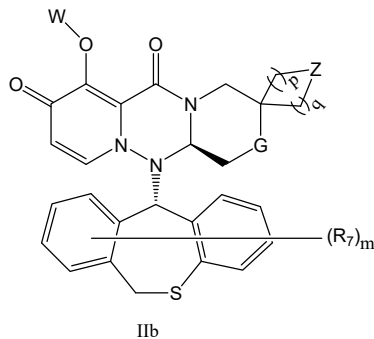
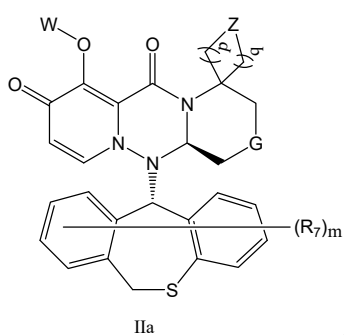


CLAIMS

What is claimed is:

- 5 1. A pyridone derivative represented by Formula IIa or Formula IIb or a stereoisomer, a pharmaceutically acceptable salt, a solvate or a crystal thereof,



wherein:

- 10 (1) m is 0, 1, 2, 3, 4 or 5, and R₇ is selected from hydrogen, hydroxy, cyano, halogen, carboxyl, ester, sulfonyl amide, amide; or, R₇ is selected from the following unsubstituted or substituted groups: C₁₋₆ hydrocarbyl, C₁₋₆ hydrocarbyloxy, C₁₋₆ hydrocarbylamino, C₁₋₆ hydrocarbylsulfydryl, carbonyl hydrazide, C₁₋₆ hydrocarbyl carbonyl, C₁₋₆ hydrocarbylamino carbonyl, C₁₋₆ hydrocarbylcarbonyl amino, C₁₋₆ hydrocarbyloxy carbonyl, C₁₋₆ hydrocarbylsulfinyl, C₁₋₆ hydrocarbylamino carbonylamino, C₄₋₈ heterocycloalkyl, C₄₋₈ heterocycloalkoxy, C₄₋₈ heterocycloalkylamino, C₄₋₈ heterocycloalkyl sulfydryl, C₄₋₈ heterocycloalkyl carbonyl, C₄₋₈ heterocycloalkylamino carbonyl, C₅₋₁₀ aryl, C₅₋₁₀ aryloxy, C₅₋₁₀ aryloxy hydrocarbyl, C₅₋₁₀ arylamino, C₅₋₁₀ aryl sulfydryl, C₅₋₁₀ aryl carbonyl, C₁₋₆ hydrocarbyl sulfonyl, C₁₋₆ hydrocarbyl sulfonylamino, C₅₋₁₀ aryl sulfonyl, C₅₋₁₀ aryl sulfonylamino, aminooxalyl amino, aminooxalyl, C₅₋₁₀ arylamino carbonyl or C₅₋₁₀ arylamino carbonylamino;

- (2) W is hydrogen or W is selected from the following groups: (a) -C(=O)-R₈; (b) -C(=O)-(CH₂)_k-R₈, k is selected from 0-3; (c) -C(=O)-O-(CH₂)_k-R₈, k is selected from 0-3; (d) -CH₂-O-R₈; (e) -CH₂-O-C(=O)-R₈; (f) -CH₂-O-C(=O)-O-R₈; (g) -CH(-CH₃)-O-C(=O)-R₈; (h) -CH(-CH₃)-O-C(=O)-O-(CH₂)_k-R₈, k is selected from 0-3; (i) -CH₂-O-P(=O)(OH)₂; (j) -CH₂-O-P(=O)(OPh)(NHR₈); (k) -CH₂-O-P(=O)(OCH₂OC(=O)OR₈)₂; R₈ is selected from the following unsubstituted or substituted groups: C₁₋₆ hydrocarbyl, C₁₋₆ hydrocarbyloxy, C₁₋₆ hydrocarbylamino, C₁₋₆ hydrocarbylsulfydryl, carbonyl hydrazide, C₁₋₆ hydrocarbyl carbonyl,

