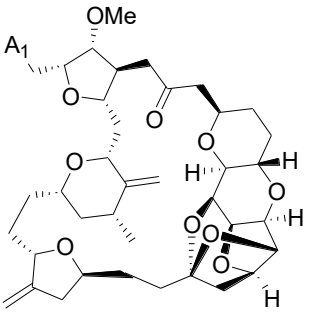
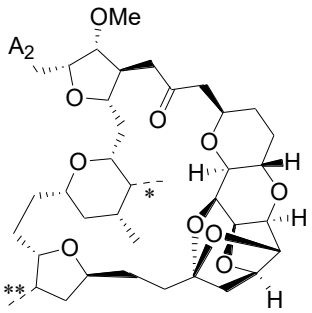
What is claimed is:

1. An eribulin derivative, which is a compound of formula (I) or (II), or an isotope-labeled compound, an optical isomer, a geometric isomer, a tautomer, an isomer mixture, or a pharmaceutically acceptable salt thereof;

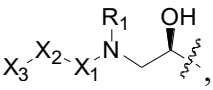
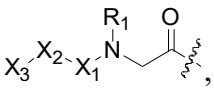
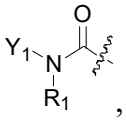
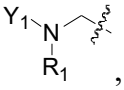
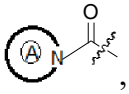
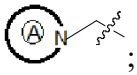


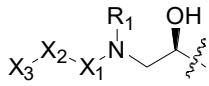
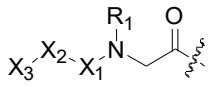
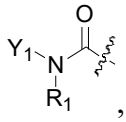
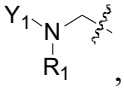
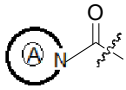
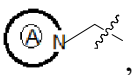
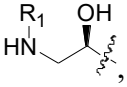
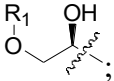
Formula (I)



Formula (II)

wherein:

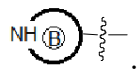
A_1 in formula (I) is selected from , , , , , or ;

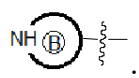
A_2 in formula (II) is selected from , , , , , , , or ; each of ---- marked by * and ** is independently a single bond, a double bond, or an oxo bond (=O), and at least one of ---- is not a double bond;

R_1 is selected from H, an alkyl group, a hydroxyl-substituted alkyl group, an alkyloxy-substituted alkyl group, an amino-substituted alkyl group, a haloalkyl group or a cyano-substituted alkyl group;

X_1 is selected from CO-, -CH_2, -S(O)-, or -$S(O)_2$-;

X_2 is selected from the direct bond, -O-, or -NR_1-;

X_3 is selected from -$(CR_2R_3)_{m1}$-NH_2, -$(CR_2R_3)_{m1}$-OH, -R_4-$(CR_2R_3)_{m2}$-NH_2, -R_4-$(CR_2R_3)_{m2}$-OH, or ;

Y_1 is selected from -$(CR_2R_3)_{m1}$-NH_2, -$(CR_2R_3)_{m1}$-OH, -R_4-$(CR_2R_3)_{m2}$-NH_2, -R_4-$(CR_2R_3)_{m2}$-OH, or ;

R_2 and R_3 are each independently selected from H, an alkyl group, a hydroxyl group, an

alkyloxy group, an amino group, halogen, a cyano group, a hydroxyl-substituted alkyl group, an alkyloxy-substituted alkyl group, an amino-substituted alkyl group, a haloalkyl group, a cyano-substituted alkyl group, an alkyl group substituted by a substituted or unsubstituted carbon ring, an alkyl group substituted by a substituted or unsubstituted heterocyclic substituent, a substituted or unsubstituted carbon ring group or a substituted or unsubstituted heterocyclic group; and the substituted or unsubstituted carbon ring group and the substituted or unsubstituted heterocyclic group are optionally substituted by one or more substituents selected from an oxo group, an alkyl group, a hydroxyl group, an alkyloxy group, an amino group, halogen, a cyano group, a hydroxyl-substituted alkyl group, an alkyloxy-substituted alkyl group, an amino-substituted alkyl group, a haloalkyl group, and a cyano-substituted alkyl group;

R_4 is selected from a substituted or unsubstituted carbon ring group or a substituted or unsubstituted heterocyclic group; and the substituted or unsubstituted carbon ring group and the substituted or unsubstituted heterocyclic group are optionally substituted by one or more substituents selected from an oxo group, an alkyl group, a hydroxyl group, an alkyloxy group, an amino group, halogen, a cyano group, a hydroxyl-substituted alkyl group, an alkyloxy-substituted alkyl group, an amino-substituted alkyl group, a haloalkyl group, and a cyano-substituted alkyl group;

Ⓑ ring is a substituted or unsubstituted heterocyclic group; and a ring of the heterocyclic group contains at least one -NH-, and the substitution refers to substitution with one or more substituents selected from an oxo group, an alkyl group, an alkyloxy group, halogen, a cyano group, an alkyloxy-substituted alkyl group, a haloalkyl group, and a cyano-substituted alkyl group;

Ⓐ ring is the heterocyclic group; and a ring of the heterocyclic group contains at least one -NH-, and/or the heterocyclic group is substituted by an amino group, a hydroxyl group, an amino-substituted alkyl group, or a hydroxyl-substituted alkyl group, and the heterocyclic group is optionally substituted by one or more substituents selected from an oxo group, an alkyl group, an alkyloxy group, halogen, a cyano group, an alkyloxy-substituted alkyl group, a haloalkyl group, and a cyano-substituted alkyl group;

m1 is selected from 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10; and

m2 is selected from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

2. The eribulin derivative of claim 1, wherein the alkyl group is a C_1-C_{12} linear or branched alkyl group; the carbon ring group is a saturated, partially unsaturated or completely unsaturated carbon ring group, and the number of carbon atoms is 3 to 20; and the heterocyclic group is a saturated, partially unsaturated or completely unsaturated heterocyclic group, containing 3 to 20 atoms and 1, 2, 3, or 4 heteroatoms selected from N, O, and S.

3. The eribulin derivative of claim 1 or 2, wherein R_1 is selected from H, a C_1-C_6 alkyl group, or a hydroxy-substituted C_1-C_6 alkyl group, or is preferably selected from H, a methyl group, an ethyl group, an n-propyl group, an isopropyl group, a hydroxymethyl group, a hydroxyethyl group,

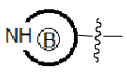
a hydroxy-n-propyl group, and a hydroxyisopropyl group;

X_1 is selected from -CO- and -CH_2-;

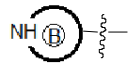
R_2 and R_3 are each independently selected from H, a C_1-C_6 alkyl group, a hydroxy group, a C_1-C_6 alkyloxy group, a hydroxy- substituted C_1-C_6 alkyl group, a C_1-C_6 alkyloxy-substituted C_1-C_6 alkyl group, a C_1-C_6 alkyl group substituted by a substituted or unsubstituted C_3-C_6 cycloalkyl group, a C_1-C_6 alkyl group substituted by a substituted or unsubstituted 3- to 6-membered heterocycloalkyl group containing 1 or 2 heteroatoms of N or O, a substituted or unsubstituted C_3-C_6 cycloalkyl group, and a substituted or unsubstituted 3- to 6-membered heterocycloalkyl group containing 1 or 2 heteroatoms of N or O; and the substituted or unsubstituted C_3-C_6 cycloalkyl group and the substituted or unsubstituted 3- to 6-membered heterocycloalkyl group containing 1 or 2 heteroatoms of N or O are optionally substituted with one or more substituents selected from oxo, a C_1-C_6 alkyl group, a hydroxy group, a C_1-C_6 alkyloxy group, a hydroxy-substituted C_1-C_6 alkyl group, and a C_1-C_6 alkyloxy-substituted C_1-C_6 alkyl group;

R_4 is selected from a substituted or unsubstituted C_3-C_{12} monocyclic, fused, bicyclic, spiro or bridged cycloalkyl group, a substituted or unsubstituted 3- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, a substituted or unsubstituted C_6-C_{10} aryl group, and a substituted or unsubstituted 5- to 10-membered heteroaryl group containing 1, 2, or 3 heteroatoms of N or O; and substitution means being substituted with one or more substituents selected from oxo, a C_1-C_6 alkyl group, a hydroxy group, a C_1-C_6 alkyloxy group, a hydroxy- substituted C_1-C_6 alkyl group, and a C_1-C_6 alkyloxy-substituted C_1-C_6 alkyl group;

Ⓑ ring is a substituted or unsubstituted 3- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, the heterocycloalkyl ring contains at least one -NH-, and substitution means being substituted with one or more substituents selected from oxo, a C_1-C_6 alkyl group, a C_1-C_6 alkyloxy group, and a C_1-C_6 alkyloxy-substituted C_1-C_6 alkyl group;

X_3 is selected from -$(CR_2R_3)_{m1}$- NH_2, -$(CR_2R_3)_{m1}$-OH, -R_4-$(CR_2R_3)_{m2}$-NH_2, -R_4-$(CR_2R_3)_{m2}$-OH, or , Ⓑ ring is preferably a substituted or unsubstituted 4- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, the substitution means being substituted with one or more substituents selected from oxo and a C_1-C_6 alkyl group; m1 is selected from 1, 2, 3, 4, 5, or 6; m2 is selected from 0, 1, 2, 3, 4, 5, or 6; R_2 and R_3 are each independently selected from H, a C_1-C_6 alkyl group, a hydroxy group, a hydroxy-substituted C_1-C_6 alkyl group, a C_1-C_6 alkyl group substituted by a substituted or unsubstituted C_3-C_6 cycloalkyl group, and a substituted or unsubstituted C_3-C_6 cycloalkyl group, wherein the substituted or unsubstituted C_3-C_6 cycloalkyl group is optionally substituted with one or more substituents selected from oxo and a C_1-C_6 alkyl group; and R_4 is selected from a C_4-C_{12} monocyclic, fused, bicyclic, spiro or bridged cycloalkyl group, a 4- to 12-membered monocyclic,

fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, and a phenyl group;

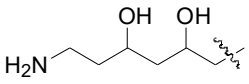
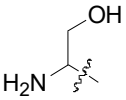
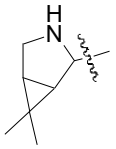
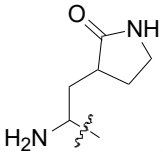
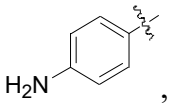
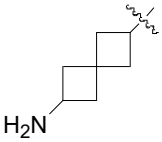
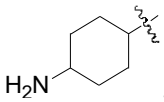
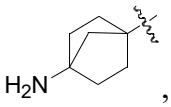
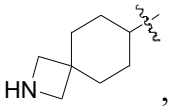
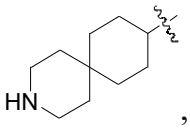
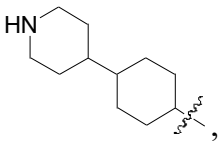
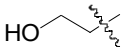
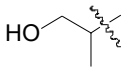
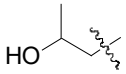
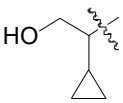
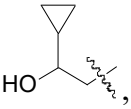
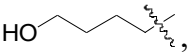
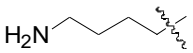
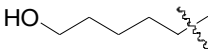
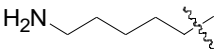
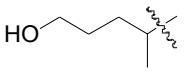
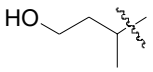
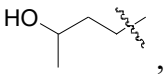
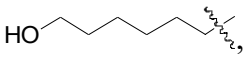
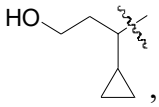
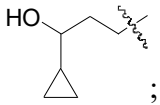
Y_1 is selected from $-(CR_2R_3)_{m1}-NH_2$, $-(CR_2R_3)_{m1}-OH$, $-R_4-(CR_2R_3)_{m2}-NH_2$, $-R_4-(CR_2R_3)_{m2}-OH$, or , Ⓑ ring is preberably a substituted or unsubstituted 4- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, the substitution means being substituted with one or more substituents selected from oxo and a C_1-C_6 alkyl group; m1 is selected from 1, 2, 3, 4, 5, or 6; m2 is selected from 0, 1, 2, 3, 4, 5, or 6; R_2 and R_3 are each independently selected from H, a C_1-C_6 alkyl group, a hydroxy group, a hydroxy-substituted C_1-C_6 alkyl group, a C_1-C_6 alkyl group substituted by a substituted or unsubstituted C_3-C_6 cycloalkyl group, and a substituted or unsubstituted C_3-C_6 cycloalkyl group, wherein the substituted or unsubstituted C_3-C_6 cycloalkyl group is optionally substituted with one or more substituents selected from oxo and a C_1-C_6 alkyl group; and R_4 is selected from a C_4-C_{12} monocyclic, fused, bicyclic, spiro or bridged cycloalkyl group, a 4- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, and a phenyl group; and/or

Ⓐ ring is a 3- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, the heterocycloalkyl ring contains at least one -NH- and/or the heterocycloalkyl group is substituted with an amino group, a hydroxy group, an amino-substituted C_1-C_6 alkyl group, or a hydroxy- substituted C_1-C_6 alkyl group, and the heterocycloalkyl group is optionally substituted with one or more substituents selected from oxo, a C_1-C_6 alkyl group, a C_1-C_6 alkyloxy group, or a C_1-C_6 alkyloxy-substituted C_1-C_6 alkyl group.

4. The eribulin derivative of claim 3, wherein R_2 and R_3 are each independently selected from H, a C_1-C_6 alkyl group, a hydroxy group, a hydroxy-substituted C_1-C_6 alkyl group, a C_1-C_6 alkyl group substituted by a substituted or unsubstituted C_3-C_6 cycloalkyl group, a C_1-C_6 alkyl group substituted by a substituted or unsubstituted 3- to 6-membered heterocycloalkyl group containing 1 or 2 heteroatoms of N or O, a substituted or unsubstituted C_3-C_6 cycloalkyl group, and a substituted or unsubstituted 3- to 6-membered heterocycloalkyl group containing 1 or 2 heteroatoms of N or O; and the substituted or unsubstituted C_3-C_6 cycloalkyl group and the substituted or unsubstituted 3- to 6-membered heterocycloalkyl group containing 1 or 2 heteroatoms of N or O are optionally substituted with one or more substituents selected from oxo, a C_1-C_6 alkyl group, a hydroxy group, and a hydroxy- substituted C_1-C_6 alkyl group;

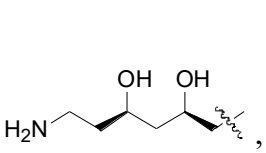
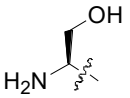
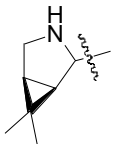
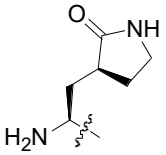
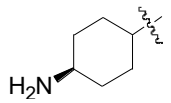
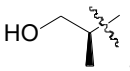
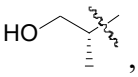
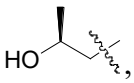
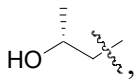
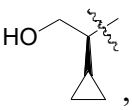
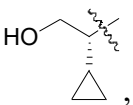
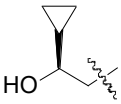
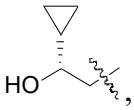
R_4 is selected from a substituted or unsubstituted C_4-C_{12} monocyclic, fused, bicyclic, spiro or bridged cycloalkyl group, a substituted or unsubstituted 4- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, a substituted or unsubstituted phenyl group, and a substituted or unsubstituted 5- to 10-membered heteroaryl group containing 1, 2, or 3 heteroatoms of N or O; and substitution means being

substituted with one or more substituents selected from oxo and a C_1-C_6 alkyl group;

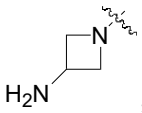
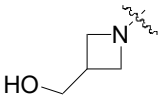
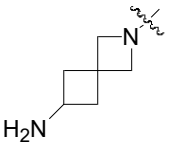
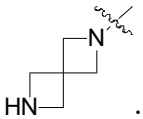
X_3 is selected from the following groups: , , , , , , , , , , , , , , , , , , , , , , , , , , , and ;

Y_1 is selected from -$(CR_2R_3)_{m1}$-NH_2 and -$(CR_2R_3)_{m1}$-OH, m1 is selected from 1, 2, 3, 4, 5, or 6, and R_2 and R_3 are each independently selected from H, a C_1-C_6 alkyl group, a hydroxy group, or a hydroxy-substituted C_1-C_6 alkyl group; and/or

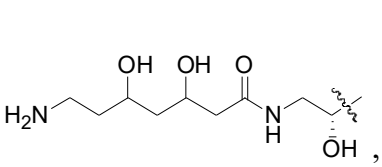
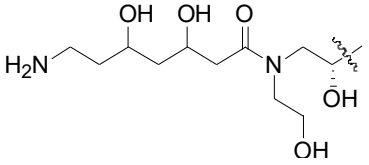
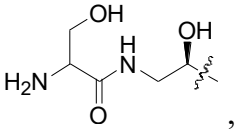
Ⓐ ring is a 4- to 12-membered monocyclic, fused, bicyclic, spiro or bridged heterocycloalkyl group containing 1, 2, or 3 heteroatoms of N or O, and the heterocycloalkyl ring contains at least one -NH- and/or the heterocycloalkyl group is substituted with an amino group, a hydroxy group, an amino-substituted C_1-C_6 alkyl group, or a hydroxy-substituted C_1-C_6 alkyl group.

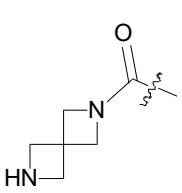
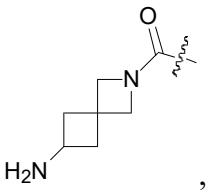
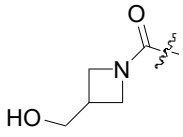
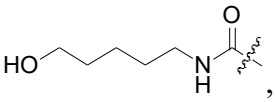
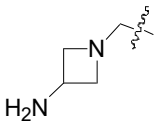
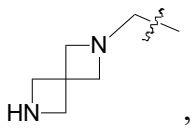
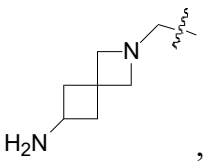
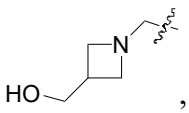
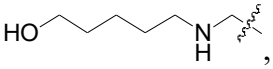
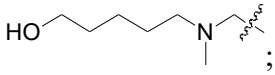
5. The eribulin derivative of claim 4, wherein X_3 is selected from the following groups: , , , , , , , , , , , , , , , , , , , , , and ;

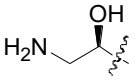
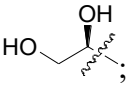
Y_1 is ; and/or

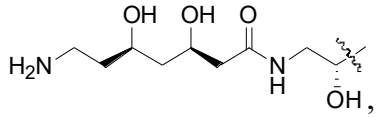
Ⓐ is selected from the following groups: , , , and .

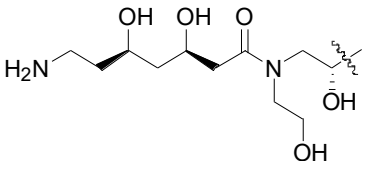
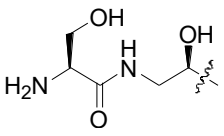
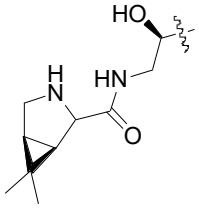
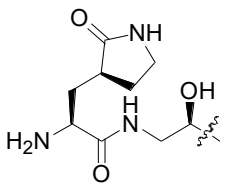
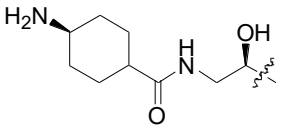
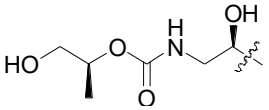
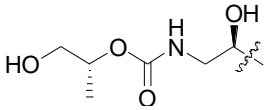
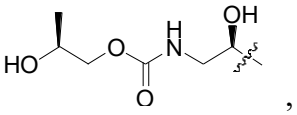
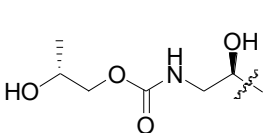
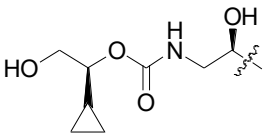
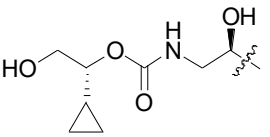
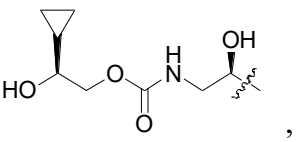
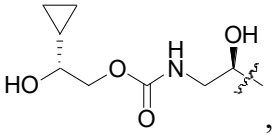
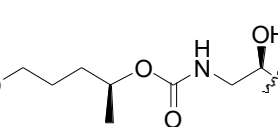
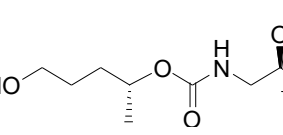
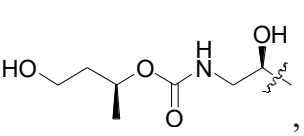
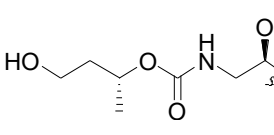
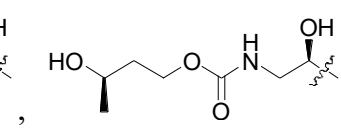
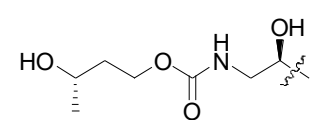
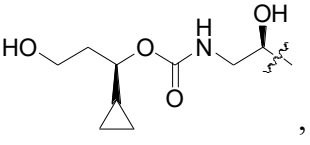
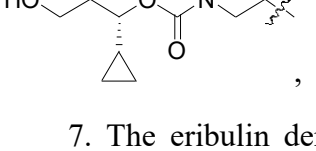
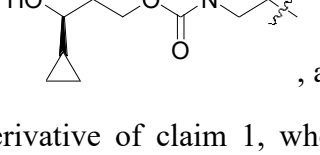
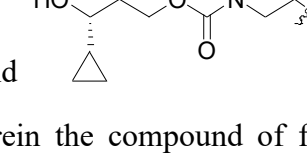
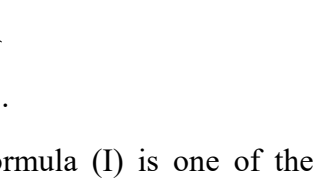
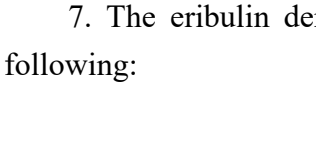
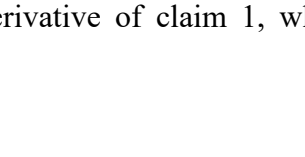
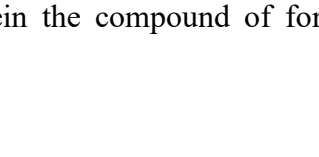
6. The eribulin derivative of claim 1, wherein A_1 and A_2 are selected from the following groups:

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and

; and

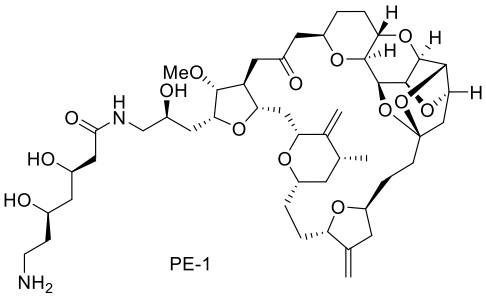
A_2 in formula (II) is alternatively selected from  or ; or

preferably, A_1 and A_2 are selected from the following groups: ,




























and

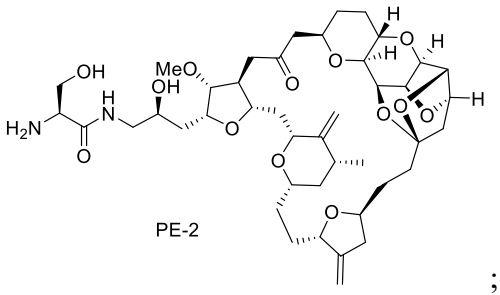
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7. The eribulin derivative of claim 1, wherein the compound of formula (I) is one of the following:



