoma, neuroblastoma, hepatocellular carcinoma, papillary renal cell carcinoma and /or squamous cell carcinoma of the head and neck.~~

20 ~~28. The method according to any one of claims 25-27, wherein, the subject is a human.~~

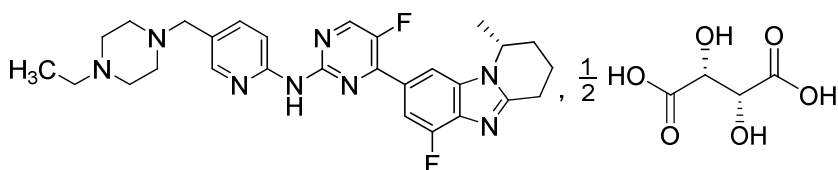
1. A salt of a compound as shown in Formula I or a crystal form of the salt:



Formula I.

2. The salt or the crystal form of the salt according to claim 1, wherein, the salt is tartaric acid salt, wherein, the tartaric acid salt is L-tartaric acid salt.

3. The salt or the crystal form of the salt according to claim 2, wherein, the tartaric acid salt has a structure as shown in Formula II:



Formula II.

4. A crystal form of a compound as shown in Formula II.

5. The crystal form according to claim 4, wherein, the X-ray powder diffraction pattern of the crystal form has characteristic peaks at the diffraction angle 2θ of $4.4\pm 0.2^\circ$, $23.6\pm 0.2^\circ$ and $26.9\pm 0.2^\circ$.

6. The crystal form according to claim 5, wherein, the X-ray powder diffraction pattern of the crystal form has characteristic peaks at the diffraction angle 2θ of $4.4\pm 0.2^\circ$, $8.7\pm 0.2^\circ$, $10.8\pm 0.2^\circ$, $18.4\pm 0.2^\circ$, $23.6\pm 0.2^\circ$ and $26.9\pm 0.2^\circ$.

7. The crystal form according to claim 6, wherein, the X-ray powder diffraction pattern of the crystal form has characteristic peaks at the diffraction angle 2θ of $4.4\pm 0.2^\circ$, $8.7\pm 0.2^\circ$, $10.8\pm 0.2^\circ$, $15.9\pm 0.2^\circ$, $18.4\pm 0.2^\circ$, $23.6\pm 0.2^\circ$ and $26.9\pm 0.2^\circ$.

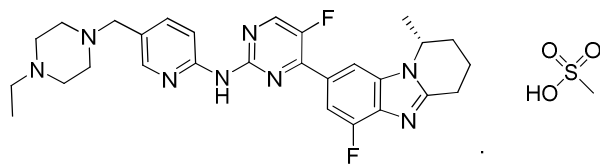
8. The crystal form according to claim 4, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 1.

9. The crystal form according to claim 4, wherein, the crystal form approximately has

an X-ray powder diffraction pattern as shown in Fig. 12.

10. A crystal form of L-tartaric acid salt of the compound as shown in Formula I, wherein, the crystal form approximately has an X-ray powder diffraction pattern as shown in Fig. 3.

11. A compound of Formula III or a crystal form thereof:



Formula III.

12. A method for preparing L-tartaric acid salt of (R)-N-(5-((4-ethylpiperazin-1-yl)methyl)pyridin-2-yl)-5-fluoro-4-(6-fluoro-1-methyl-1,2,3,4-tetrahydrobenzo[4,5]imidazo[1,2-a]pyridin-8-yl)pyrimidin-2-amine (the compound as shown in Formula II), comprising:

pharmaceutically acceptable excipients, auxiliaries and /or carriers.

15. Use of the salt and /or the crystal form according to any one of claims 1-11 or the pharmaceutical composition according to any one of claims 13-14 in the manufacture of a medicament for the treatment of a disease, disorder or condition in a patient, wherein, the disease, disorder or condition is mediated by CDK, such as CDK4 and /or CDK6.

16. The use according to claim 15, wherein the disease, disorder or condition is a cancer and /or proliferative disease.

17. The use according to claim 15 or 16, wherein the disease, disorder or condition is breast cancer, lung cancer, melanoma, colon cancer, liver cancer, pancreatic cancer, brain cancer, kidney cancer, ovarian cancer, gastric cancer, skin cancer, bone cancer, glioma, lymphoma, neuroblastoma, hepatocellular carcinoma, papillary renal cell carcinoma and /or squamous cell carcinoma of the head and neck.