- C₁₋₆ hydrocarbylamino carbonyl, C₁₋₆ hydrocarbylcarbonyl amino, C₁₋₆ hydrocarbyloxy carbonyl, C₁₋₆ hydrocarbylsulfinyl, C₁₋₆ hydrocarbylamino carbonylamino, C₄₋₈ heterocycloalkyl, C₄₋₈ heterocycloalkoxy, C₄₋₈ heterocycloalkylamino, C₄₋₈ heterocycloalkyl sulfydryl, C₄₋₈ heterocycloalkyl carbonyl, C₄₋₈ heterocycloalkylamino carbonyl, C₅₋₁₀ aryl, C₅₋₁₀ aryloxy, C₅₋₁₀ aryloxy hydrocarbyl, C₅₋₁₀ arylamino, C₅₋₁₀ aryl sulfydryl, C₅₋₁₀ aryl carbonyl, C₁₋₆ hydrocarbyl sulfonyl, C₁₋₆ hydrocarbyl sulfonylamino, C₅₋₁₀ aryl sulfonyl, C₅₋₁₀ aryl sulfonylamino, aminooxalyl amino, aminooxalyl, C₅₋₁₀ arylamino carbonyl or C₅₋₁₀ arylamino carbonylamino;
- (3) G is O;
- (4) Z is selected from CH₂, O or S;
- (5) p and q are respectively 0, 1 or 2, and the two are not 0 at the same time, and when Z is O or S, p+q is greater than or equal to 2.

2. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to claim 1, wherein,

R₇ is selected from hydrogen, hydroxy, cyano, halogen, carboxyl, sulfonyl amide or amide; or, R₇ is selected from the following unsubstituted or substituted groups: C₁₋₆ hydrocarbyl, C₁₋₆ hydrocarbyloxy, C₁₋₆ hydrocarbylamino, C₁₋₆ hydrocarbylsulfydryl, carbonyl hydrazide, C₁₋₆ hydrocarbyl carbonyl, C₁₋₆ hydrocarbylamino carbonyl, C₁₋₆ hydrocarbylcarbonyl amino, C₁₋₆ hydrocarbyloxy carbonyl, C₁₋₆ hydrocarbylsulfinyl, C₁₋₆ hydrocarbylamino carbonylamino, C₁₋₆ hydrocarbyl sulfonyl or C₁₋₆ hydrocarbyl sulfonylamino;

and/or, R₈ is selected from the following unsubstituted or substituted groups: C₁₋₆ hydrocarbyl, C₁₋₆ hydrocarbyloxy, C₁₋₆ hydrocarbylamino, C₁₋₆ hydrocarbylsulfydryl, carbonyl hydrazide, C₁₋₆ hydrocarbyl carbonyl, C₁₋₆ hydrocarbylamino carbonyl, C₁₋₆ hydrocarbylcarbonyl amino, C₁₋₆ hydrocarbyloxy carbonyl, C₁₋₆ hydrocarbylsulfinyl, C₁₋₆ hydrocarbylamino carbonylamino, C₁₋₆ hydrocarbyl sulfonyl or C₁₋₆ hydrocarbyl sulfonylamino;

and/or, the substituted groups are groups with its hydrogen atom replaced with 1,2, 3 or more substituents selected from cyano, F, Cl, Br, hydroxy, carboxyl, ester, sulfonyl, sulphonylamino, amide, carbonyl, methylsulfinylamino, ethylsulfinylamino, isopropylsulfinylamino, tert-butylsulfinylamino, amino, carbonyl hydrazide, methyl, ethyl, n-propyl, isopropyl, cyclopropyl, n-butyl, isobutyl, tert-butyl, cyclobutyl, n-pentyl, isopentyl, neopentyl, cyclohexyl, halomethyl, haloethyl, halo-n-propyl, halo-isopropyl, halocyclopropyl,

halo-n-butyl, halo-isobutyl, halo-tert-butyl, halocyclobutyl, hydroxymethyl, hydroxyethyl, hydroxy-n-propyl, hydroxyisopropyl, hydroxycyclopropyl, hydroxy-n-butyl, hydroxyisobutyl, hydroxy-tert-butyl, hydroxycyclobutyl, hydroxy-n-pentyl, hydroxyisopentyl, hydroxy neopentyl, hydroxycyclohexyl, methoxy, ethoxy or propoxy.