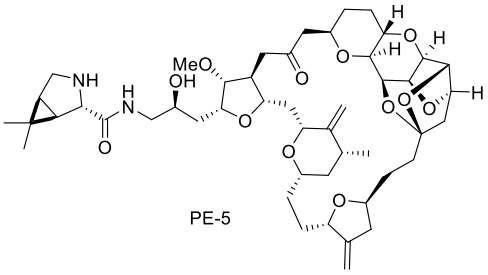
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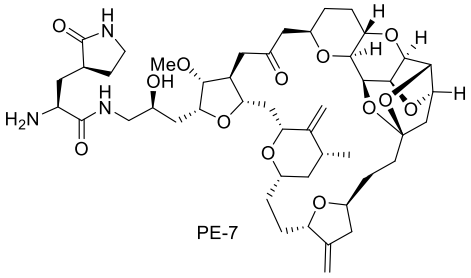
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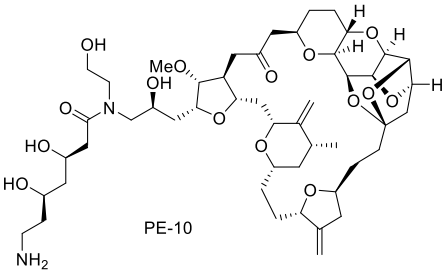
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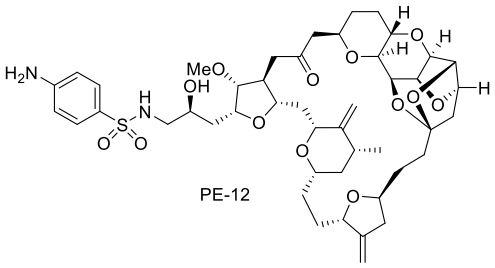
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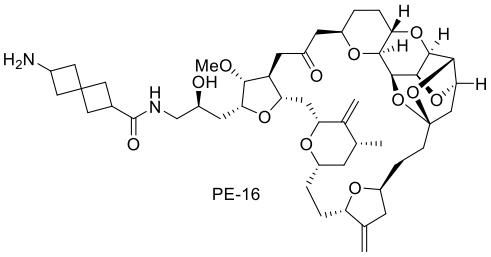
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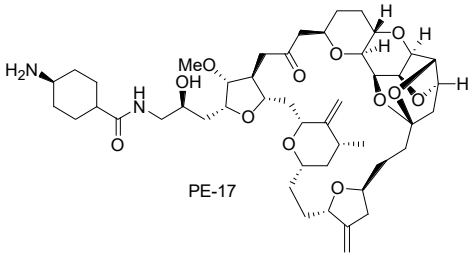
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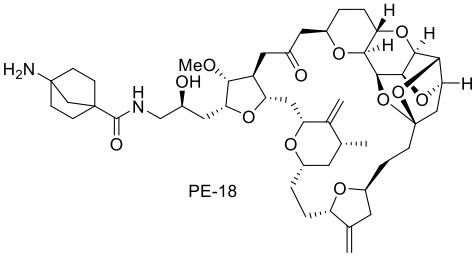
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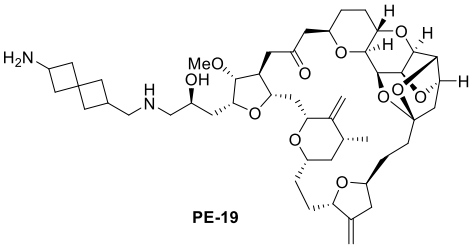
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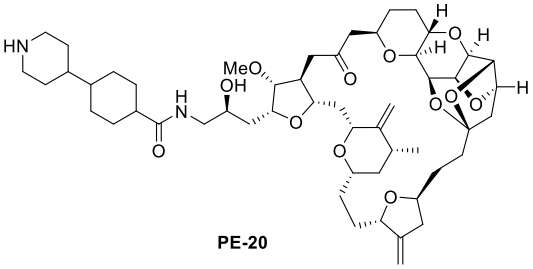
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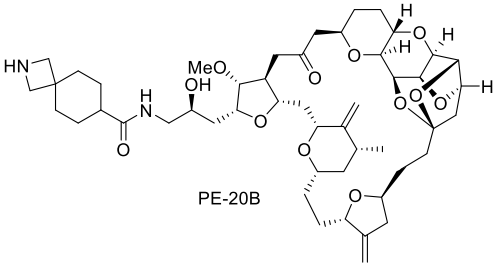
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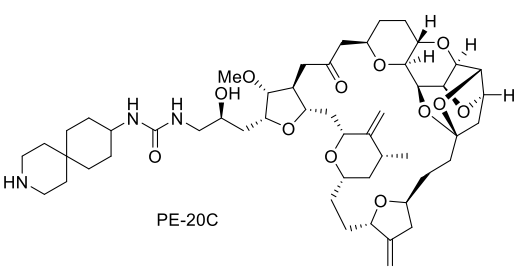
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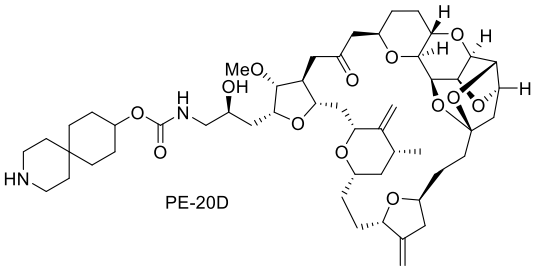


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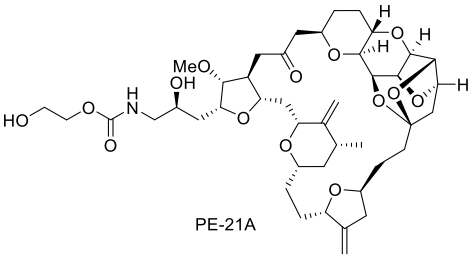
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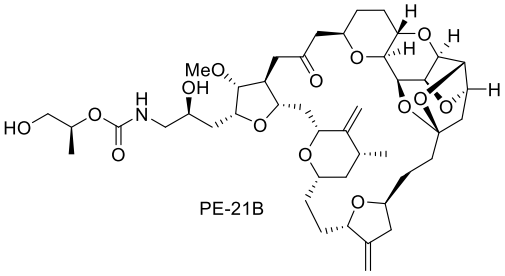
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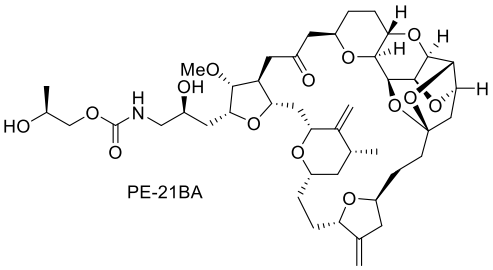
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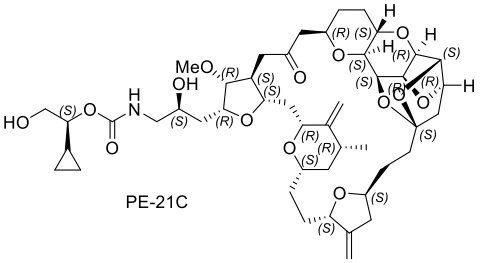
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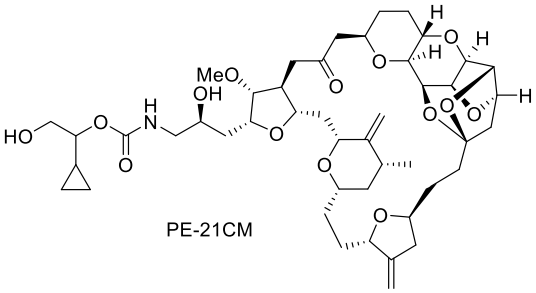
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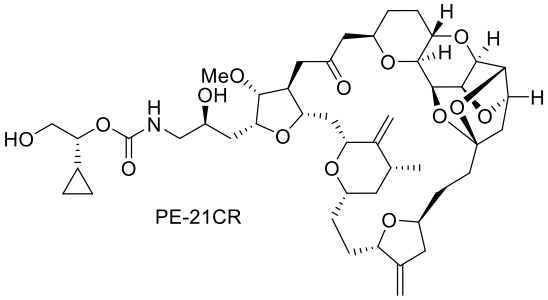
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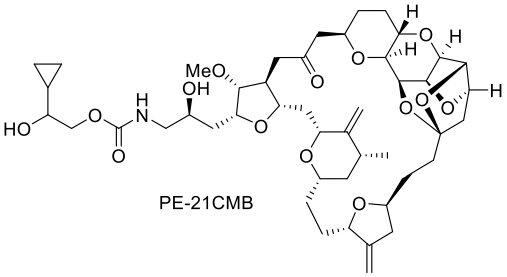
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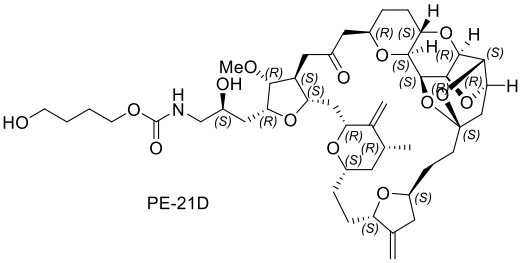
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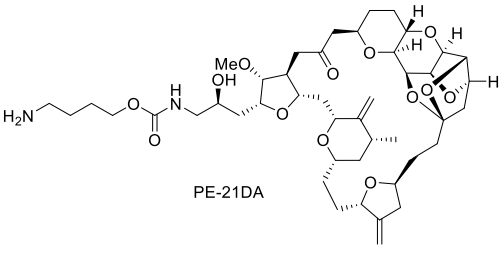
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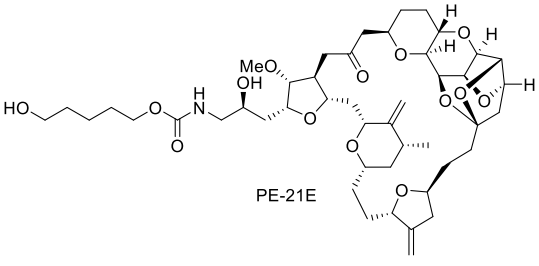
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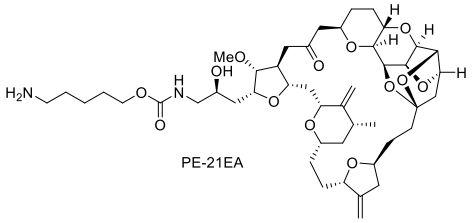
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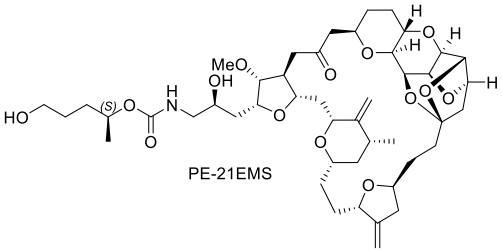


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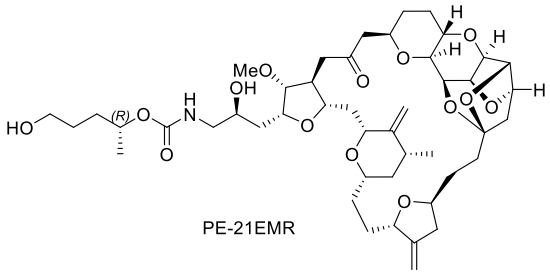
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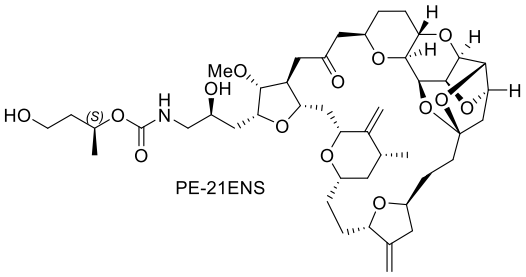
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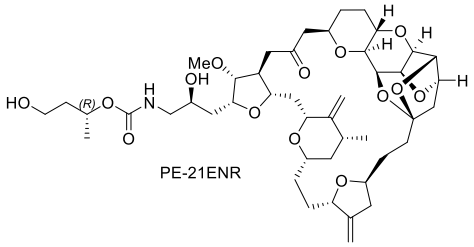
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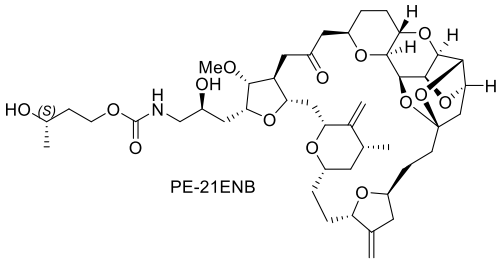
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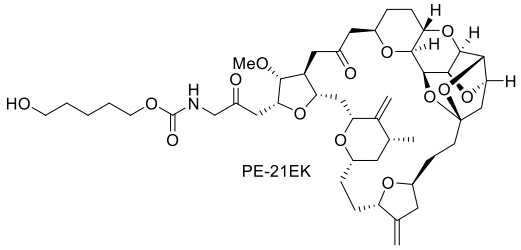
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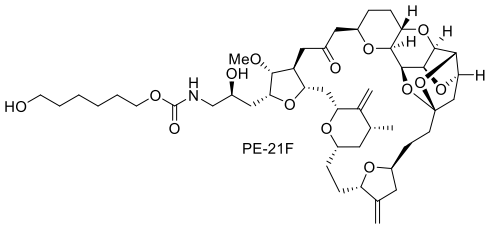
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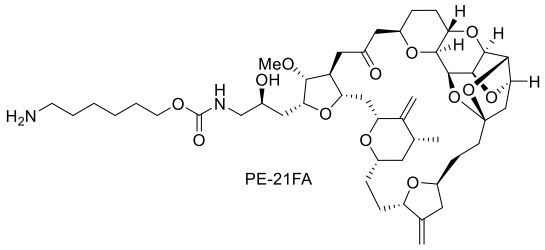
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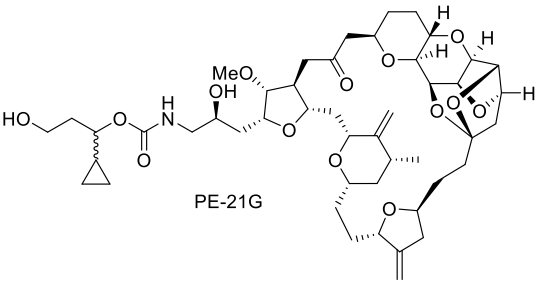
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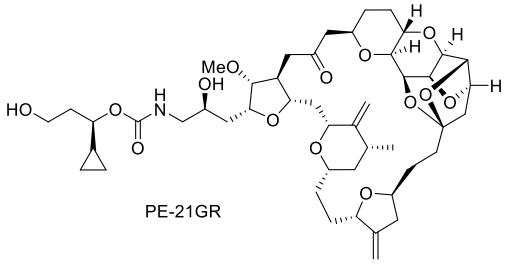
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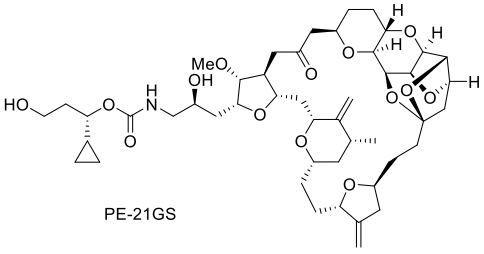
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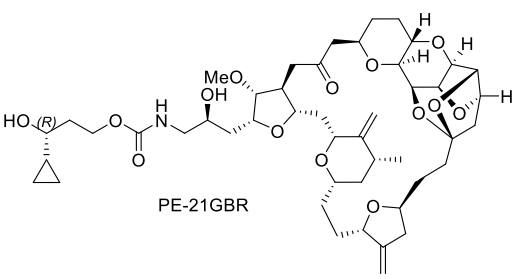
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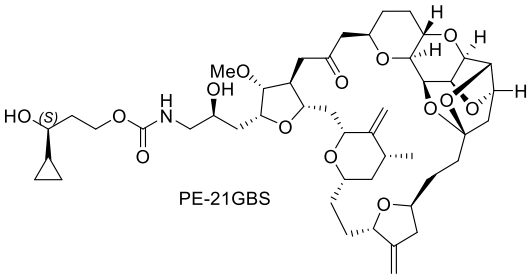


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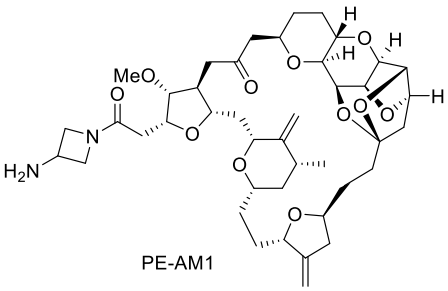
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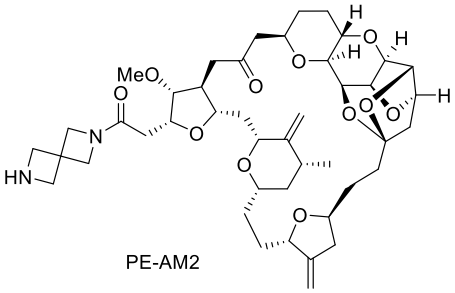
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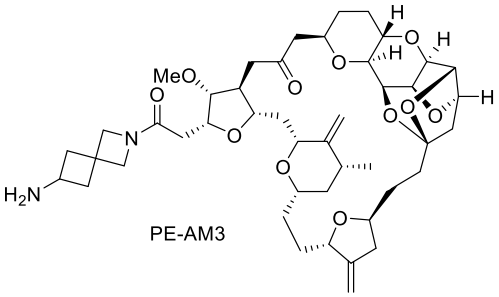
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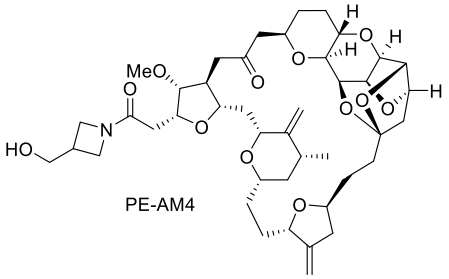
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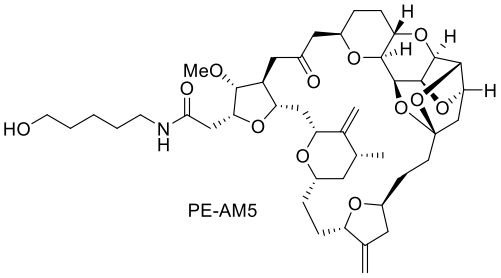
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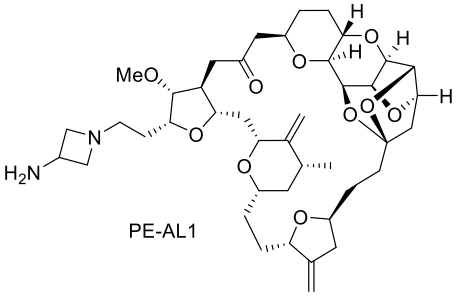
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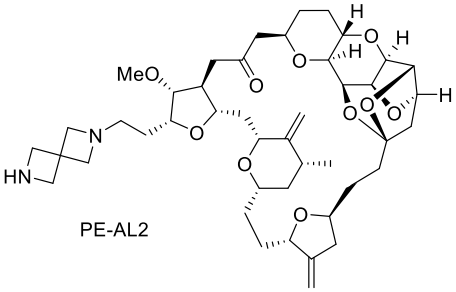
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H
PE-AM5

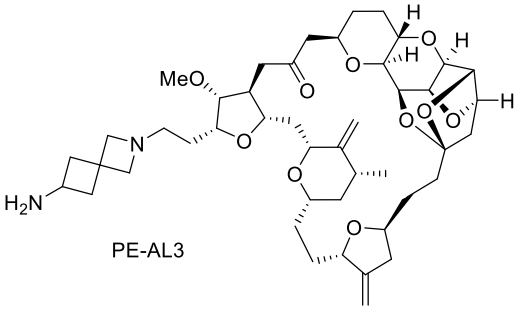
,


MeO
N
H2N
PE-AL1

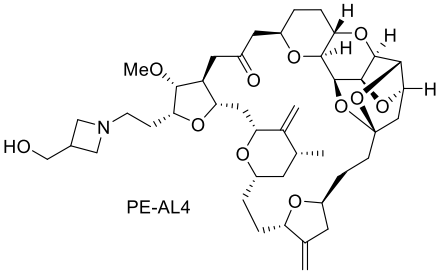
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MeO
N
HN
PE-AL2

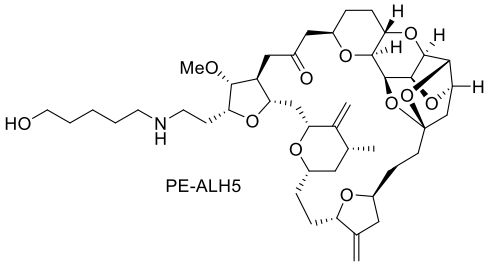
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MeO
N
H2N
PE-AL3

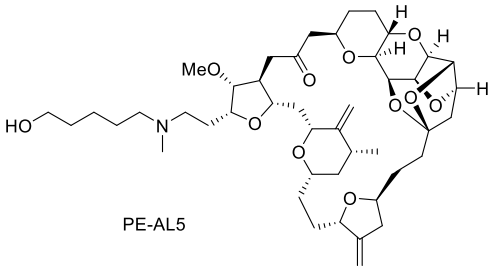
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MeO
N
HO
PE-AL4

,

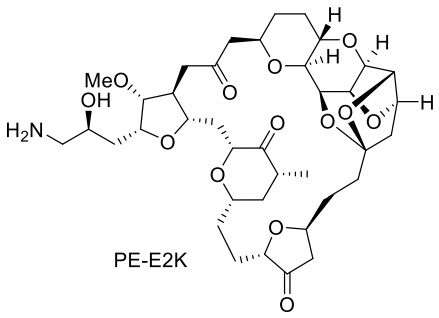

HO
MeO
N
H
PE-ALH5

,

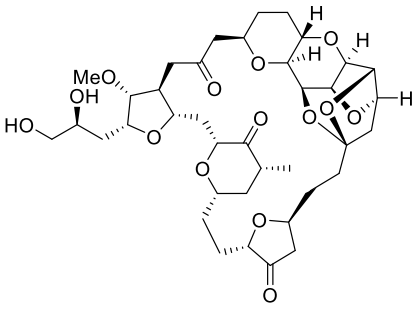


; or

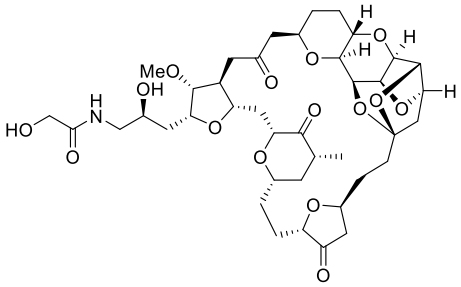
specifically, the compound of formula (II) is one of the following:



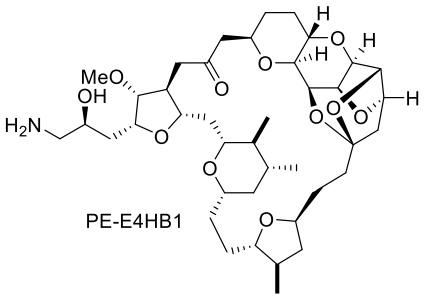
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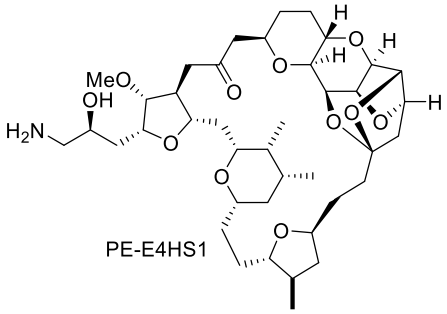
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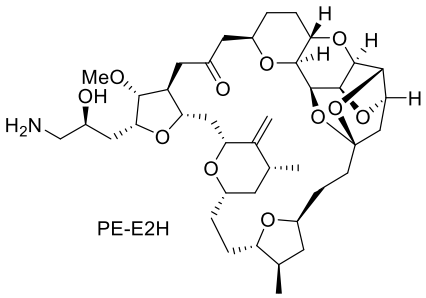


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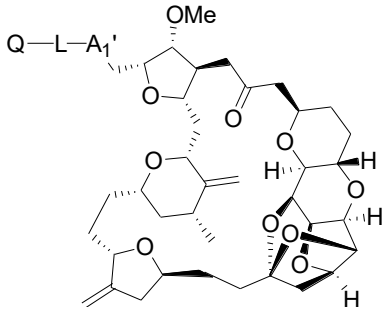
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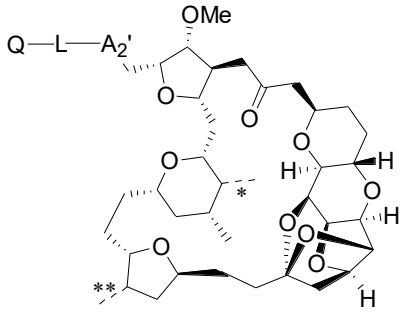




, and .