5

3. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to claim 2, wherein,

R₇ is selected from hydrogen, hydroxy, cyano, halogen, carboxyl, sulfonyl amide or amide; or, R₇ is selected from the following unsubstituted or substituted groups: C₁₋₆ alkyl, C₁₋₆ alkoxy, C₁₋₆ alkylamino, C₁₋₆ alkylsulfydryl, carbonyl hydrazide, C₁₋₆ alkyl carbonyl, C₁₋₆ alkylamino carbonyl, C₁₋₆ alkylcarbonyl amino, C₁₋₆ alkoxy carbonyl, C₁₋₆ alkylsulfinyl, C₁₋₆ alkylamino carbonylamino, C₁₋₆ alkyl sulfonyl or C₁₋₆ alkyl sulfonylamino;

and/or, R₈ is selected from the following unsubstituted or substituted groups: C₁₋₆ alkyl, C₁₋₆ alkoxy, C₁₋₆ alkylamino, C₁₋₆ alkylsulfydryl, carbonyl hydrazide, C₁₋₆ alkyl carbonyl, C₁₋₆ alkylamino carbonyl, C₁₋₆ alkylcarbonyl amino, C₁₋₆ alkoxy carbonyl, C₁₋₆ alkylsulfinyl, C₁₋₆ alkylamino carbonylamino, C₁₋₆ alkyl sulfonyl, C₁₋₆ alkyl sulfonylamino, C₁₋₆ alkyl sulfonyl or C₁₋₆ alkyl sulfonylamino.

4. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 3, wherein, m is 0, 1, 2 or 3.

5. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 4, wherein in Formula IIa and Formula IIb, p+q = 1 or 2 or 3, and Z is CH₂; or, p = 1 or 2, q = 1 or 2, and Z is O or S.

6. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 5, wherein in Formula IIa and Formula IIb,

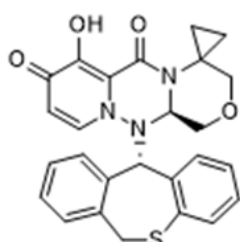
Z is CH₂, and p=0, q=1; or, p=0, q=2; or, p=1, q=0; or, p=1, q=1; or p=1, q=2; or, p=2, q=0; or, p=2, q=1; or

Z is O, and p=1, q=1; or, p=1, q=2; or, p=2, q=1; or, p=2, q=2; or

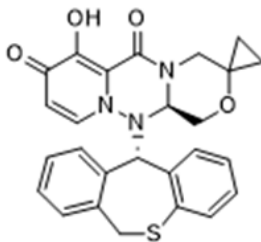
Z is S, and p=1, q=1; or, p=1, q=2; or, p=2, q=1; or, p=2, q=2.

7. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 6, wherein R₇ is connected to a phenyl ring.
- 5 8. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1, 2 and 4 to 7, wherein R₇ is selected from hydrogen, hydroxy, cyano, halogen, C₁₋₆ hydrocarbyl, C₁₋₆ halohydrocarbyl, C₁₋₆ alkoxy C₁₋₆ hydrocarbyl, hydroxy C₁₋₆ hydrocarbyl, C₁₋₆ hydrocarbyloxy.
- 10 9. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 8, wherein R₇ is connected to a phenyl ring, R₇ is selected from F, Cl, Br, difluoromethyl, trifluoromethyl or methyl, and m is 0, 1, 2 or 3.
- 15 10. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 9, wherein R₇ is connected to a phenyl ring, R₇ is selected from F, Cl, Br, trifluoromethyl or methyl, and m is 0, 1, 2 or 3.
- 20 11. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 10, wherein W is hydrogen or W is selected from the following groups: (e) -CH₂-O-C(=O)-R₈; (f) -CH₂-O-C(=O)-O-R₈; (g) -CH(-CH₃)-O-C(=O)-R₈; (h) -CH(-CH₃)-O-C(C=O)-O-(CH₂)_k-R₈, k is selected from 0-3; (i) -CH₂-O-P(=O)(OH)₂; (j) -CH₂-O-P(=O)(OPh)(NHR₈) or (k) -CH₂-O-P(=O)(OCH₂OC(=O)OR₈)₂.
- 25 12. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1, 2 and 4 to 11, wherein R₈ is selected from C₁₋₆ hydrocarbyl or C₁₋₆ hydrocarbyloxy.
- 30 13. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 12, wherein the R₈ is selected from methyl, ethyl, isopropyl or butyl.
14. The pyridone derivative or the stereoisomer, the pharmaceutically acceptable salt, the