8. An eribulin derivative, which is a compound of formula (I') or (II'), or an isotope-labeled compound, an optical isomer, a geometric isomer, a tautomer, an isomer mixture, or a pharmaceutically acceptable salt thereof;





Formula (I') Formula (II')

wherein:

Q is a linker group capable of conjugating to an antibody or antigen-binding fragment;

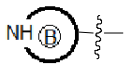
L is a linker group that connects Q to A_1' or Q to A_2';

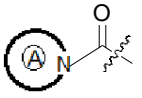
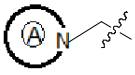
A_1' is a group formed by connecting A_1 to L after removal of a hydrogen atom from $-NH_2$, -OH, -NH- on the chain, or -NH- on the ring of A_1;

A_2' is a group formed by connecting A_2 to L after removal of a hydrogen atom from $-NH_2$, -OH, -NH- on the chain, or -NH- on the ring of A_2; and

definitions of A_1, A_2, *, and ** are the same as those in formula (I) and formula (II) of any one of claims 1 to 7.

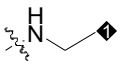
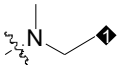
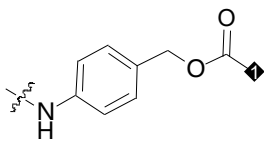
9. The eribulin derivative of claim 8, wherein when X_3 and Y_1 are each independently selected from $-(CR_2R_3)_{m1}-NH_2$, $-(CR_2R_3)_{m1}-OH$, $-R_4-(CR_2R_3)_{m2}-NH_2$, and $-R_4-(CR_2R_3)_{m2}-OH$, A_1' is a group formed by connecting A_1 to L after removal of the hydrogen atom from terminal $-NH_2$ or terminal -OH of X_3 or Y_1; and A_2' is a group formed by connecting A_2 to L after removal of the hydrogen atom from the terminal $-NH_2$ or terminal -OH of X_3 or Y_1;

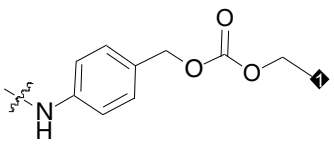
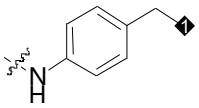
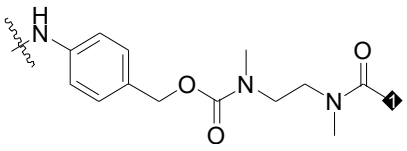
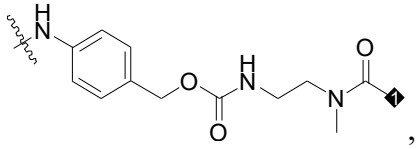
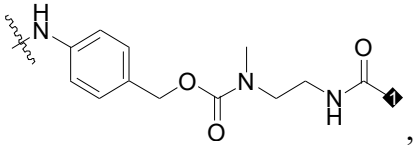
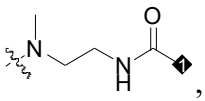
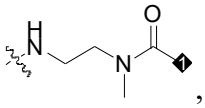
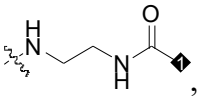
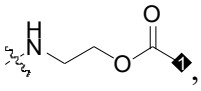
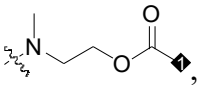
when X_3 and Y_1 are each independently , A_1' represents a group formed by connecting A_1 to L after removal of the hydrogen atom of -NH- on the Ⓑ ring, and A2' represents a group formed by connecting A_2 to L after removal of the hydrogen atom of -NH- on the Ⓑ ring;

when A_1 and A_2 are each independently  or , A_1' is a group formed by connecting A_1 to L after removal of the hydrogen atom of -NH- on the Ⓐ ring, or the hydrogen atom of $-NH_2$ or -OH on the Ⓐ ring substituent, and A_2' is a group formed by connecting A_2 to L after removal of the hydrogen atom of -NH- on the Ⓐ ring, or the hydrogen atom of $-NH_2$ or -OH on the Ⓐ ring substituent; and

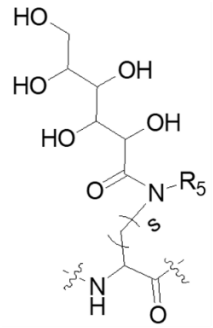
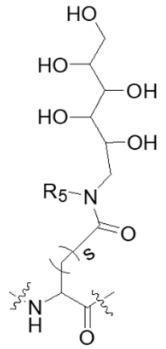
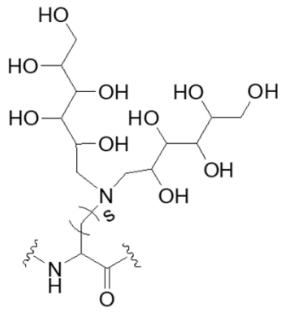
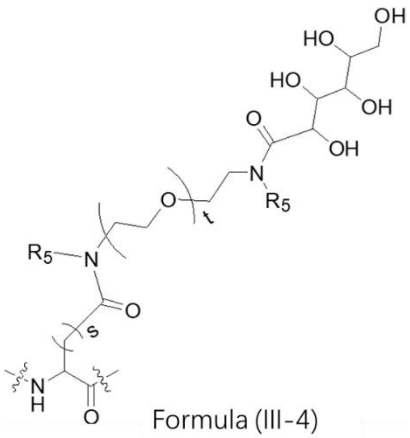
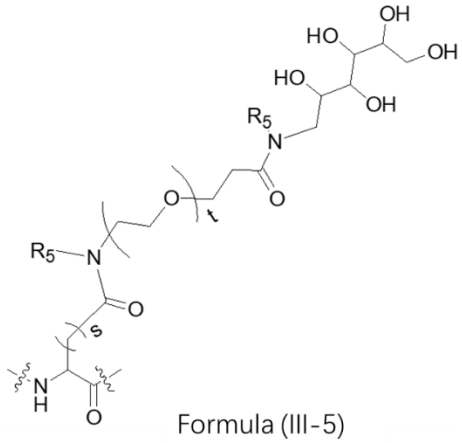
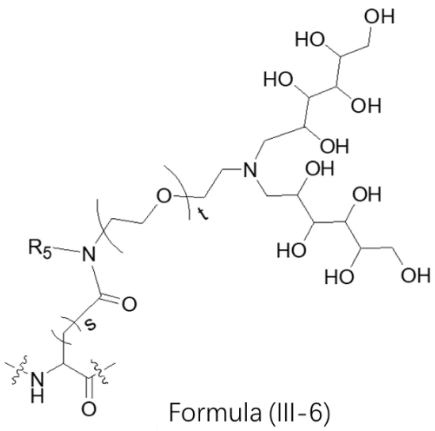
when R_1 is H, A_1' is a group formed by connecting A_1 to L after removal of R_1 from $-NR_1-$, and A_2' is a group formed by connecting A_2 to L after removal of R_1 from $-NR_1-$.

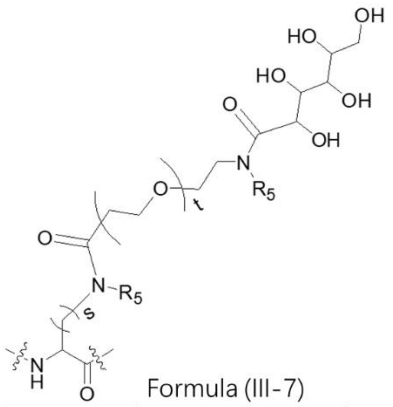
10. The eribulin derivative of claim 8, wherein L is $-L_4-L_3-L_2-L_1-$, and L_1 is connected to A_1' or A_2', and L_4 is connected to Q;

L_1 is selected from a direct bond, , , ,

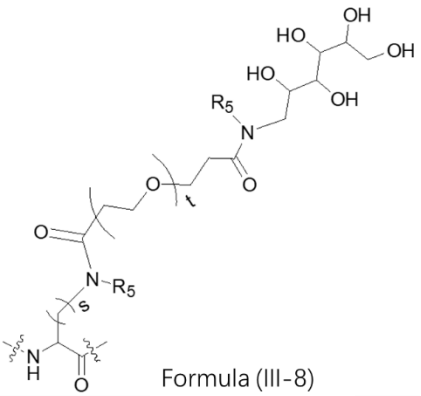

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, and

, wherein ◆ represents an attachment site to A_1' or A_2', and ~ represents an attachment site to L_2; and

L_2 is a direct bond, an amino acid residue, a short peptide chain formed by two or more amino acid residues, the amino acid residues are selected from natural or unnatural amino acid residues, the amino acid residue or short peptide chain has N-terminus attached to L_3 and C-terminus attached to L_1, and L_2 optionally contains one or more structures selected from formula (III-1) to formula (III-9):

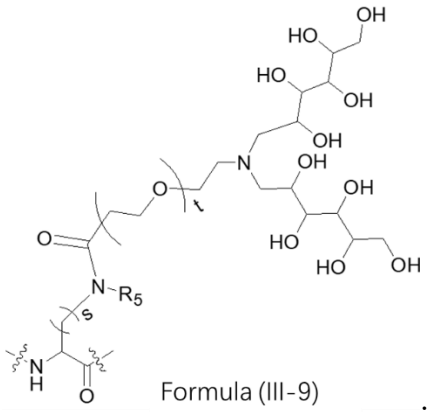

Formula (III-1)
,

Formula (III-2)
,

Formula (III-3)
,

Formula (III-4)
,

Formula (III-5)
,

Formula (III-6)
,


Formula (III-7)

,


Formula (III-8)

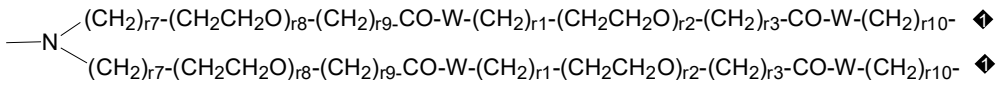
, and


Formula (III-9)

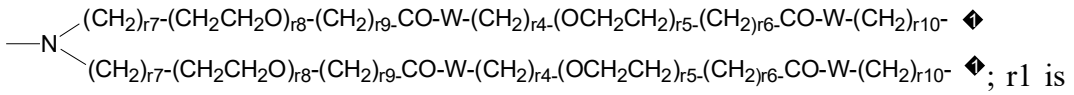
;

s is selected from 1, 2, 3, 4, 5, 6, 7, and 8, t is selected from 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12, and R_5 is selected from H or a C_1-C_8 alkyl group;

L_3 is selected from a direct bond, -NR_6-$(CH_2)_{r1}$-$(CH_2CH_2O)_{r2}$-$(CH_2)_{r3}$-CO-◆, -O-$(CH_2)_{r1}$-$(CH_2CH_2O)_{r2}$-$(CH_2)_{r3}$-CO-◆, -NR_6-$(CH_2)_{r4}$-$(OCH_2CH_2)_{r5}$-$(CH_2)_{r6}$-CO-◆, -O-$(CH_2)_{r4}$-$(OCH_2CH_2)_{r5}$-$(CH_2)_{r6}$-CO-◆, or ; or L_3 is selected from:



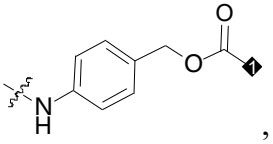
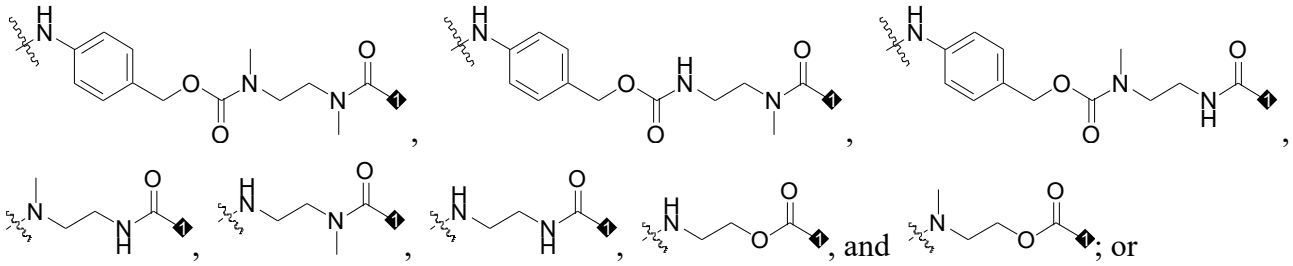
or

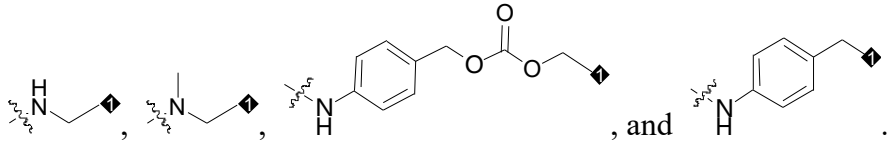


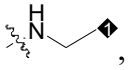
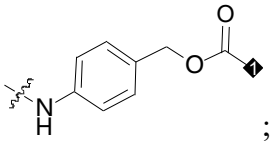
; r1 is selected from 0, 1, 2, 3, 4, 5, or 6, r2 is selected from 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12, r3 is selected from 1, 2, 3, 4, 5, or 6, r4 is selected from 1, 2, 3, 4, 5, or 6, r5 is selected from 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12, r6 is selected from 0, 1, 2, 3, 4, 5, or 6, r7 is selected from 0, 1, 2, 3, 4, 5, or 6, r8 is selected from 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12, r9 is selected from 1, 2, 3, 4, 5, or 6, r10 is selected from 1, 2, 3, 4, 5, or 6, W is selected from O or NR_6, R_6 is selected from H or a C_1-C_8 alkyl group, wherein ◆ represents an attachment site to L_2, and when ◆ appears twice in the same L_3 group, it means that L_2 is attached at both sites; and

L_4 is selected from a direct bond, -CO-, -$(CH_2)_{p1}$-CO-, -$(CH_2CH_2O)_{p2}$-$(CH_2)_{p3}$-CO-, -$(CH_2)_{p4}$-O-$(CH_2)_{p5}$-C(O)-, -NR_7-$(CH_2)_{p1}$-CO-, -NR_7-$(CH_2CH_2O)_{p2}$-$(CH_2)_{p3}$-CO-, -NR_7-$(CH_2)_{p4}$-O-$(CH_2)_{p5}$-C(O)-, -O-$(CH_2)_{p1}$-CO-, -O-$(CH_2CH_2O)_{p2}$-$(CH_2)_{p3}$-CO-, and -O-$(CH_2)_{p4}$-O-$(CH_2)_{p5}$-C(O)-, p1, p2, p3, p4, and p5 are each independently selected from 1, 2, 3, 4, 5, 6, 7, and 8, and R_7 is selected from

H or a C_1-C_8 alkyl group, wherein -CO- is attached to L_3.

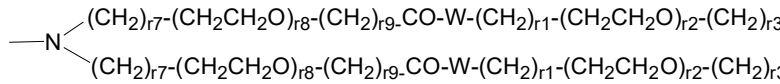
11. The eribulin derivative of claim 10, wherein A_1' represents a group formed by connecting A_1 to L after removal of the hydrogen atom from $-NH_2$, -NH- on the chain, or -NH- on the ring, and A_2' represents a group formed by connecting A_2 to L after removal of the hydrogen atom from $-NH_2$, -NH- on the chain, or -NH- on the ring, and L_1 is selected from a direct bond, , ; or

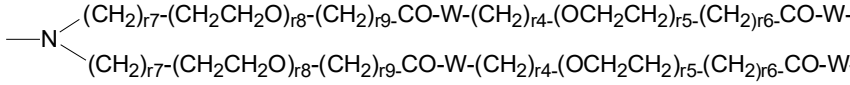
when A_1' represents a group formed by connecting A_1 to L after removal of the hydrogen atom of -OH-, or A_2' represents a group formed by connecting A_2 to L after removal of the hydrogen atom of -OH-, L_1 is selected from .

12. The eribulin derivative of claim 10, wherein L_1 is selected from the direct bond, , and ;

L_2 is an amino acid residue or a short peptide chain formed by 2 to 8 amino acid residues, and preferably, the amino acid residues are amino acid residues formed by amino acids selected from phenylalanine, alanine, glycine, valine, citrulline, leucine, isoleucine, tryptophan, tyrosine, histidine, lysine, serine, threonine, cysteine, glutamic acid, glutamine, aspartic acid, asparagine, methionine, and arginine, or more preferably, the amino acid residues are amino acid residues formed by amino acids selected from phenylalanine, alanine, glycine, valine, and citrulline;

L_3 is selected from the direct bond, $-NH-(CH_2CH_2O)_{r2}-(CH_2)_{r3}-CO-$ ◆, $-NH-(CH_2)_{r4}-(OCH_2CH_2)_{r5}-CO-$ ◆, $-O-(CH_2CH_2O)_{r2}-(CH_2)_{r3}-CO-$ ◆, or $-O-(CH_2)_{r4}-(OCH_2CH_2)_{r5}-CO-$◆; or L_3 is selected from

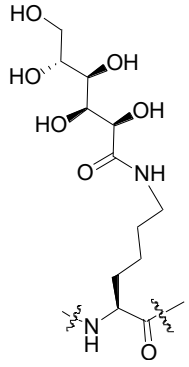
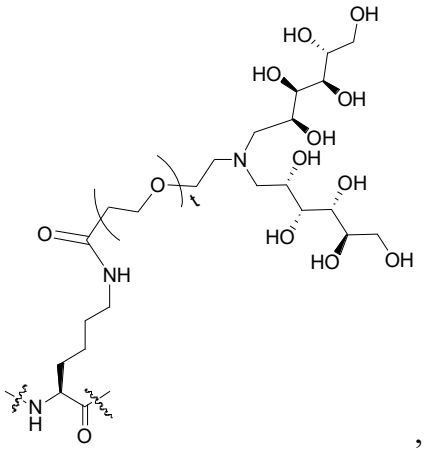


or


; r1, r6, or r7 is 0, r2 is selected from 4, 5, 6, 7, or 8, r3 is selected from 1, 2, 3, or 4, r4 is selected from 1, 2, 3, or 4, r5 is selected from 4, 5, 6, 7, or 8, r8 is selected from 1, 2, 3, or 4, r9 is selected from 1, 2, 3, or 4, r10 is

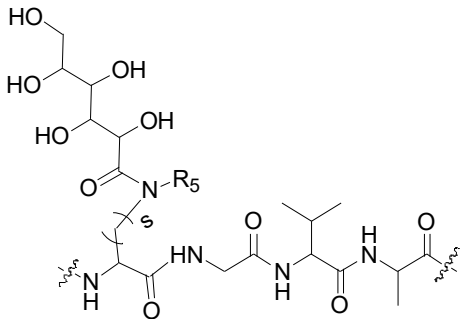
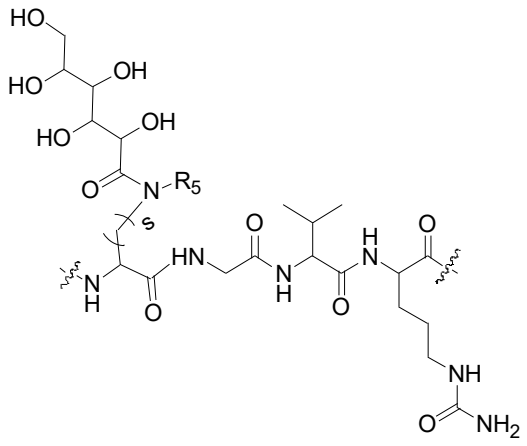
selected from 1, 2, 3, or 4, and W is NH; and/or

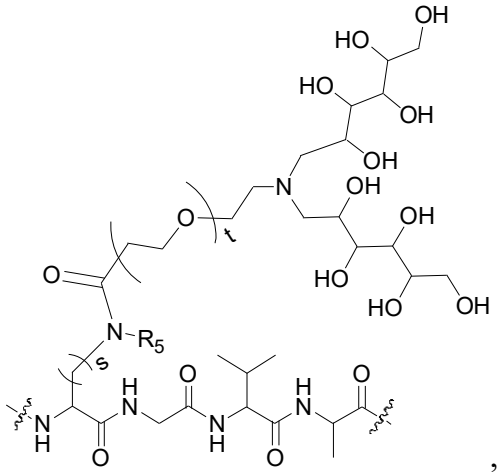
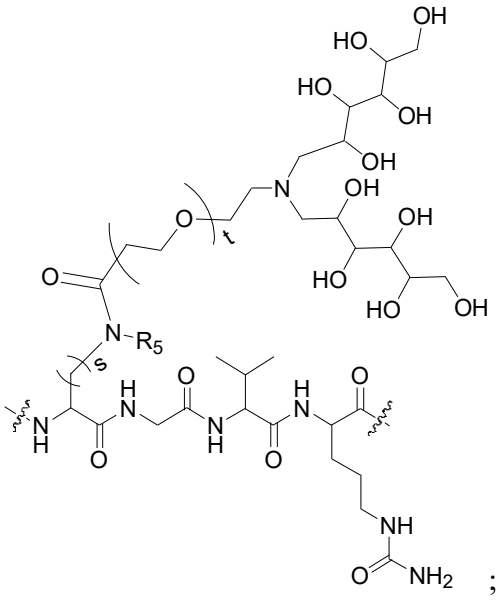
L_4 is selected from the direct bond, $-(CH_2)_{p1}-CO-$, $-(CH_2CH_2O)_{p2}-(CH_2)_{p3}-CO-$, $-(CH_2)_{p4}-O-(CH_2)_{p5}-C(O)-$, $-NR_7-(CH_2)_{p1}-CO-$, $-NR_7-(CH_2CH_2O)_{p2}-(CH_2)_{p3}-CO-$, or $-NR_7-(CH_2)_{p4}-O-(CH_2)_{p5}-C(O)-$, p1 is selected from 1, 2, 3, 4, 5, or 6, p2, p3, p4, and p5 are each independently selected from 1, 2, 3, or 4, and R_7 is selected from H or a C_1-C_6 alkyl group;.