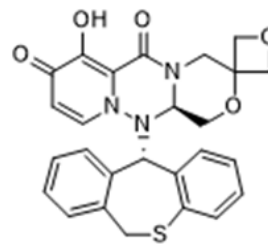
solvate or the crystal thereof according to claim 1, wherein the pyridone derivative is selected from the following compounds:



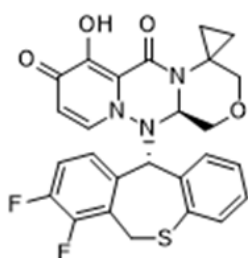
II-1



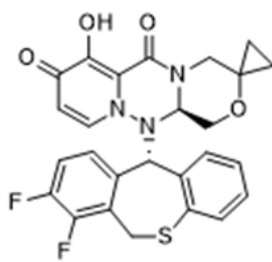
II-2



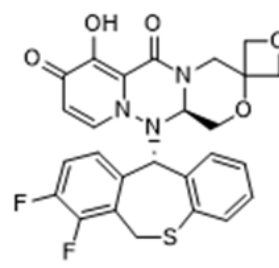
II-3



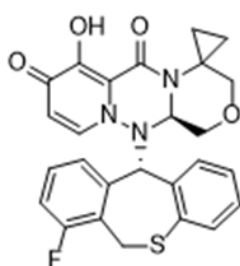
II-5



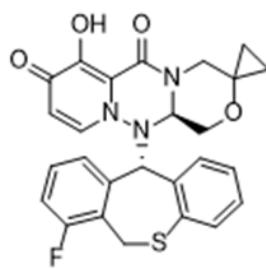
II-6



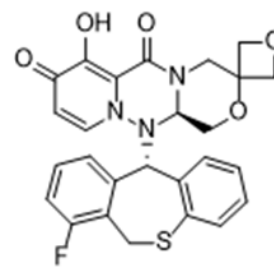
II-7



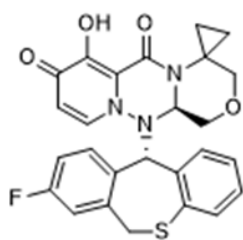
II-9



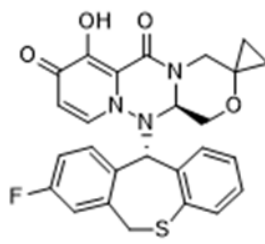
II-10