13. The eribulin derivative of claim 12, wherein L_2 optionally comprises one or more structures selected from formula (III-1) and formula (III-9), or preferably, comprises one or more structures selected from the following groups:  and , wherein t=8;

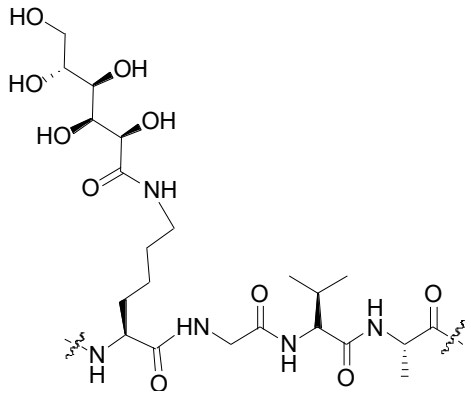
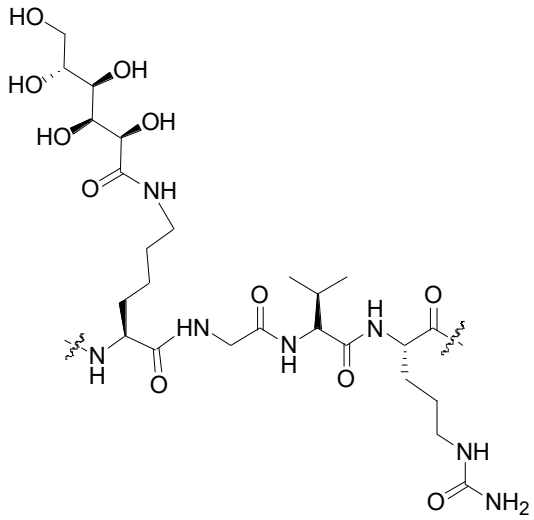
preferably, L_2 is selected from $-^{NH}Gly^{CO}-$, or selected from the following short peptide chains: $-^{NH}Gly\text{-}Gly\text{-}Phe\text{-}Gly^{CO}-$, $-^{NH}Val\text{-}Cit^{CO}-$, $-^{NH}Val\text{-}Ala^{CO}-$, $-^{NH}Gly\text{-}Gly\text{-}Val\text{-}Ala^{CO}-$, $-^{NH}Gly\text{-}Gly\text{-}Val\text{-}Cit^{CO}-$, $-^{NH}Lys\text{-}Gly\text{-}Val\text{-}Ala^{CO}-$, $-^{NH}Lys\text{-}Gly\text{-}Val\text{-}Cit^{CO}-$, and $-^{NH}Gly\text{-}Val\text{-}Cit^{CO}-$;

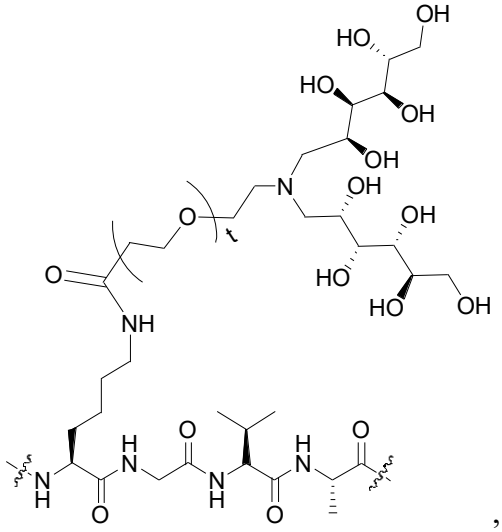
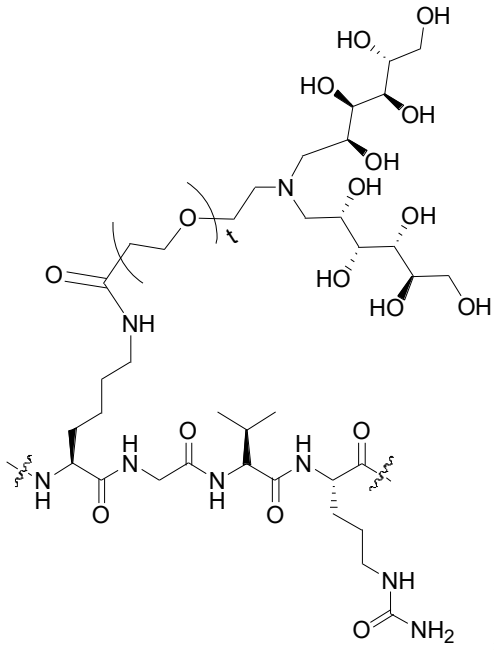
more preferably, L_2 is selected from the following groups:

, ,

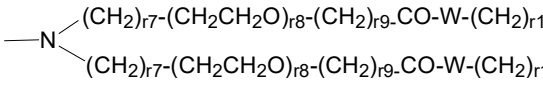

, and 
; or

further preferably, L_2 is selected from the following groups:


, 
,


, and 
, wherein t=8.

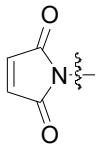
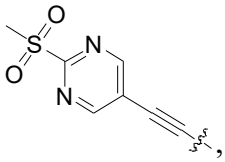
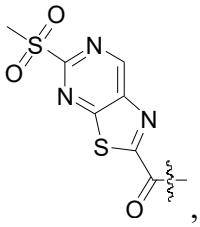
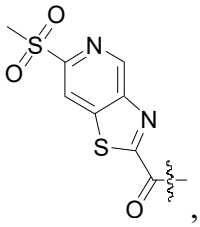
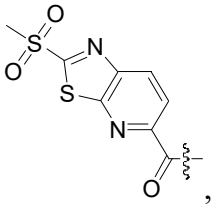
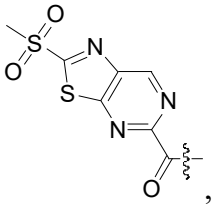
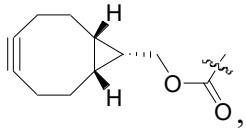
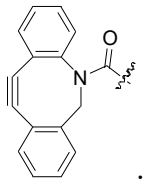
14. The eribulin derivative of claim 12, wherein L_3 is selected from the direct bond, -O-$(CH_2CH_2O)_{r2}$-$(CH_2)_{r3}$-CO-◆, -NH-$(CH_2CH_2O)_{r2}$-$(CH_2)_{r3}$-CO-◆, and

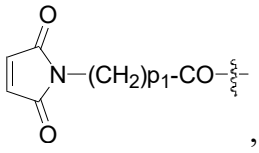


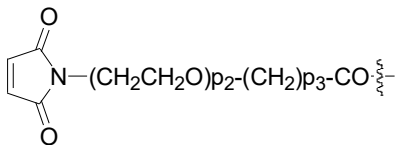
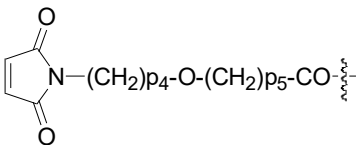
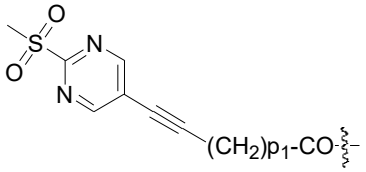
, r1 and r7 are 0, r2 is selected from 4, 5, 6, 7, or 8, r3 is 2, r8 is selected from 2, 3, or 4, r9 is 2, and r10 is 2; and/or

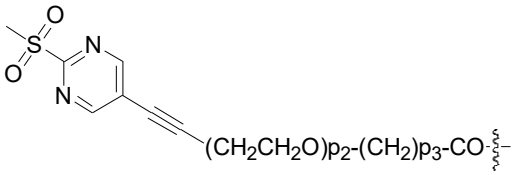
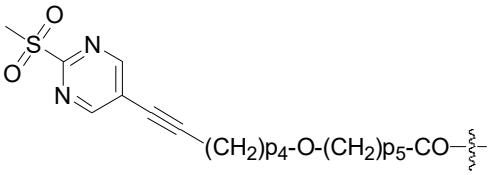
L_4 is selected from the following groups: the direct bond, -$(CH_2)_{p1}$-CO-, -$(CH_2CH_2O)_{p2}$-$(CH_2)_{p3}$-CO-, -$(CH_2)_{p4}$-O-$(CH_2)_{p5}$-C(O)-, -NR_7-$(CH_2)_{p1}$-CO-, -NR_7-$(CH_2CH_2O)_{p2}$-$(CH_2)_{p3}$-CO-, or -NR_7-$(CH_2)_{p4}$-O-$(CH_2)_{p5}$-C(O)-, p1 is selected from 3, 4, 5, or 6, p2, p3, p4, and p5 are each independently selected from 2 and 3, and R_7 is H.

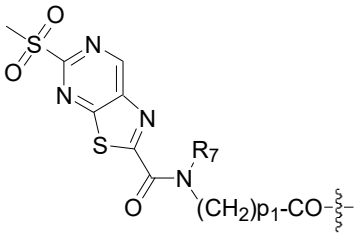
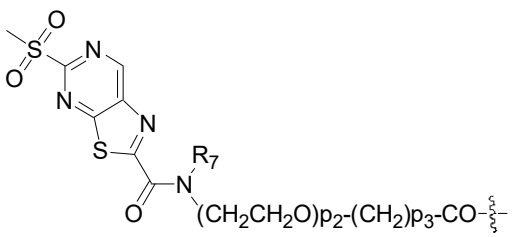
15. The eribulin derivative of claim 8, wherein Q is selected from a group comprising a maleimide linker, a group comprising a mesylpyrimidine linker, a group comprising a mesylpyridothiazole linker, a group comprising a mesylpyrimidothiazole linker, a group comprising a cycloalkyne linker, or a group comprising an oxime bond linker,

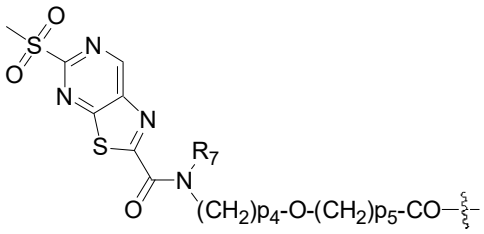
preferably, Q is selected from , , , , , , , and .

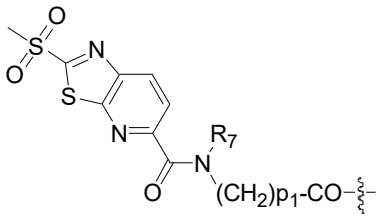
16. The eribulin derivative of claim 15, wherein Q-L_4 is selected from ,

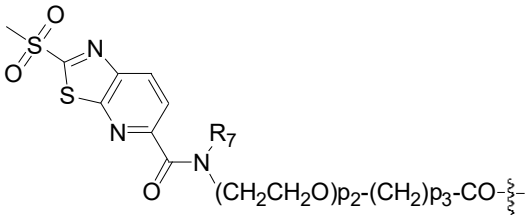
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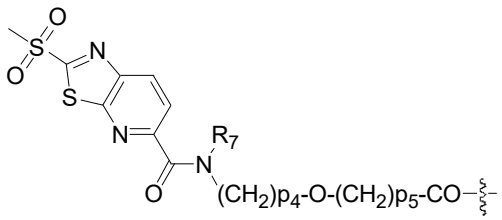
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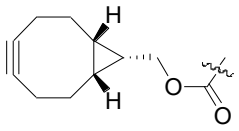
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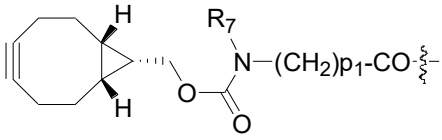


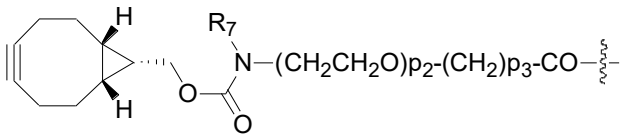
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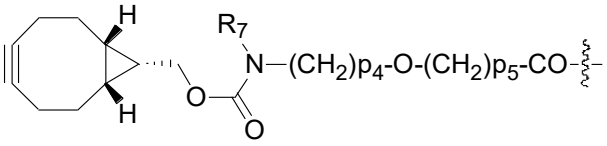
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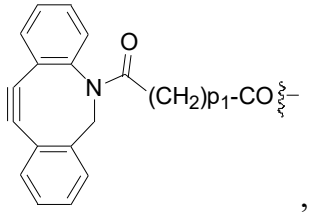
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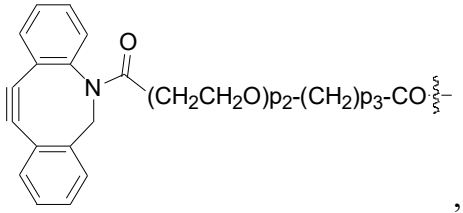
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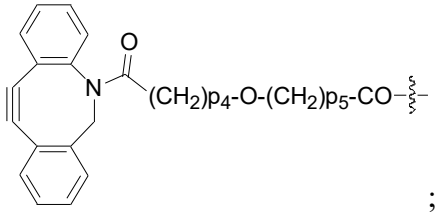
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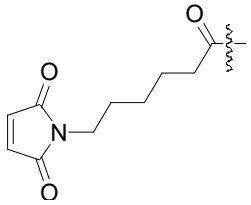
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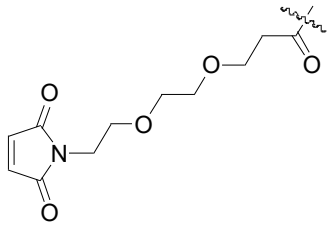
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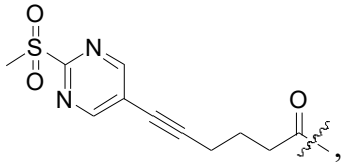
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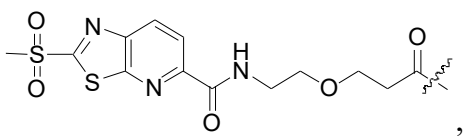
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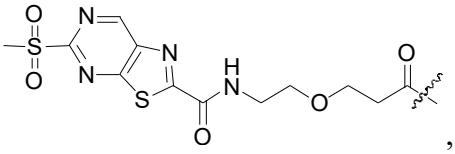
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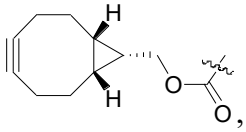
preferably, Q-L_4 is selected from


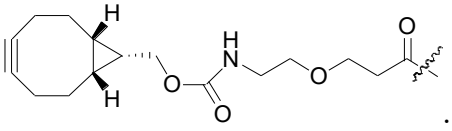
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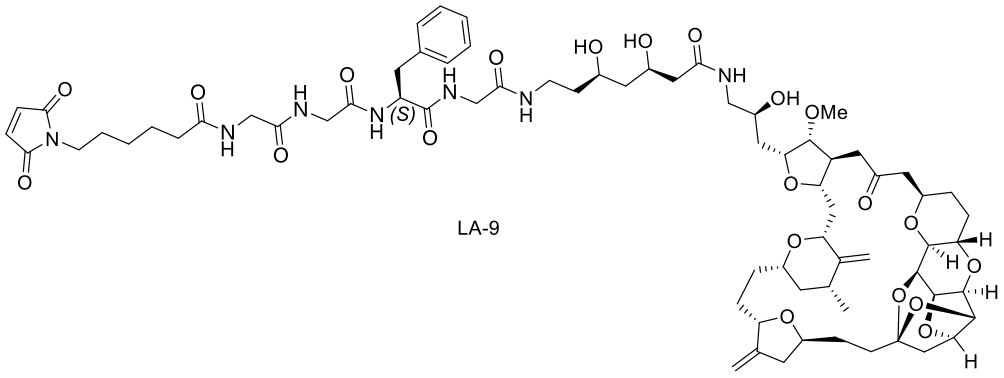
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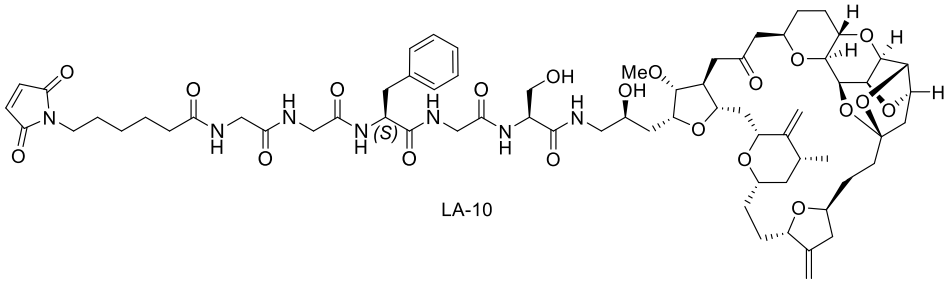
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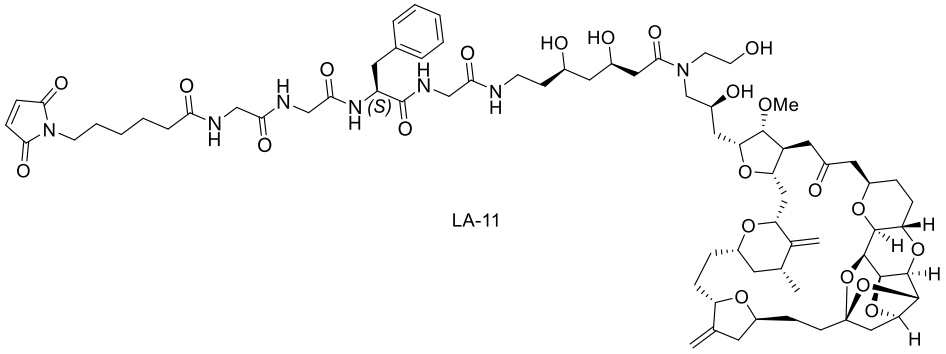
17. The eribulin derivative of claim 8, wherein formula (I') is one of the following:



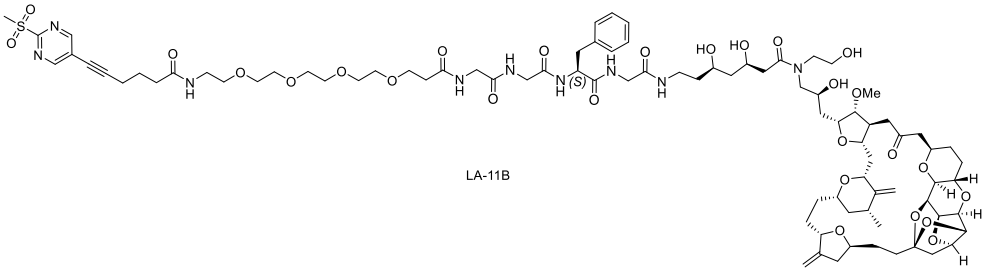
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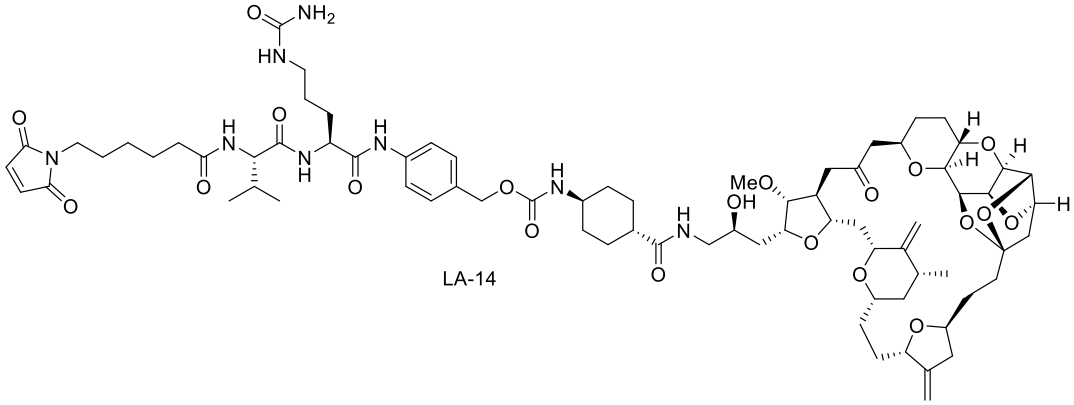
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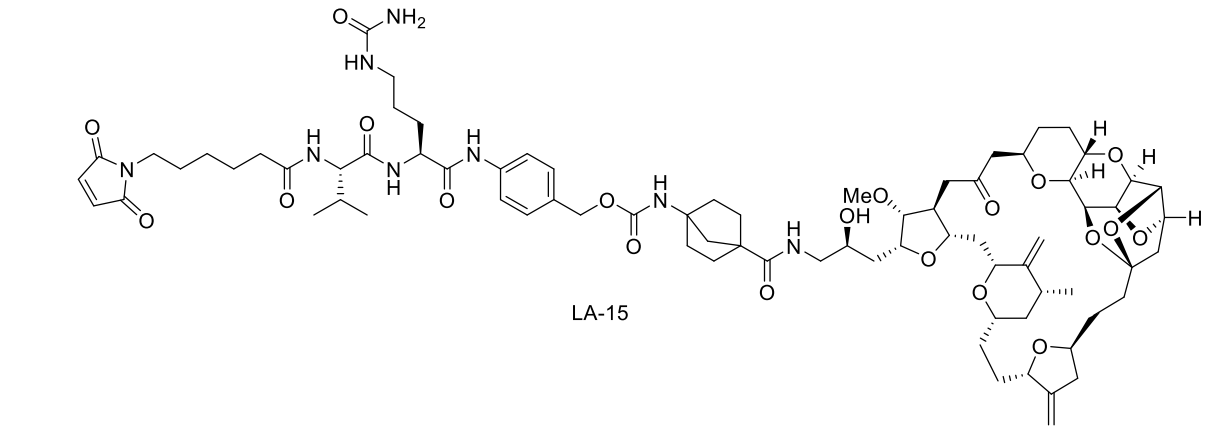
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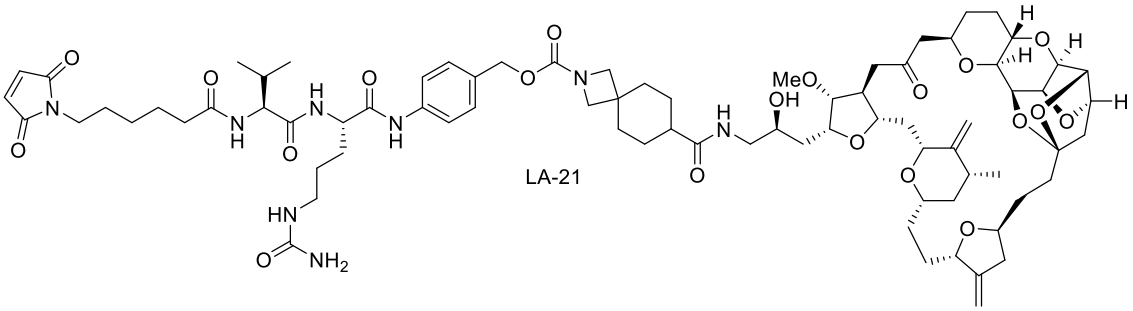
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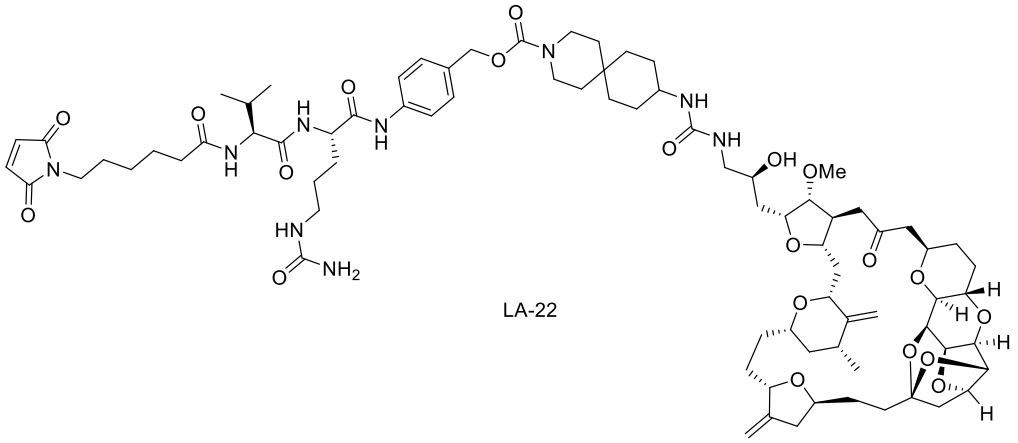
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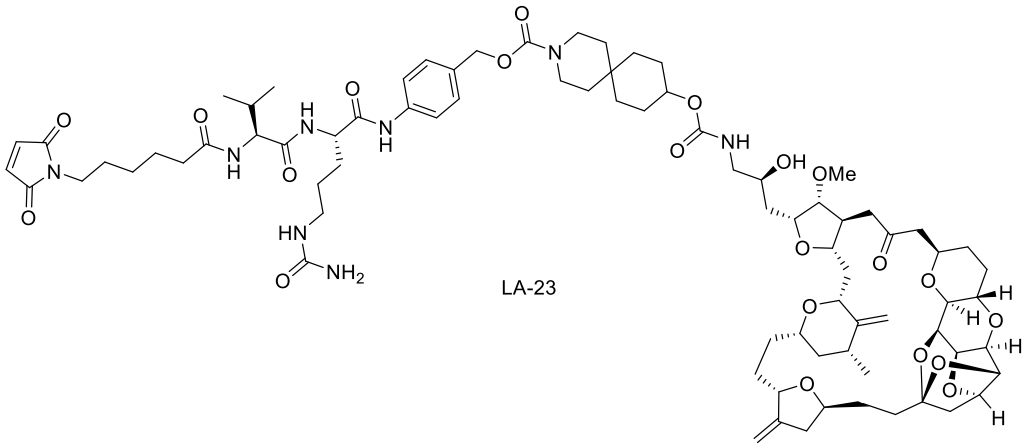
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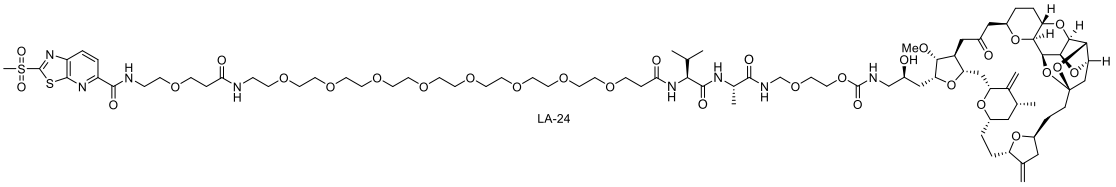
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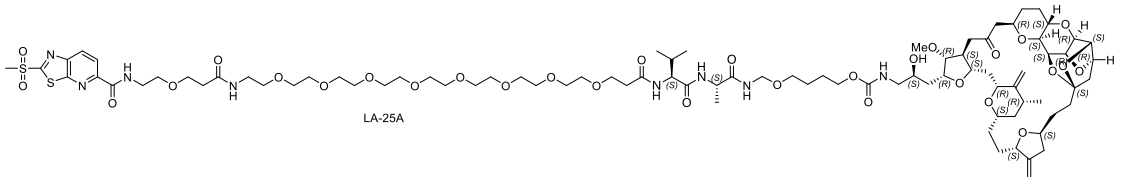
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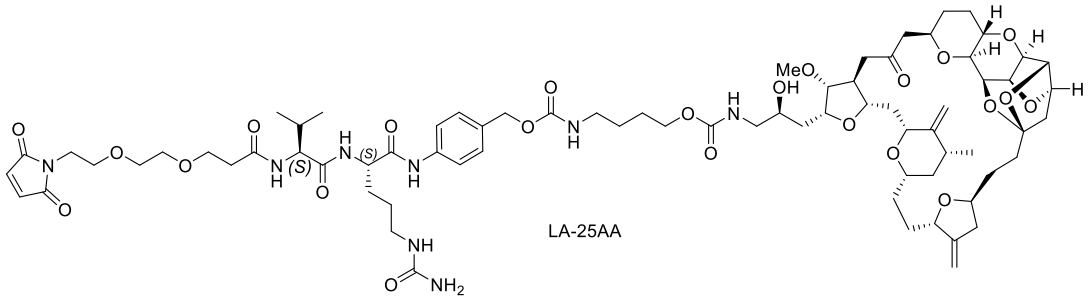
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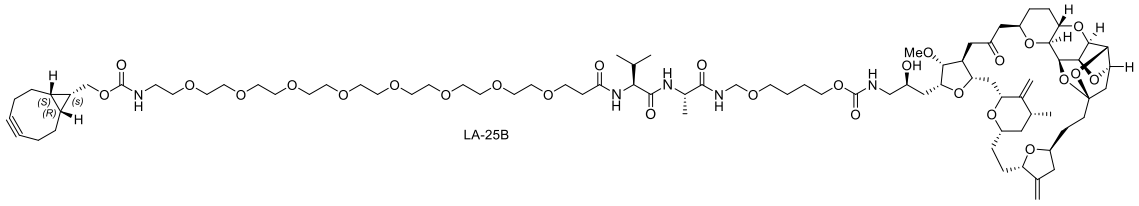
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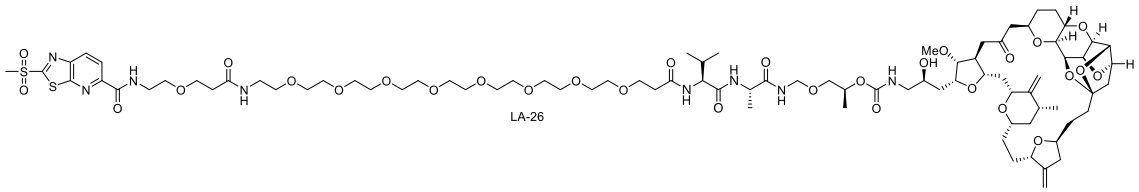
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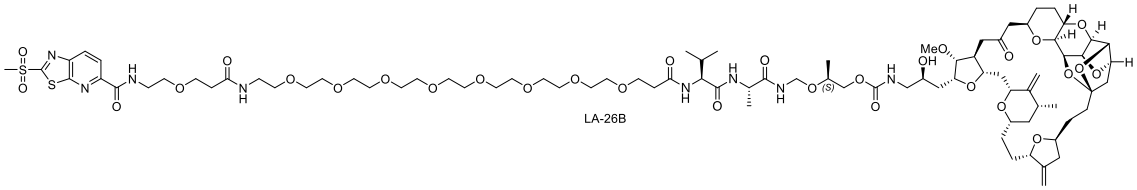
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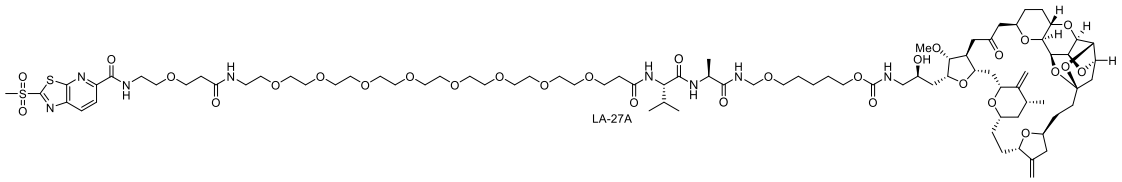
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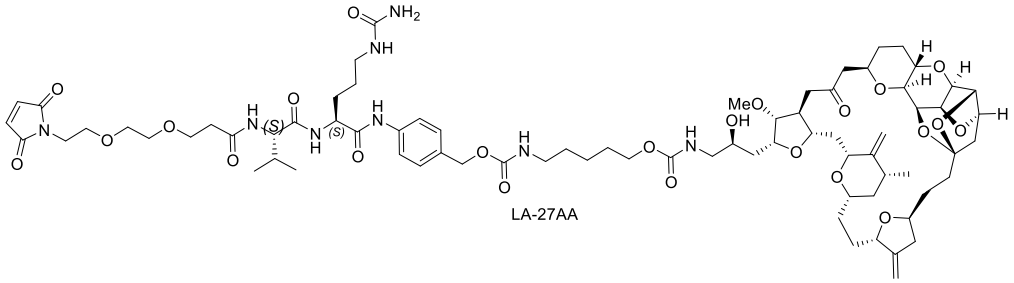
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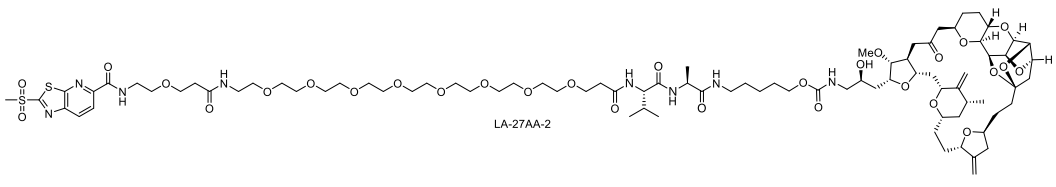
LA-26B



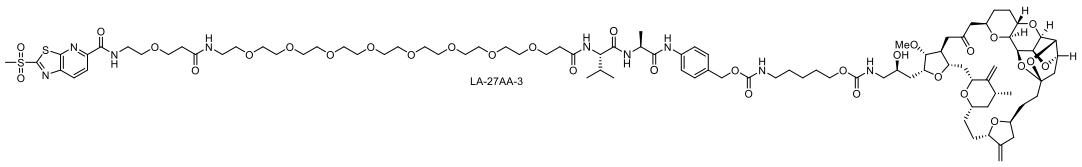
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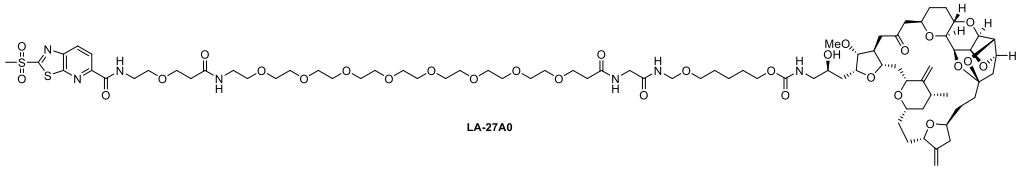
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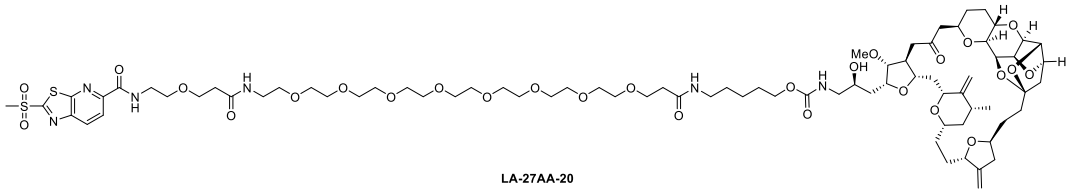
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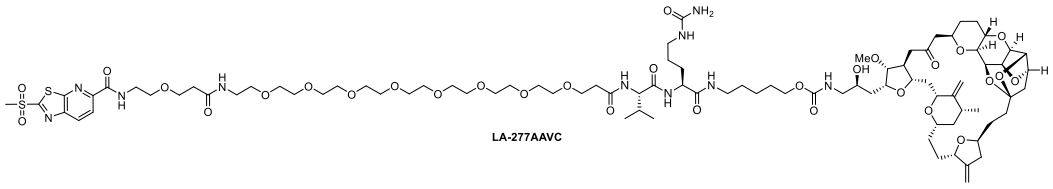
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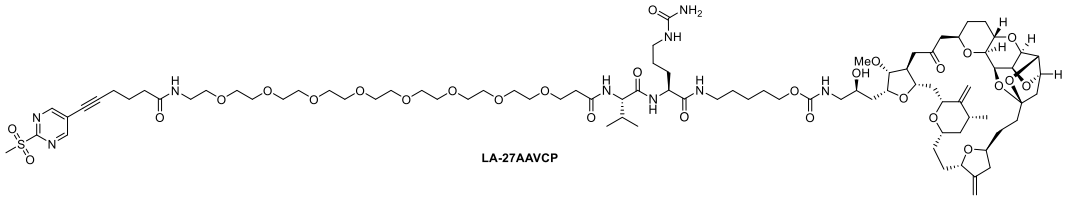
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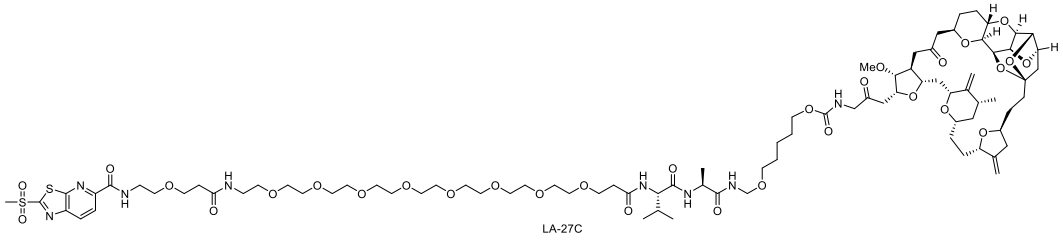
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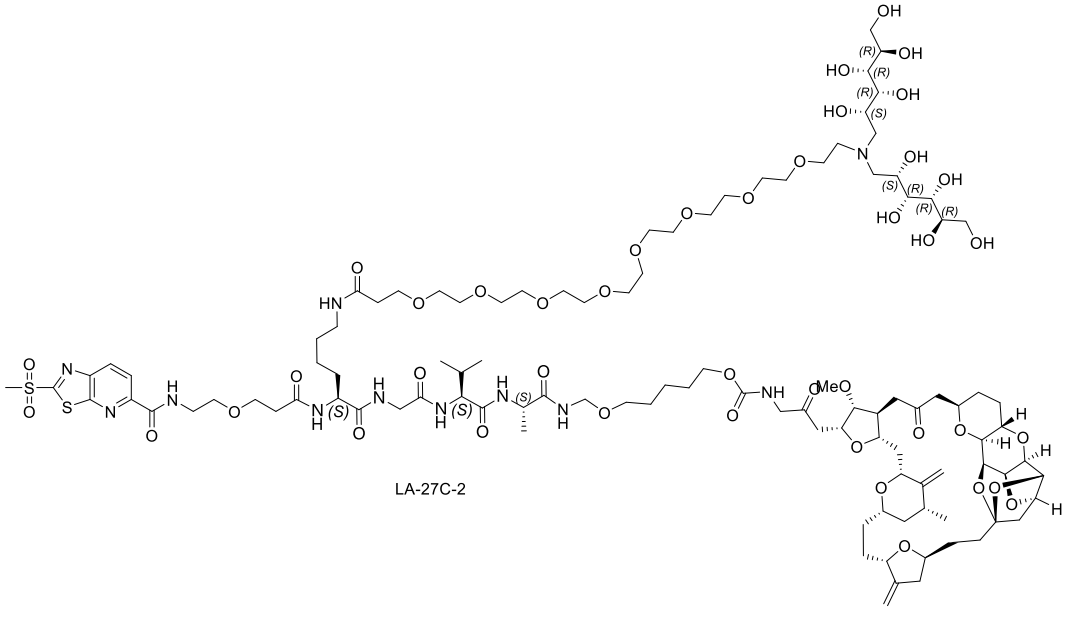
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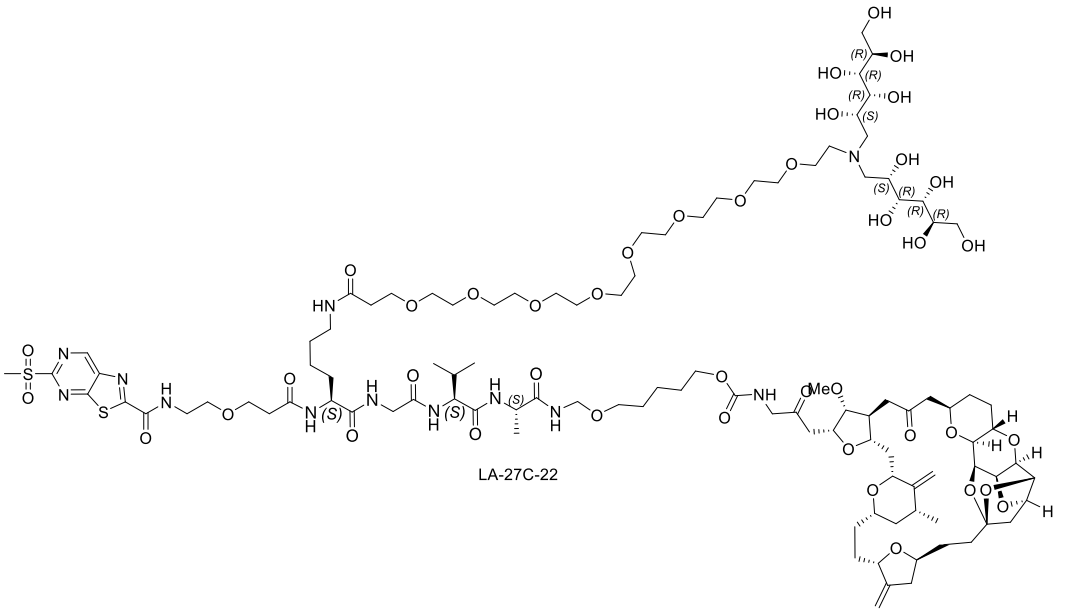
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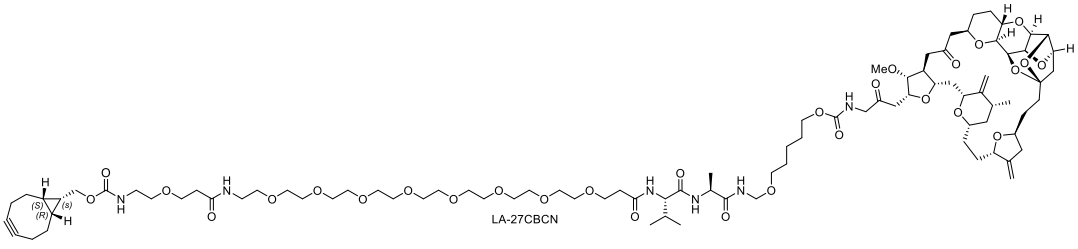
LA-27C



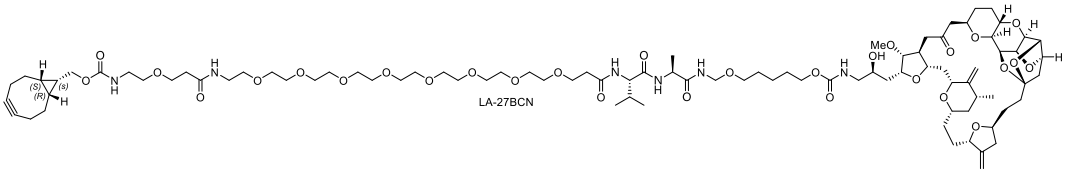
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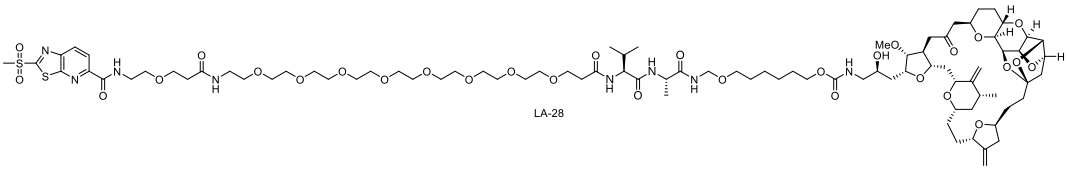
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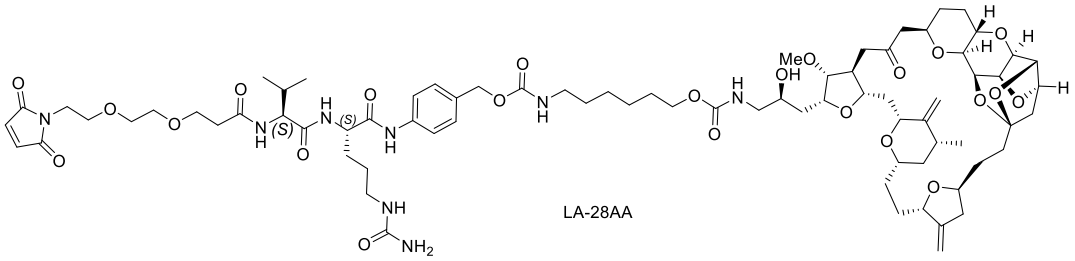
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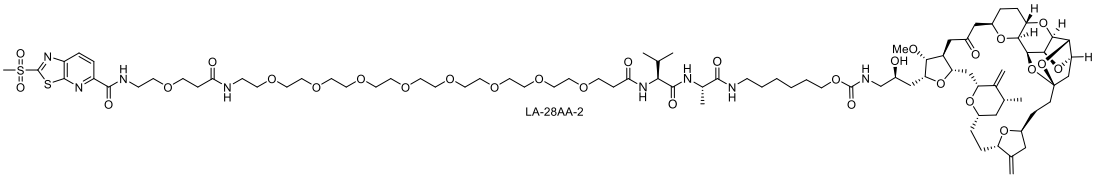
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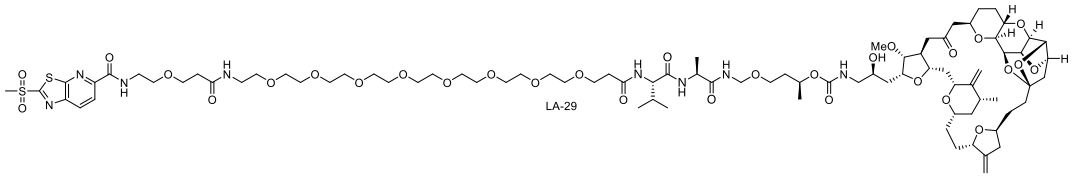
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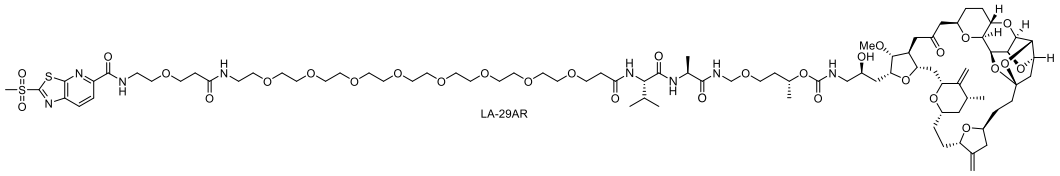
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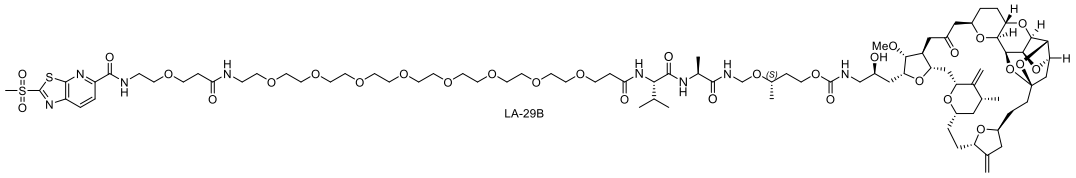
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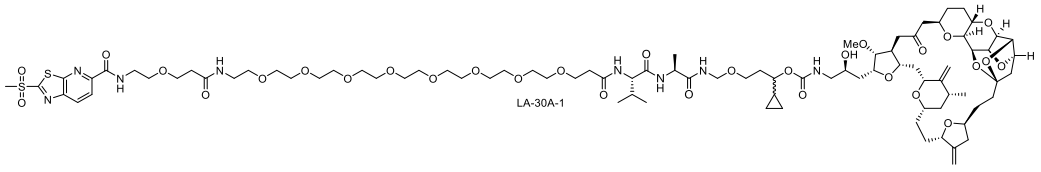
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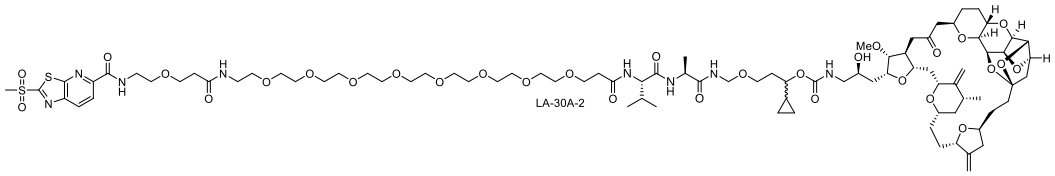
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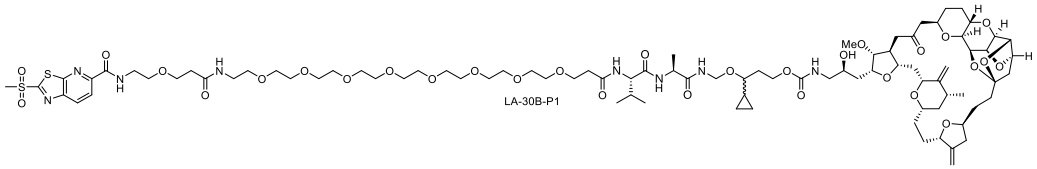
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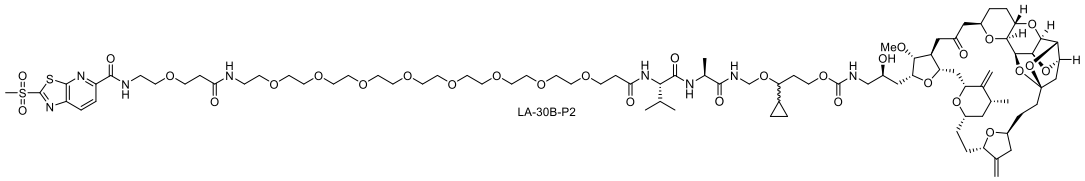
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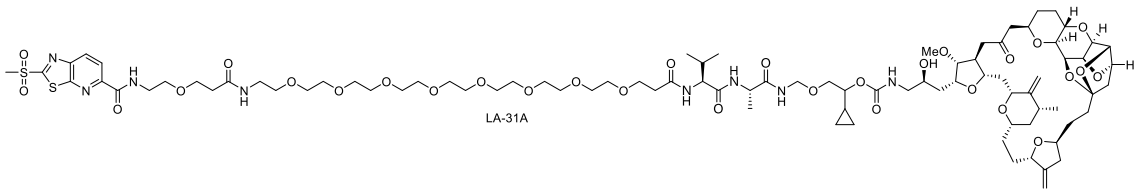
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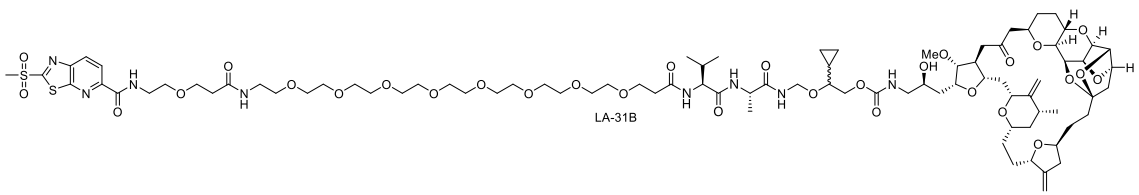
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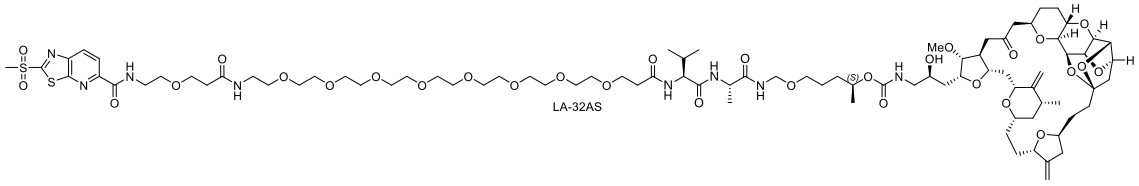
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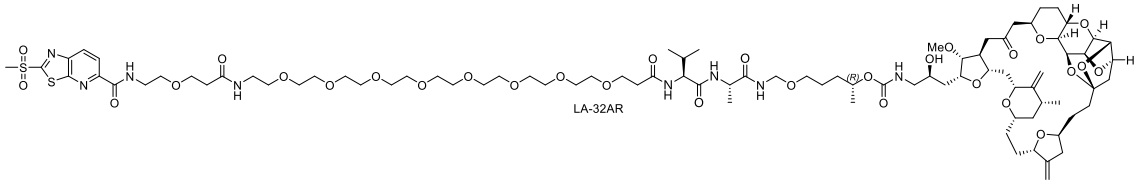
LA-31A