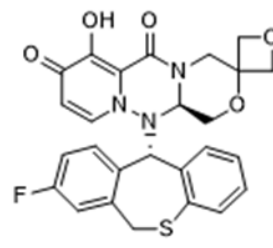
II-11



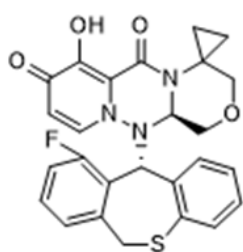
II-13



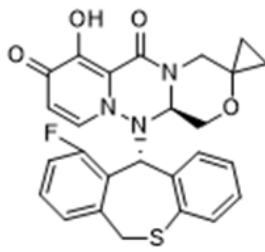
II-14



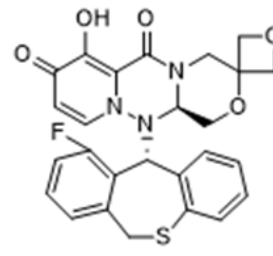
II-15



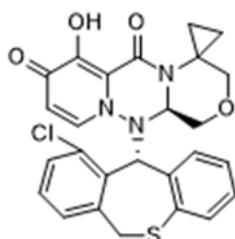
II-17



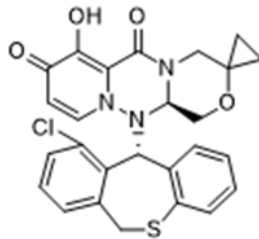
II-18



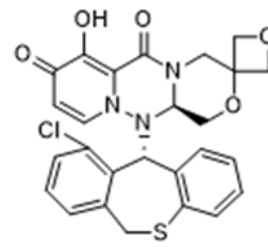
II-19



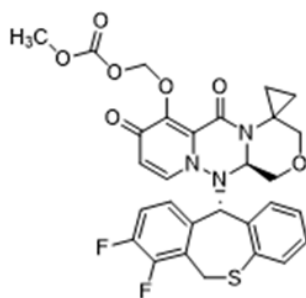
II-21



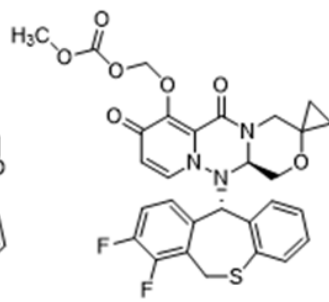
II-22



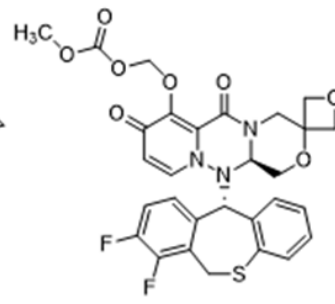
II-23



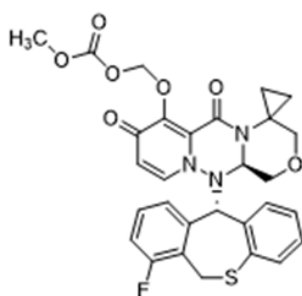
III-1



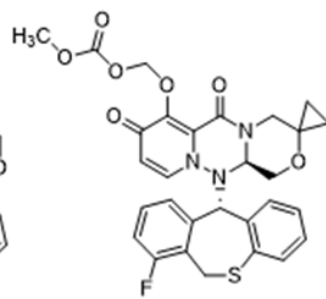
III-2



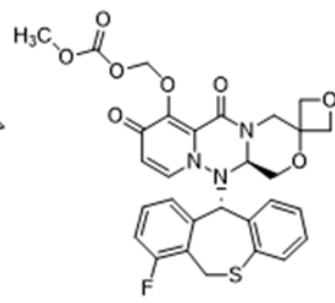
III-3



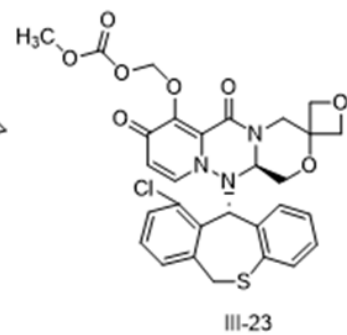
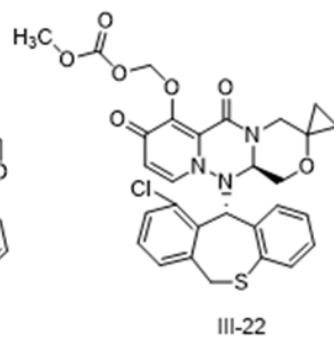
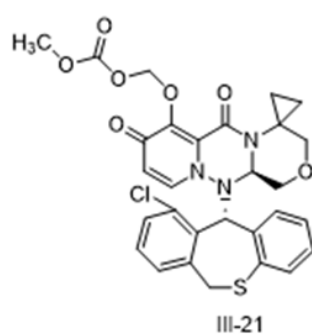
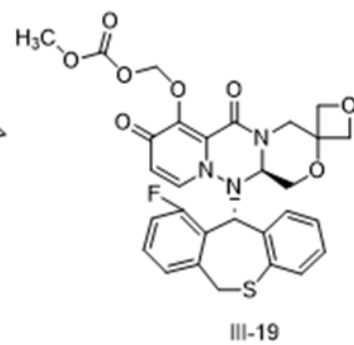
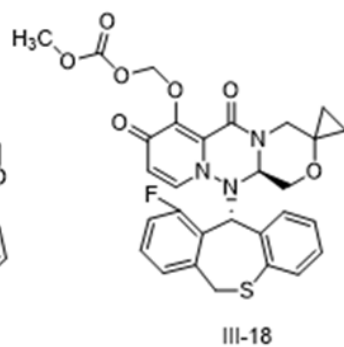
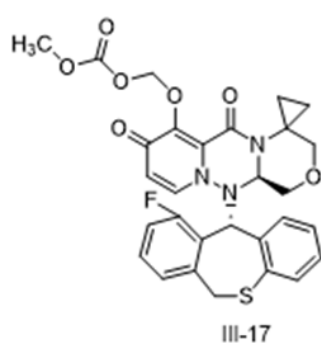
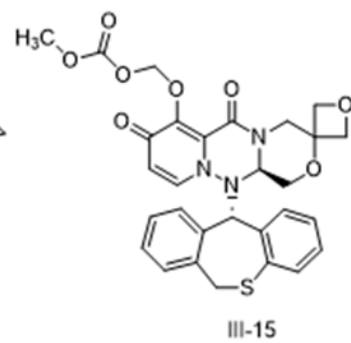
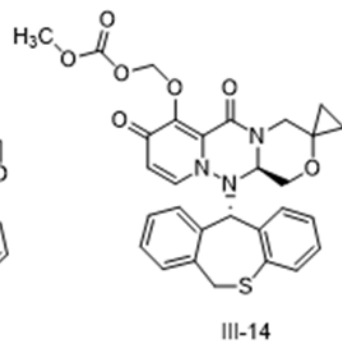
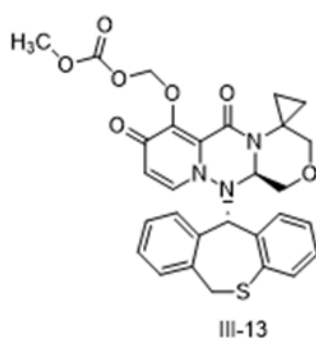
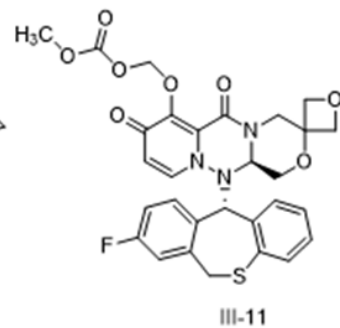
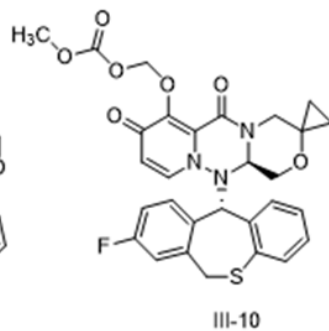
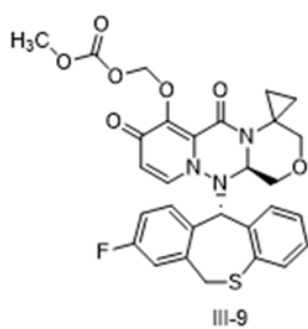
III-5