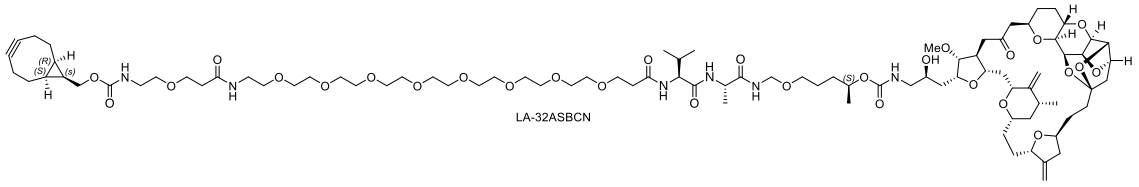
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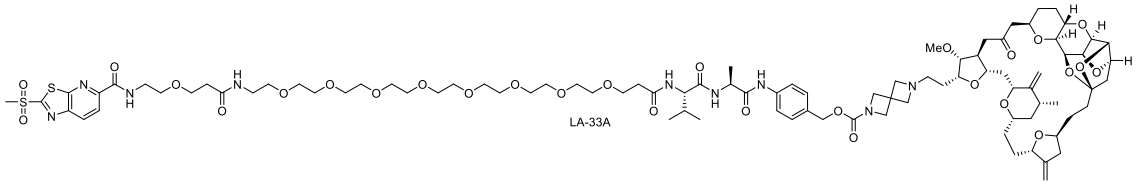
LA-32AS



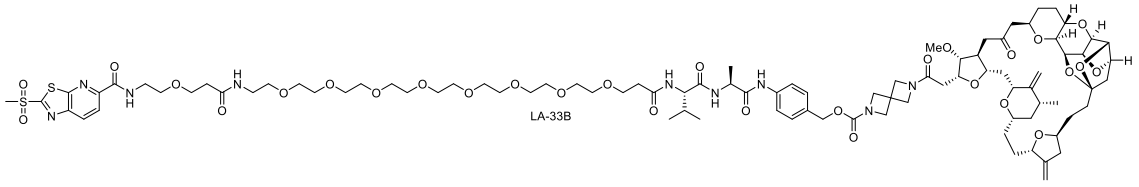
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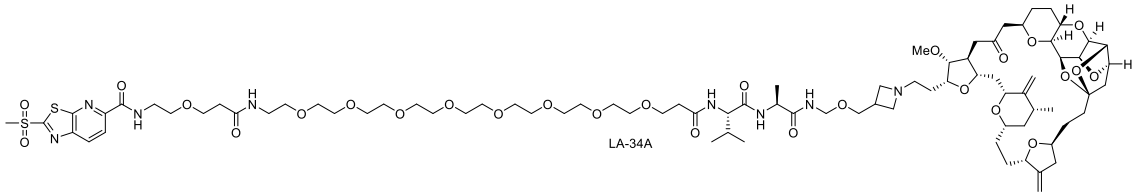
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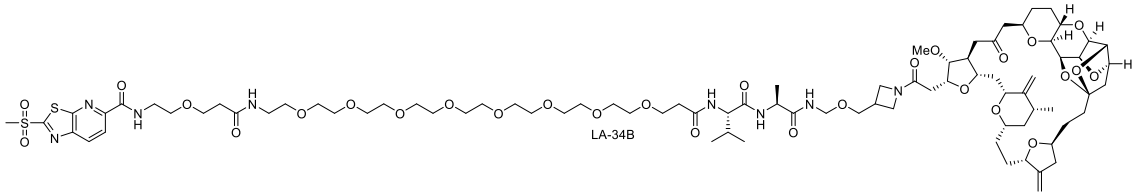
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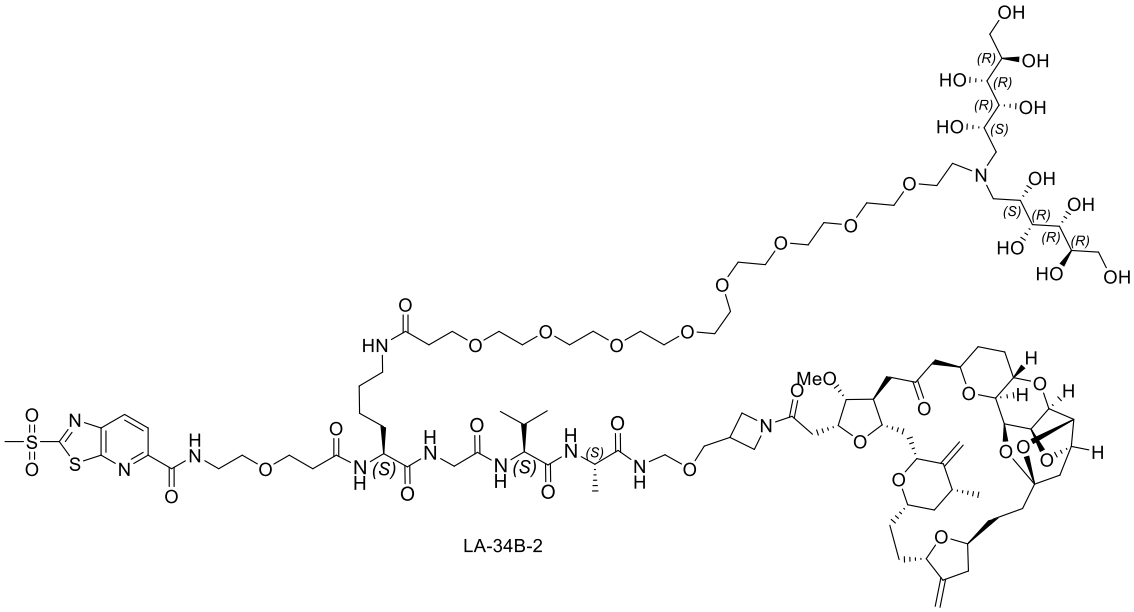
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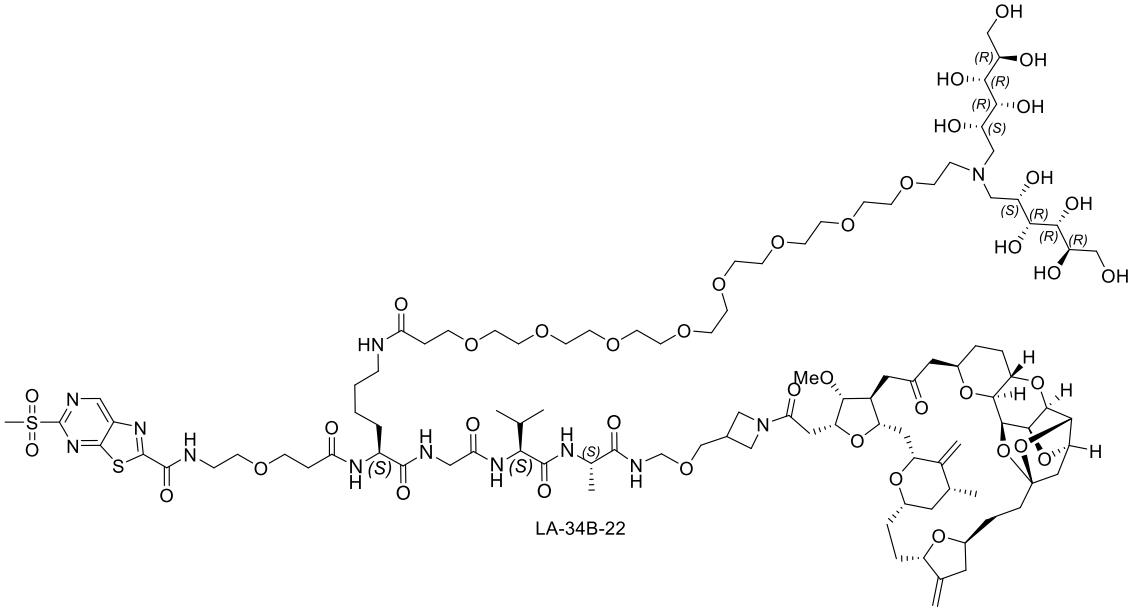
LA-34A



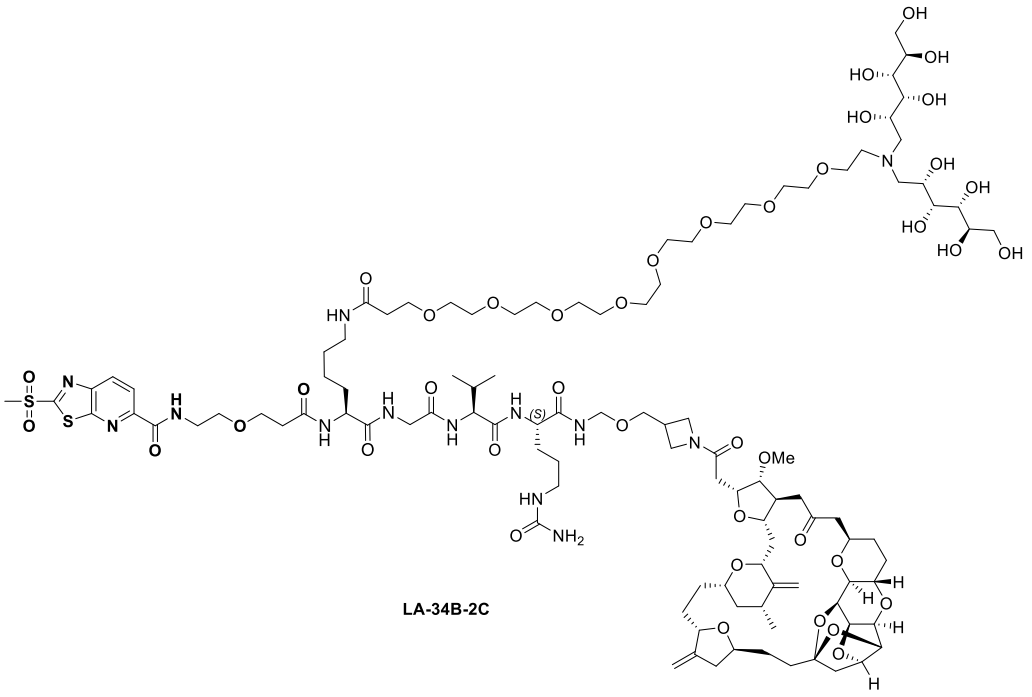
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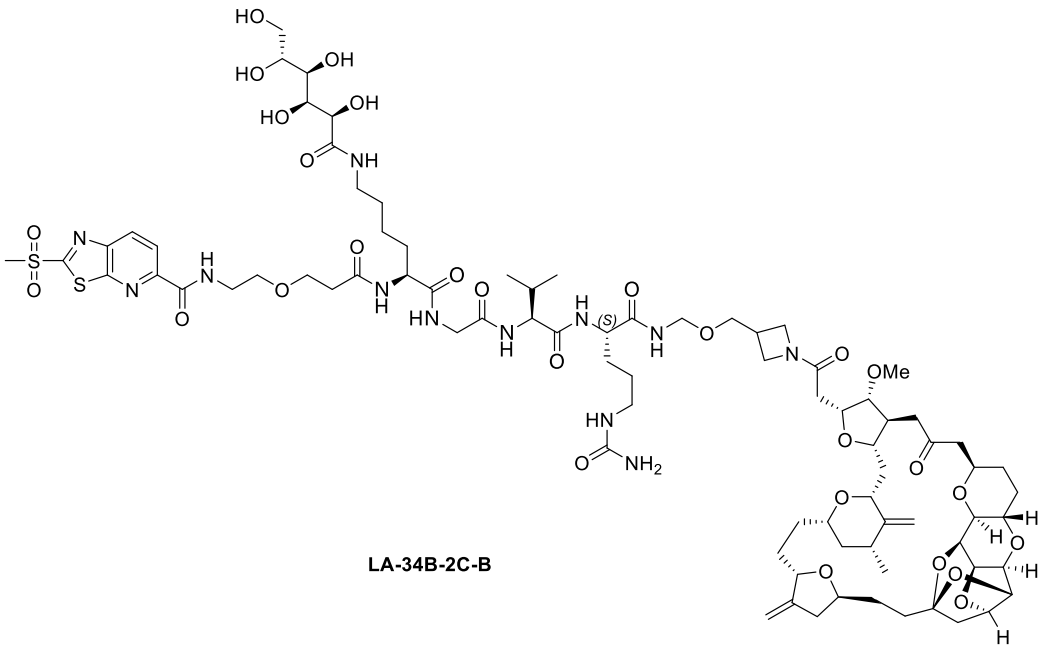
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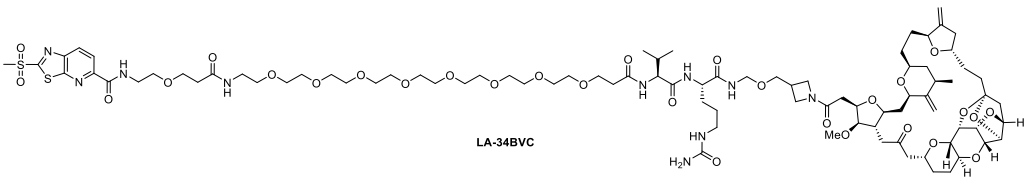
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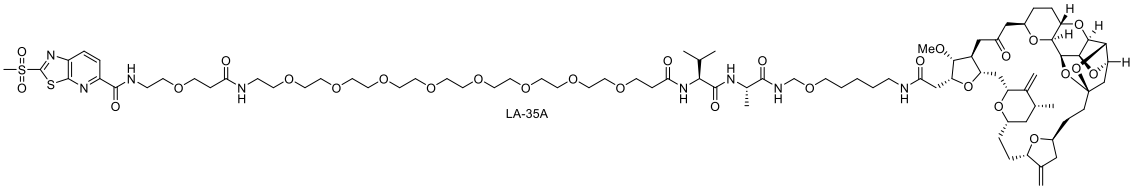
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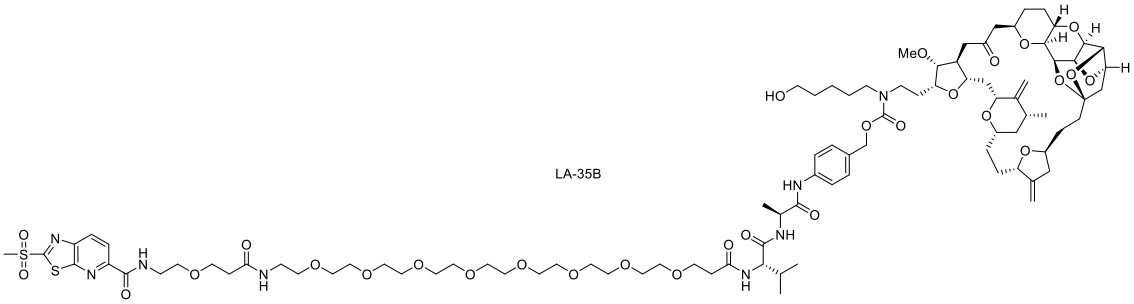
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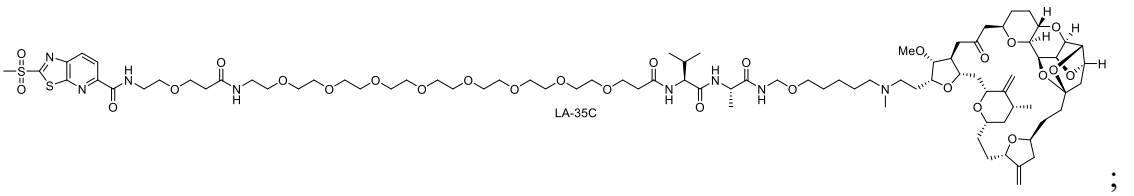


LA-34BVC



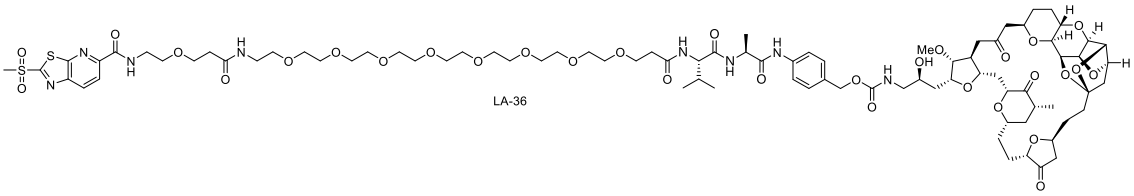
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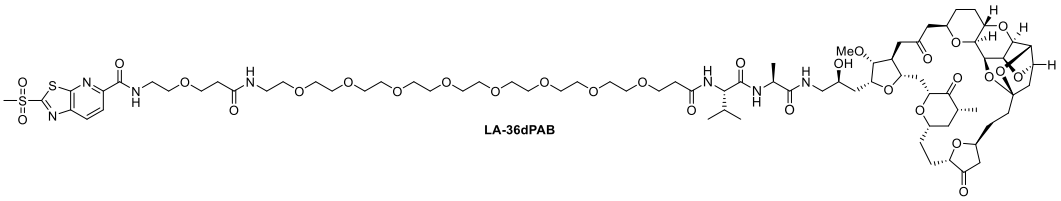


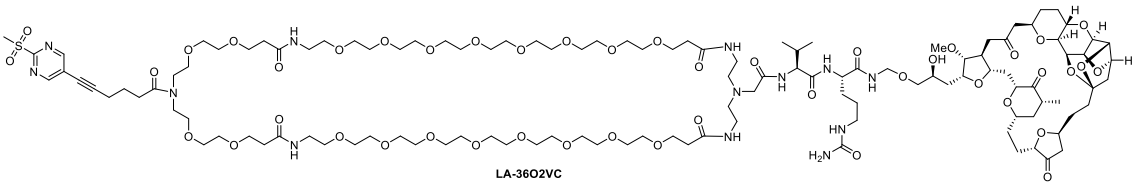


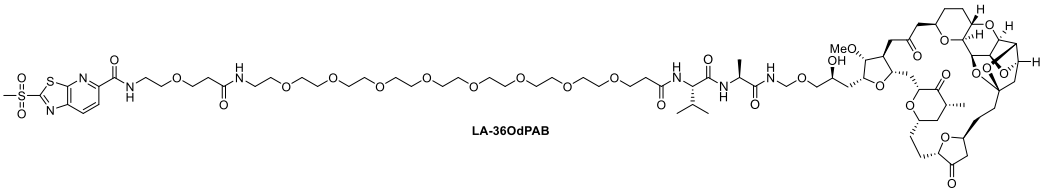
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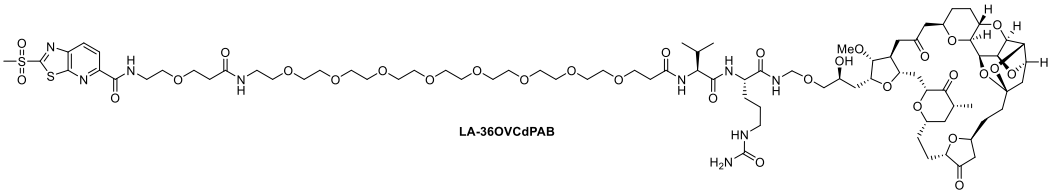
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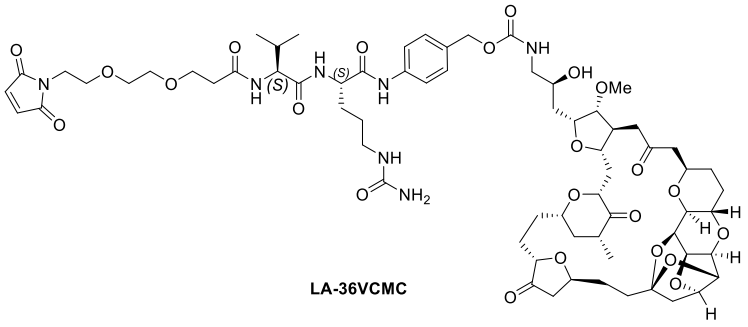