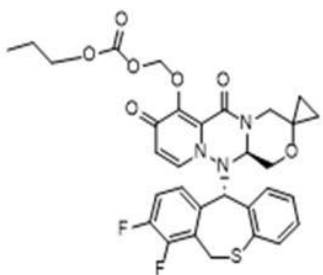


III-6

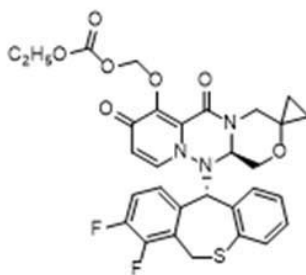


III-7

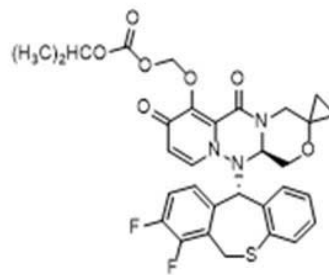




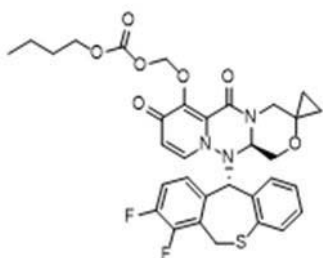
III-49



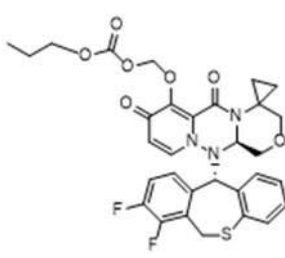
III-50



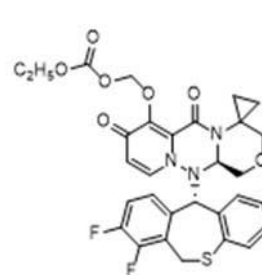
III-51



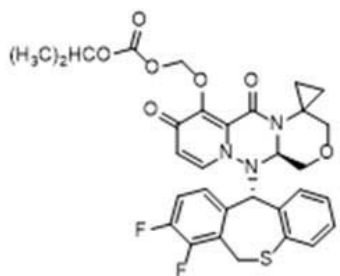
III-52



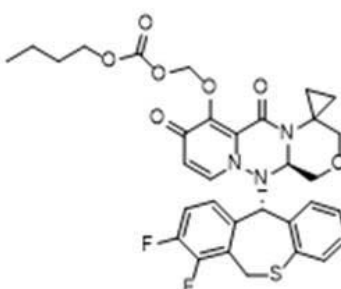
III-53



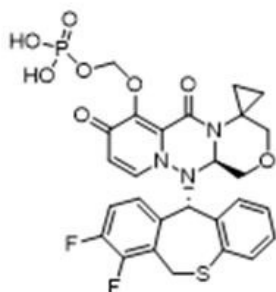
III-54



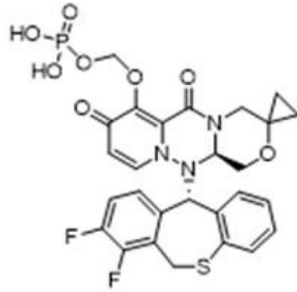
III-55



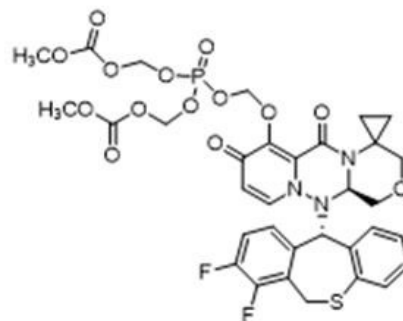
III-56



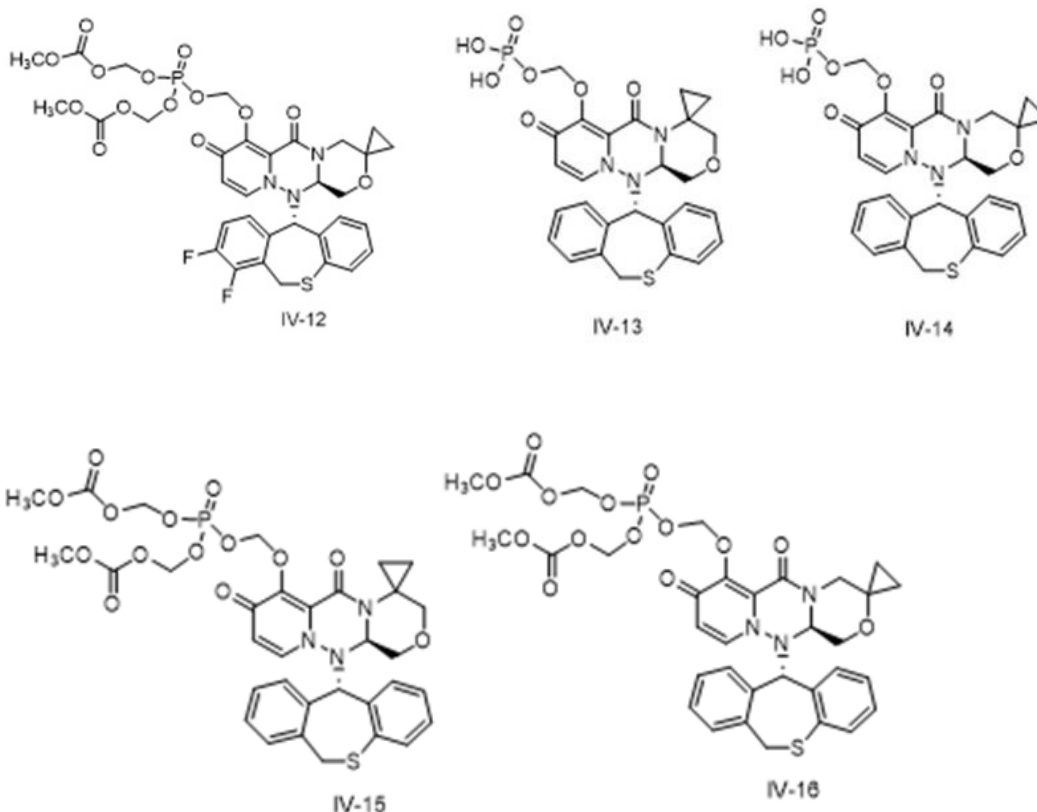
IV-9



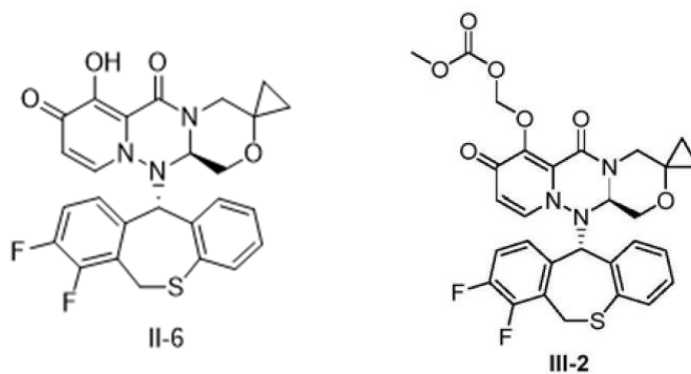
IV-10



IV-11



15. A pyridone derivative or the pharmaceutically acceptable salt thereof, wherein the



pyridone derivative is or

16. A pharmaceutical composition containing the pyridone derivative represented by Formula IIa or Formula IIb or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 14, wherein the pharmaceutical composition is an antiviral pharmaceutical composition.

17. The pharmaceutical composition according to claim 16, wherein the pharmaceutical composition further comprising one or more therapeutic agents selected from the group consisting of a neuraminidase inhibitor, a nucleoside drug, a PB2 inhibitor, a PB1 inhibitor, an M2 inhibitor and other anti-influenza drugs.

5

18. A pharmaceutical composition containing the pyridine derivate or the pharmaceutically acceptable salt thereof according to claim 15 and a pharmaceutically acceptable carrier, wherein the pharmaceutical composition is an antiviral pharmaceutical composition.

10

19. The pharmaceutical composition according to claim 18, wherein the pharmaceutical composition further comprising one or more therapeutic agents selected from the group consisting of a neuraminidase inhibitor, a nucleoside drug, a PB2 inhibitor, a PB1 inhibitor, an M2 inhibitor and other anti-influenza drugs.

15

20. The pharmaceutical composition according to any one of claims 16 to 19, wherein the pharmaceutical composition is a pharmaceutical preparation selected from a tablet, a powder, a capsule, a granule, an oral liquid, an injection, a suppository, a pill, a cream, a paste, a gel, a pulvis, an inhalant, a suspension, a dry suspension, a patch, a lotion or a nano preparation.

20

21. Use of the pyridone derivative represented by Formula IIa or Formula IIb or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 14, or the pharmaceutical composition according to claim 16 or 17, or a combination thereof in the preparation of a drug for preventing and/or treating a viral infection disease.

25

22. The use according to claim 21, wherein the viral infection disease is an influenza type A viral infection disease and/or an influenza type B viral infection disease.

30

23. Use of the pyridone derivative or the pharmaceutically acceptable salt thereof according to claim 15 or the pharmaceutical composition according to claim 18 or 19 in the preparation of a drug for preventing and/or treating a viral infection disease.

24. The use according to claim 23, wherein the viral infection disease is an influenza type A viral infection disease and/or an influenza type B viral infection disease.

25. Use of the pyridone derivative represented by Formula IIa or Formula IIb or the stereoisomer, the pharmaceutically acceptable salt, the solvate or the crystal thereof according to any one of claims 1 to 14, or the pharmaceutical composition according to claim 16 or 17, or a combination thereof in the preparation of an antiviral drug, the antiviral drug is a drug or an agent inhibiting influenza cap-dependent endonuclease activities.

26. Use of the pyridone derivative or the pharmaceutically acceptable salt thereof according to claim 15 or the pharmaceutical composition according to claim 18 or 19 in the preparation of an antiviral drug, the antiviral drug is a drug or an agent inhibiting influenza cap-dependent endonuclease activities.