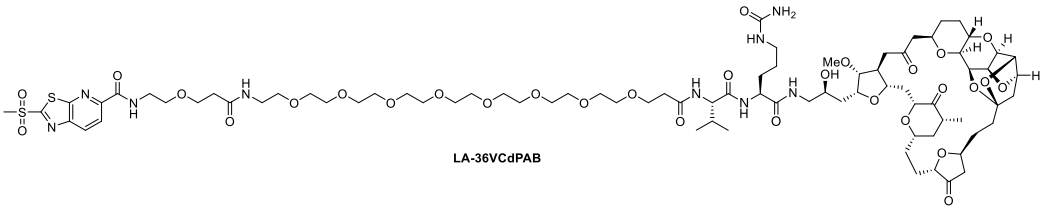




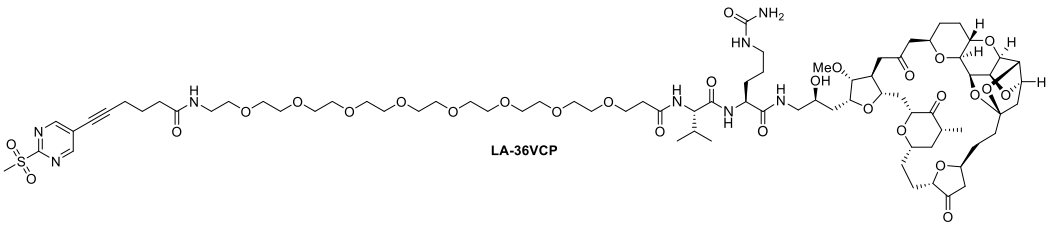




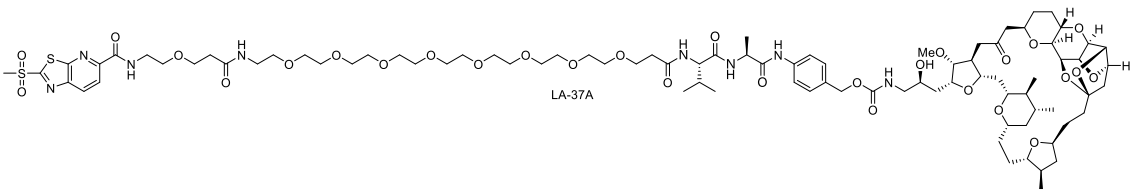
LA-36VCMC



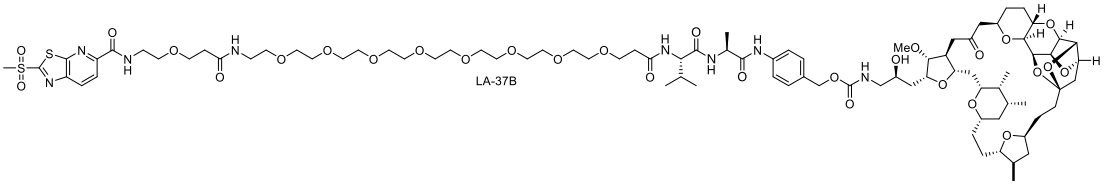
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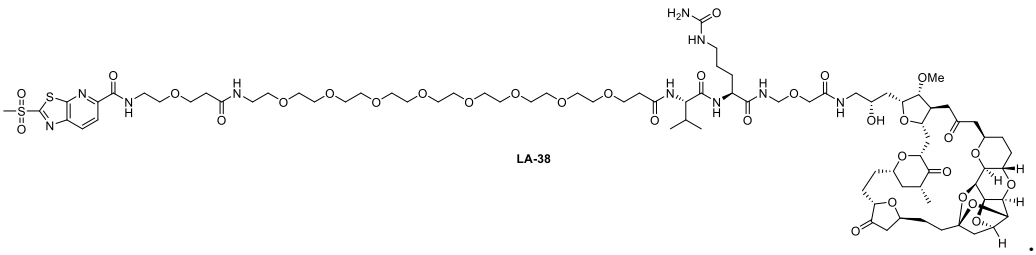
LA-36VCP



LA-37A



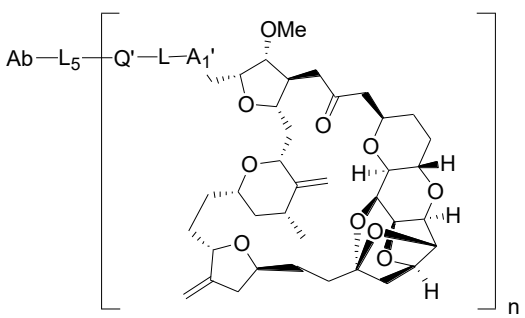
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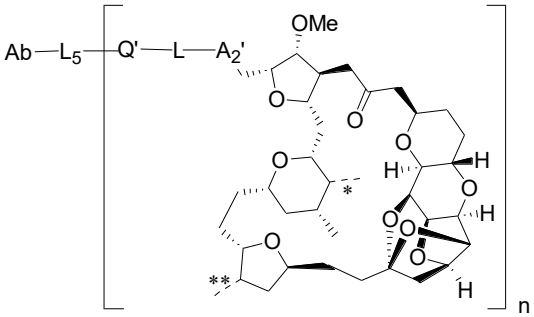
LA-38

.

18. An antibody-drug conjugate, which is a compound of formula (I") or (II"), or an isotope-labeled compound, an optical isomer, a geometric isomer, a tautomer, an isomer mixture, or a pharmaceutically acceptable salt thereof;



formula (I")



formula (II")

wherein:

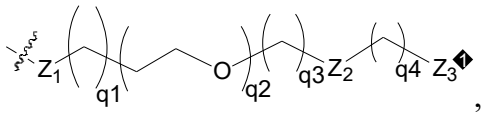
Ab is an antibody or an antigen-binding fragment;

L_5 is a direct bond or a linking group connecting Ab and Q';

Q' is a group formed after Q is attached to Ab via L_5;

n is an integer or decimal between 0 and 20, or preferably, n is an integer or decimal between 0 and 8; and

definitions of Q, L, A_1', A_2', *, and ** are the same as those in formula (I') and formula (II') of any one of claims 8 to 17.

19. The antibody-drug conjugate of claim 18, wherein L_5 is the direct bond or 

,  represents an attachment site to Ab, ◆ indicates that Z_3 is linked to Q', and Z_3 is a click probe, a sulfhydryl group, or a precursor thereof capable of binding to Q' after reaction;

Z_1 and Z_2 are each independently selected from -C(O)NH-, -C(O)O-, -C(O)-, -OC(O)-, -NHC(O)-, -NH-, -O-, -OC(O)NH-, or -NHC(O)O-;

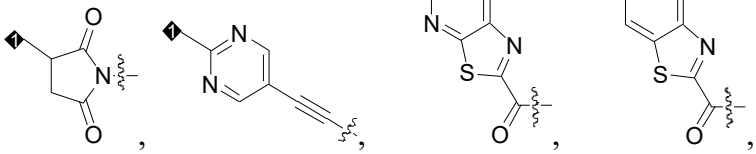
q_1 is 0, 1, 2, 3, 4, 5, 6, 7, or 8;

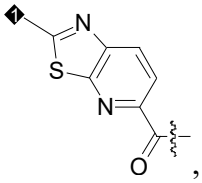
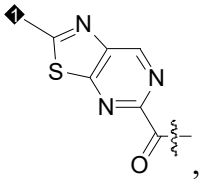
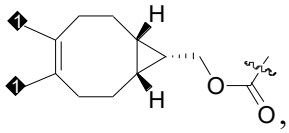
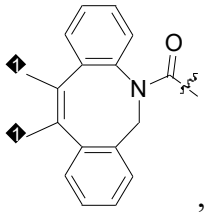
q_2 is 1, 2, 3, 4, 5, 6, 7, or 8;

q_3 is 1, 2, 3, 4, 5, 6, 7, or 8;

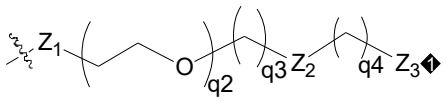
q_4 is 1, 2, 3, 4, 5, 6, 7, or 8;

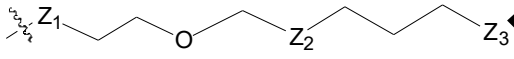
Z_3 is a click probe or a sulfhydryl group or a precursor thereof that can be linked to Q' after a metal-free click reaction, and preferably, Z_3 is an azido group; and/or

Q' is selected from the following: 





, and , wherein ◆ represents an attachment site to L_5, and ⁓ represents an attachment site to L_4.

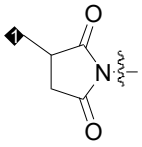
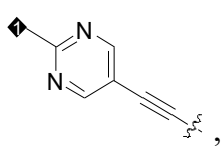
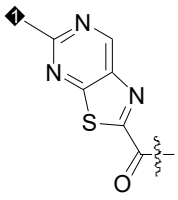
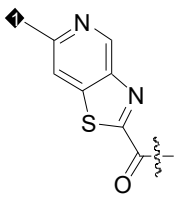
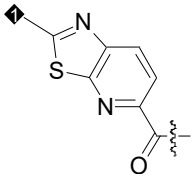
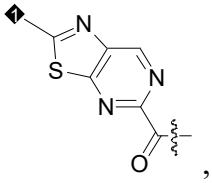
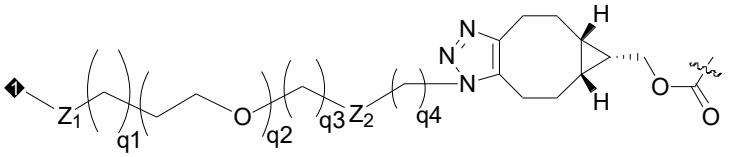
20. The antibody-drug conjugate of claim 18, wherein L_5 is the direct bond or

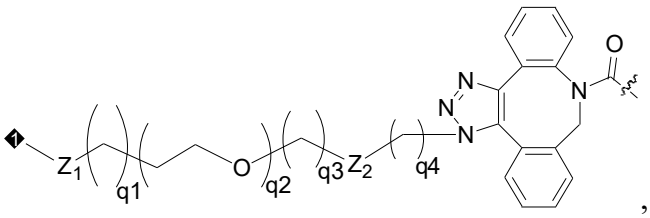

; and preferably, L_5 is the direct bond or


; and/or

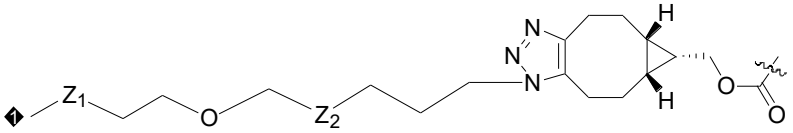
Z_1 and Z_2 are each independently -C(O)NH-.

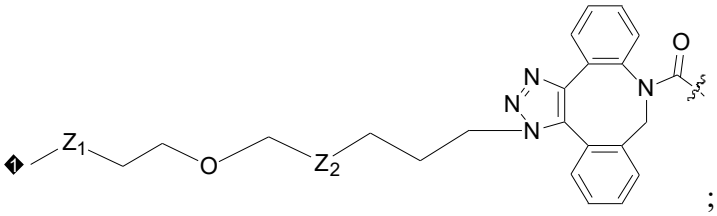
21. The antibody-drug conjugate of claim 18, wherein L_5-Q' is selected from the following:








, and


, wherein ◆ represents an attachment site to Ab, and ⁓ represents an attachment site to L_4;

preferably, L_5-Q' is selected from


and

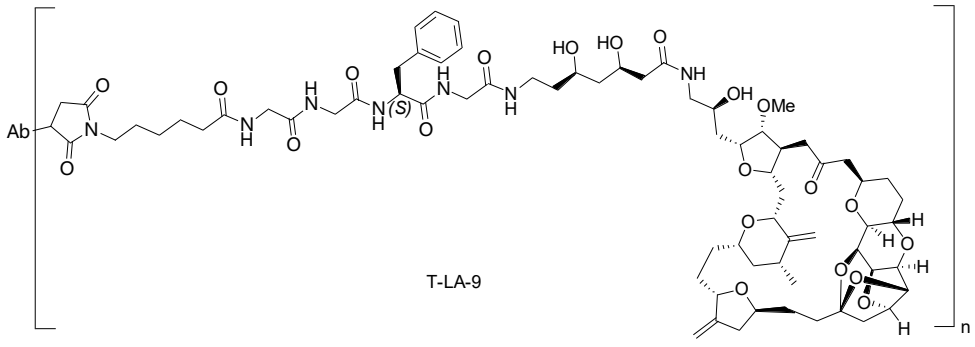

; and more preferably, Z_1 and Z_2 are each independently -C(O)NH-.

22. The antibody-drug conjugate of claim 18, wherein Ab is selected from a mouse-derived antibody, a chimeric antibody, a humanized antibody, a fully human antibody, or an antigen-binding

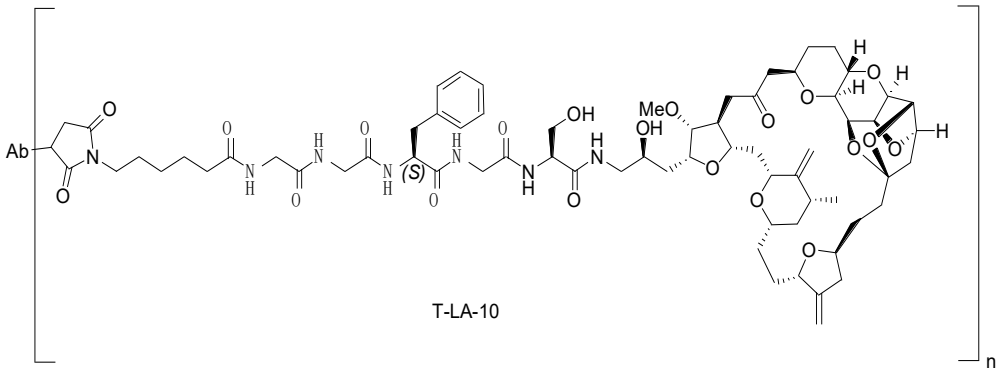
fragment thereof; and preferably, Ab is selected from anti-HER2 (ErbB2) antibody, anti-EGFR antibody, anti-B7-H3 antibody, anti-c-Met antibody, anti-HER3 (ErbB3) antibody, anti-HER4 (ErbB4) antibody, anti-ROR1 antibody, anti-CLDN6 antibody, anti-CLDN9 antibody, anti-CLDN18.2 antibody, anti-NaPi-2b antibody, anti-TNF-α antibody, anti-ENPP3 antibody, anti-DLL3 antibody, anti-CD20 antibody, anti-CD22 antibody, anti-CD28 antibody, anti-CD30 antibody, anti-CD33 antibody, anti-CD37 antibody, anti-CD38 antibody, anti-CD44 antibody, anti-CD45 antibody, anti-CD47 antibody, anti-CD48 antibody, anti-CD56 antibody, anti-CD70 antibody, anti-CD73 antibody, anti-CD98 antibody, anti-CD105 antibody, anti-CEA antibody, anti-EphA2 antibody, anti-MUCI antibody, anti-Lewis Y antibody, anti-VEGFR antibody, anti-GPNMB antibody, anti-Integrin antibody, anti-PSMA antibody, anti-Tenascin-C antibody, anti-SLC44A4 antibody, anti-CD79 antibody, anti-TROP-2 antibody, anti-CD79B antibody, anti-Mesothelin antibody, anti-Nectin-4 antibody, anti-TPBG antibody, or an antigen-binding fragment thereof.

23. The antibody-drug conjugate of claim 22, wherein Ab is the anti-HER2 (ErbB2) antibody or the antigen-binding fragment thereof; or Ab is selected from the monoclonal antibody or the antigen-binding fragment thereof, or preferably, selected from Trastuzumab, Cetuximab, Pertuzumab, Nimotuzumab, Enoblituzumab, Emibetuzumab, Inotuzumab, Pinatuzumab Vedotin, Brentuximab Vedotin, Gemtuzumab, Bivatuzumab, Lorvotuzumab, or an antigen-binding fragment thereof.

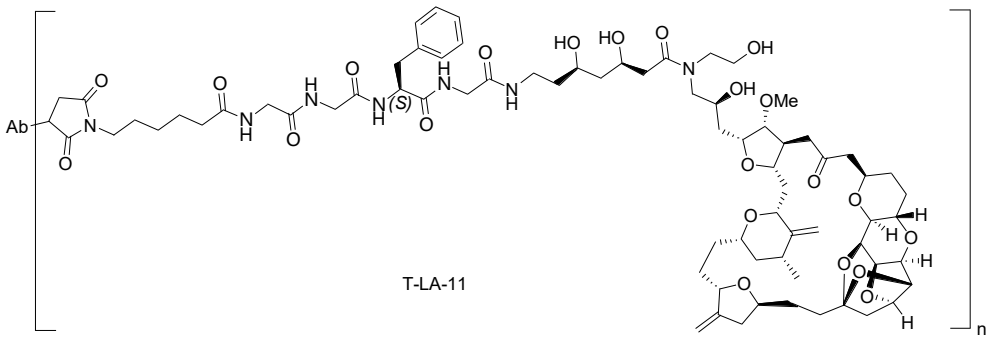
24. The antibody-drug conjugate of claim 18, wherein formula (I") is one of the following:



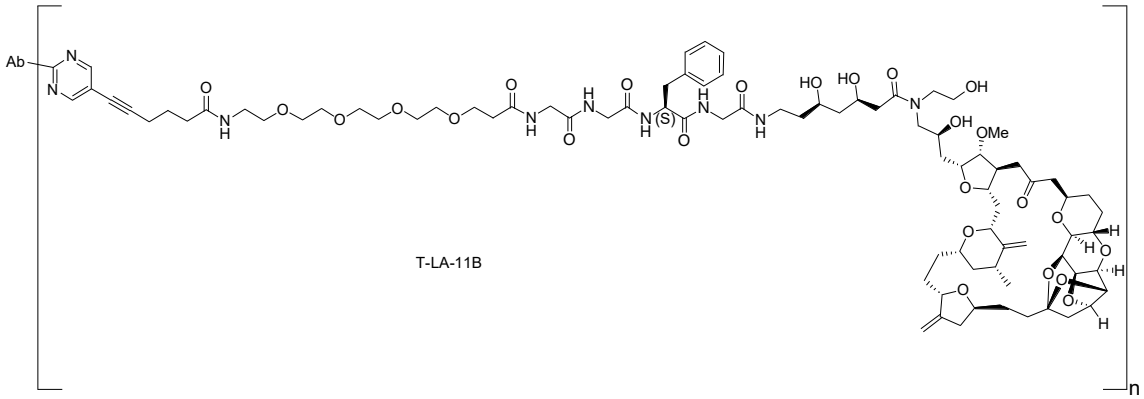
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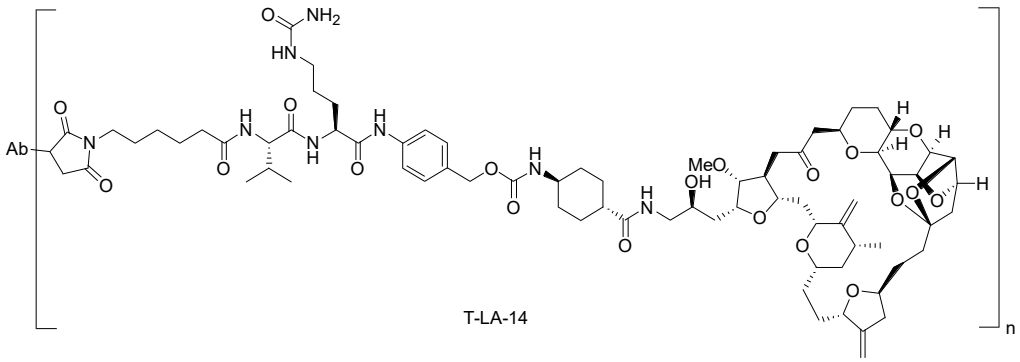
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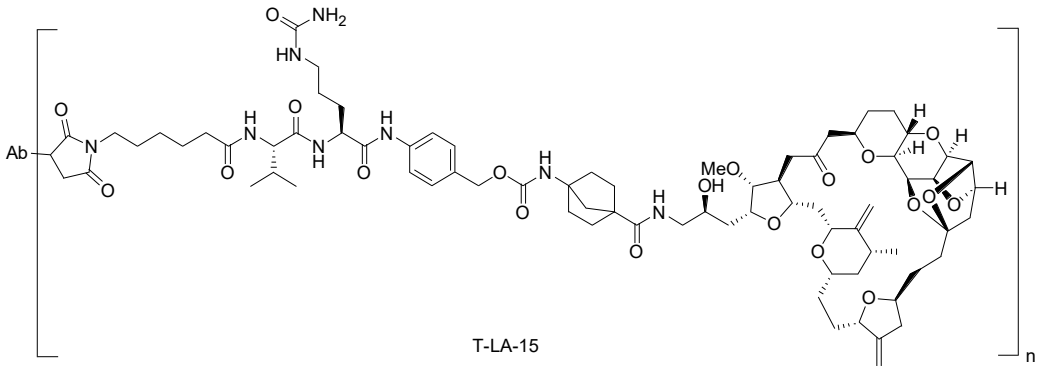
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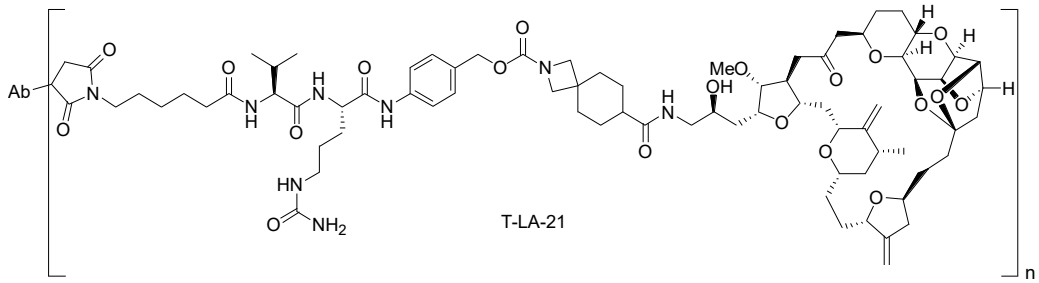
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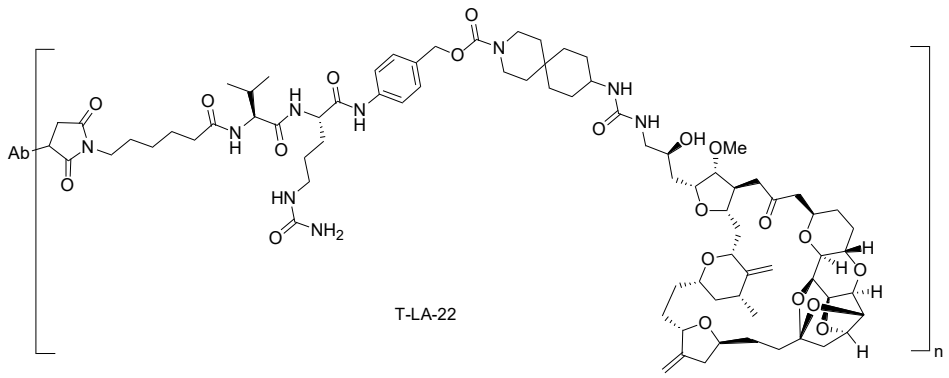
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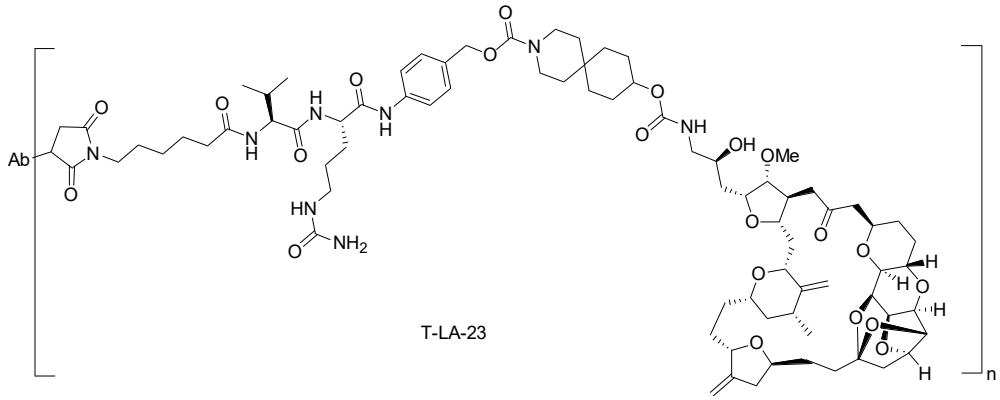
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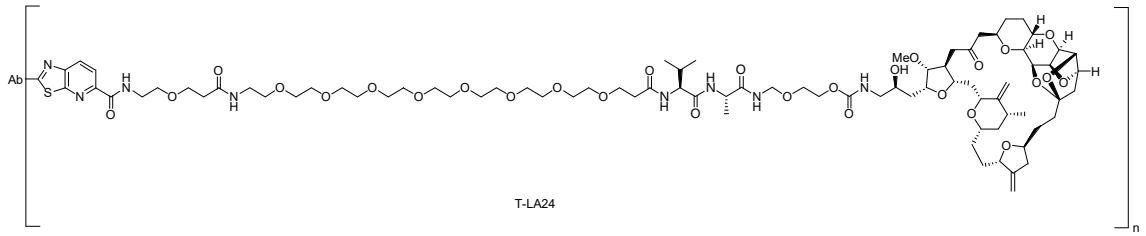
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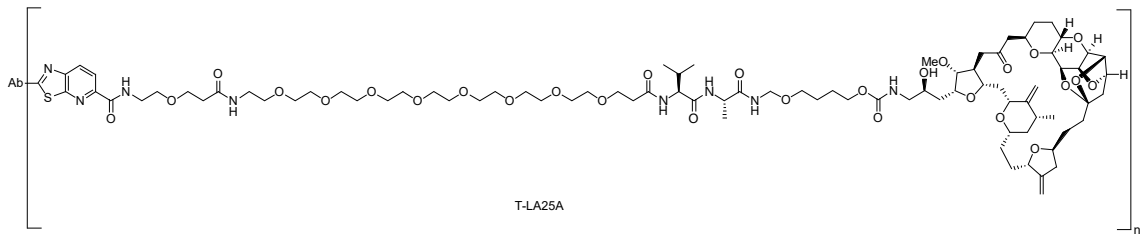
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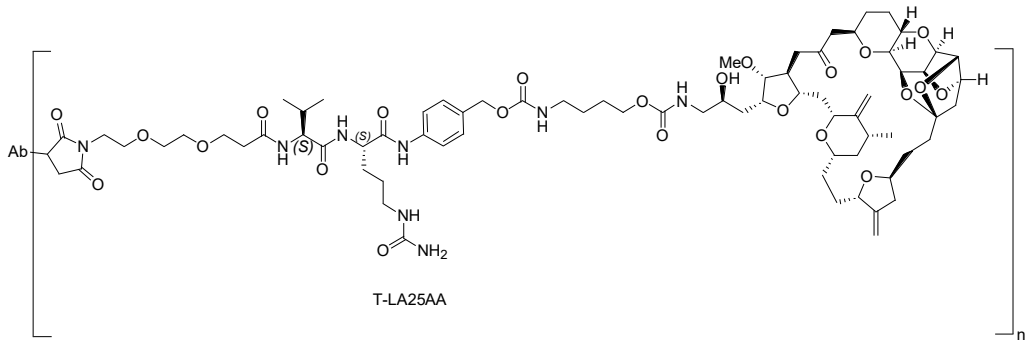
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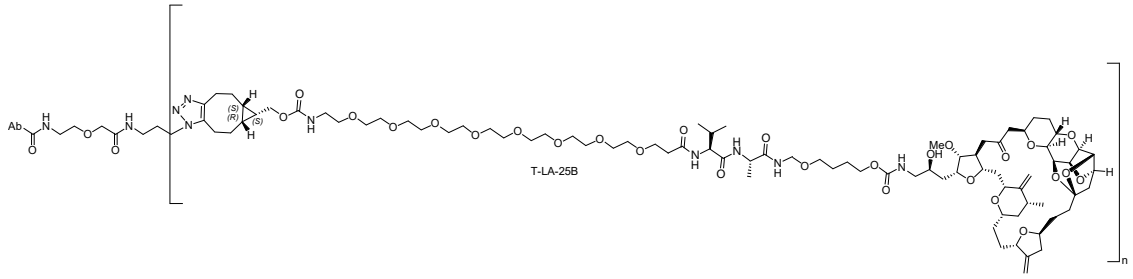
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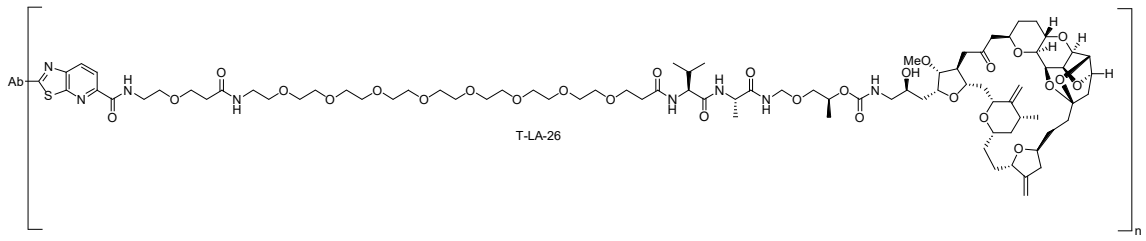
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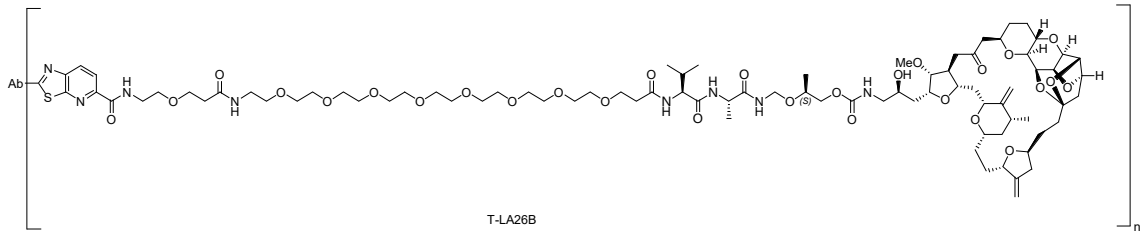
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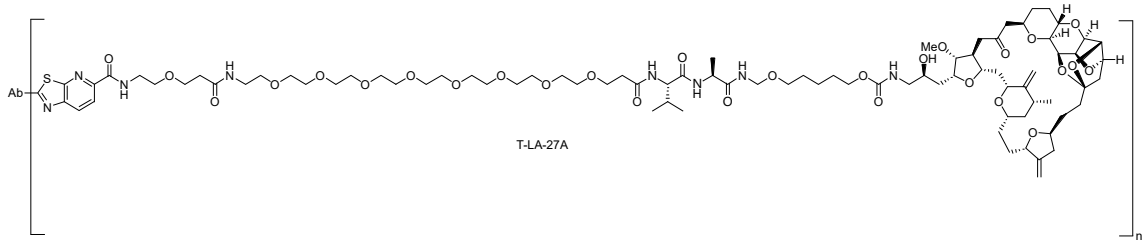
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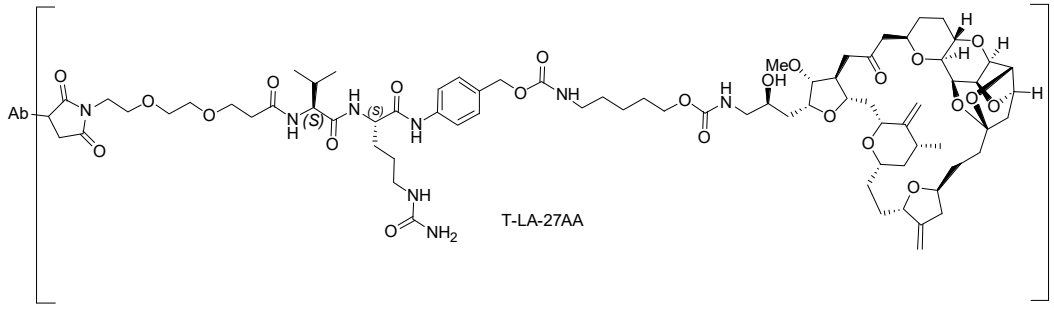
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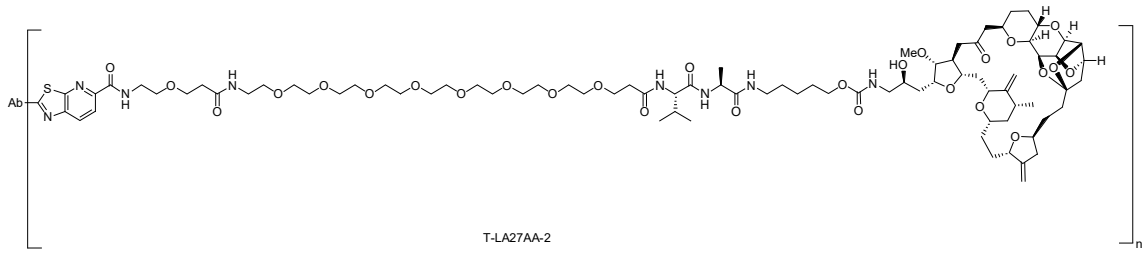
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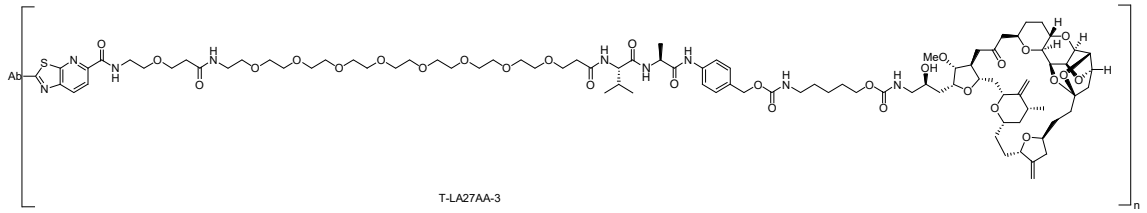
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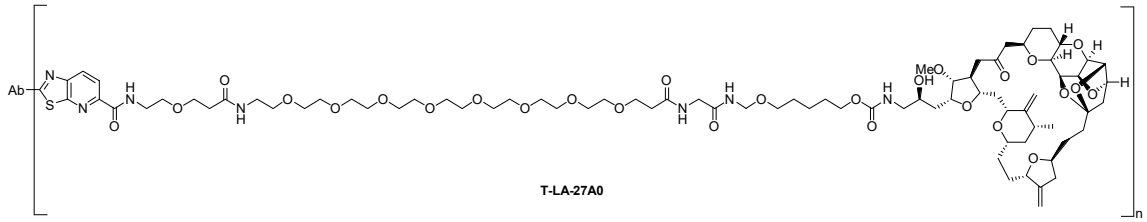
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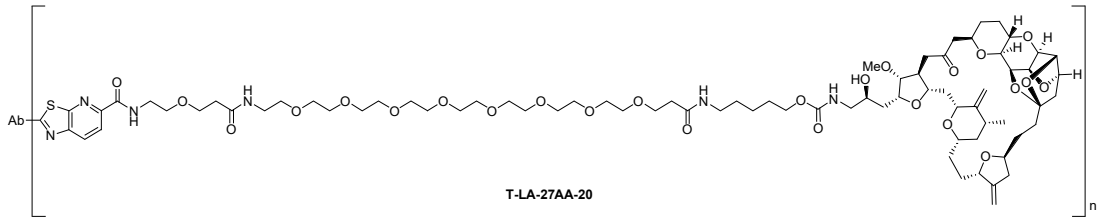
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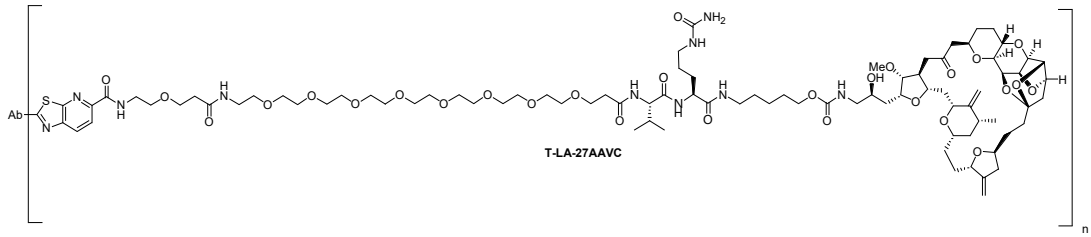
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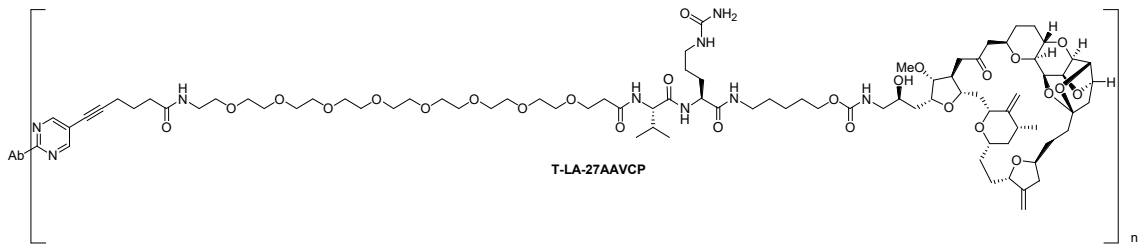
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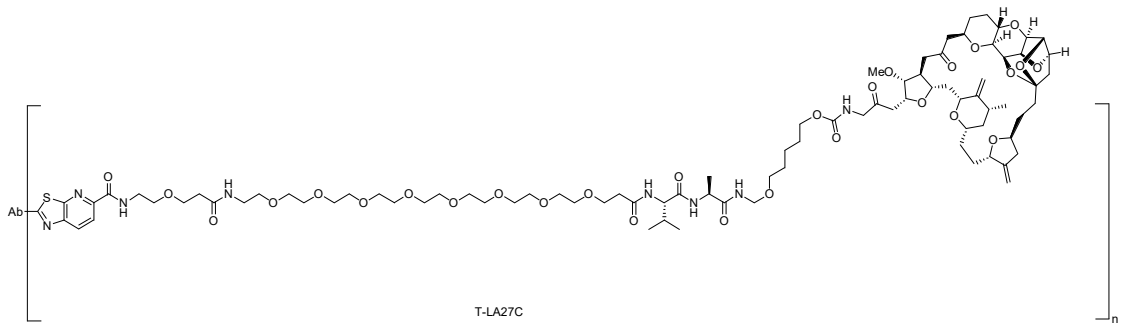
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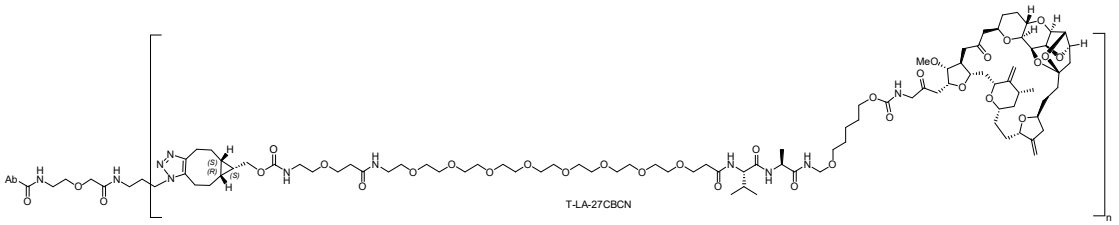
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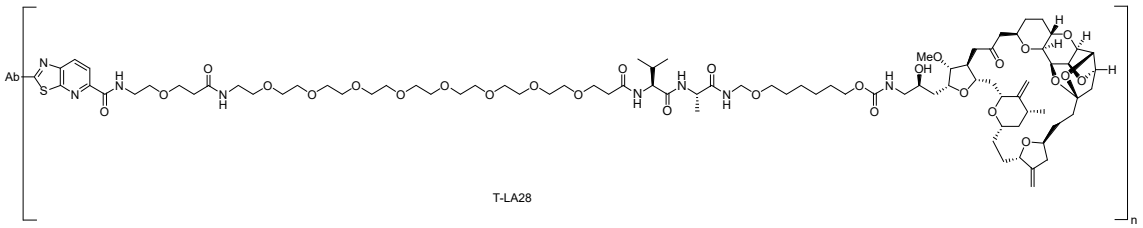
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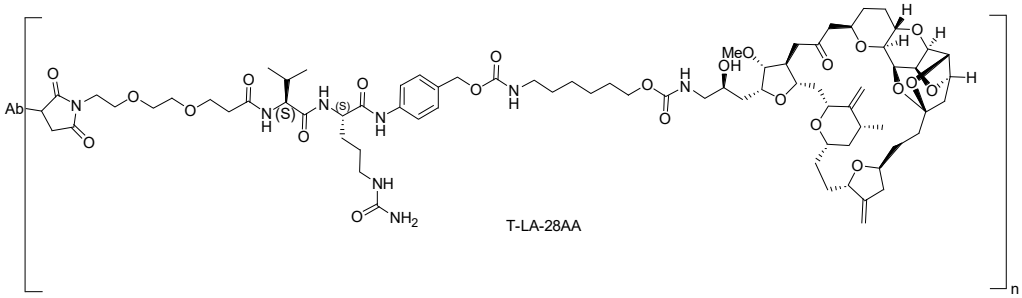
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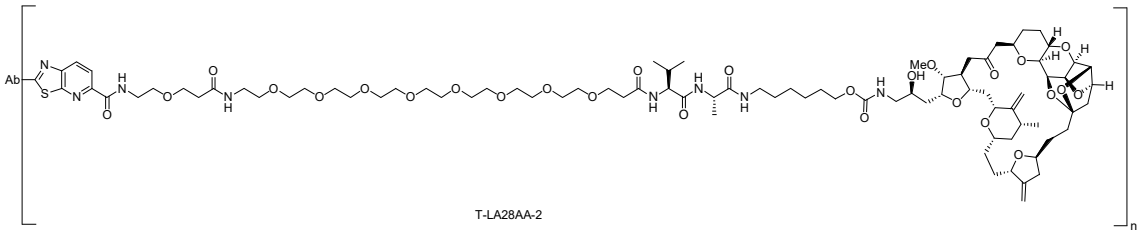
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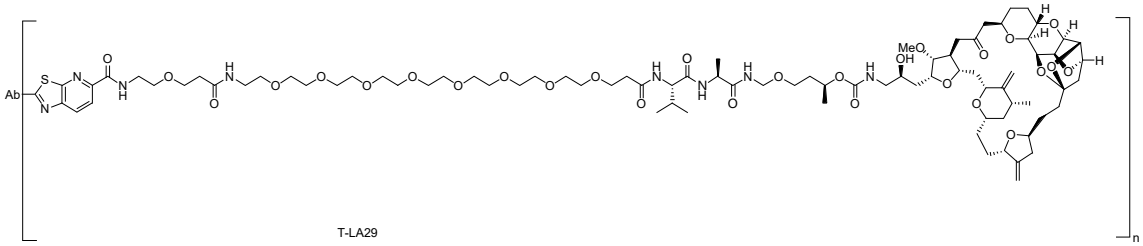
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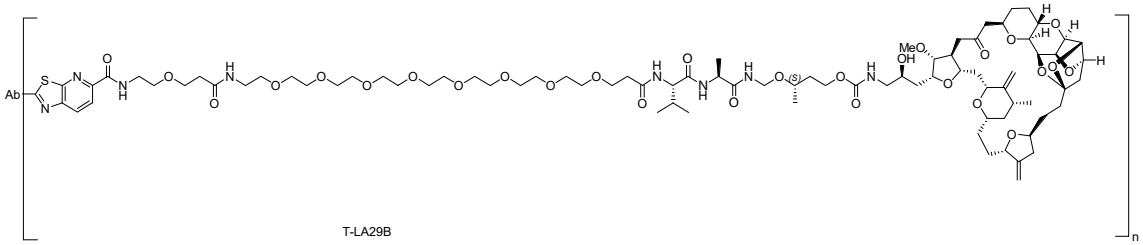
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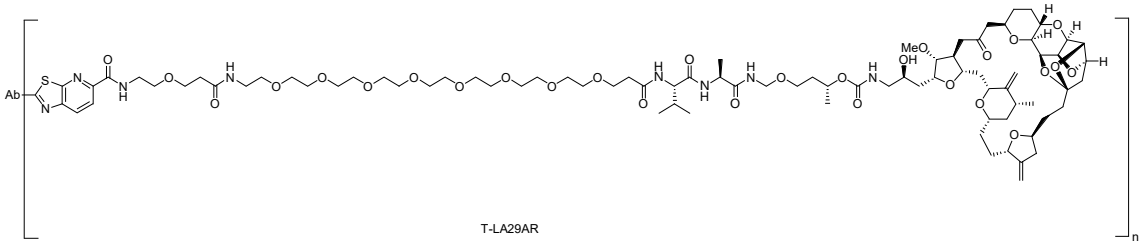
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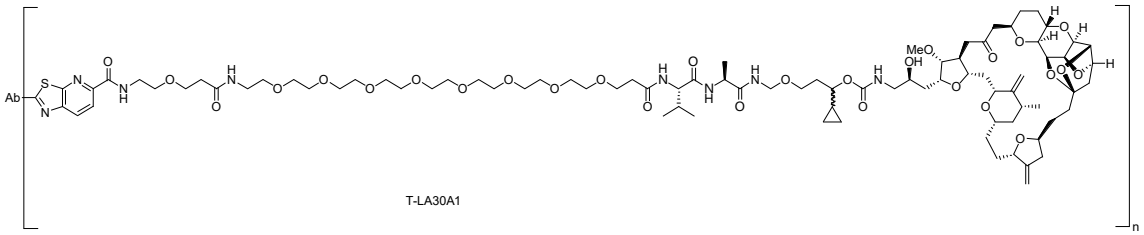
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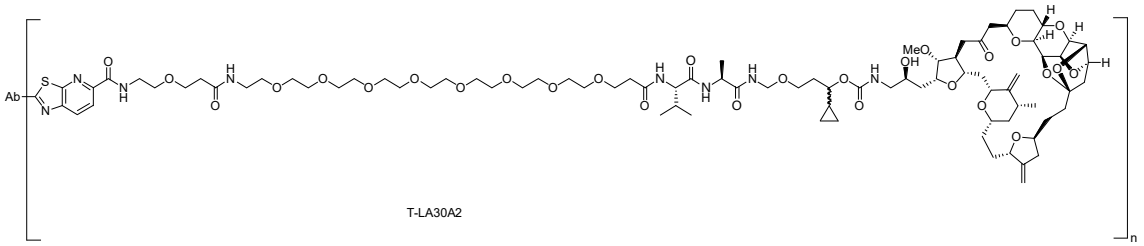
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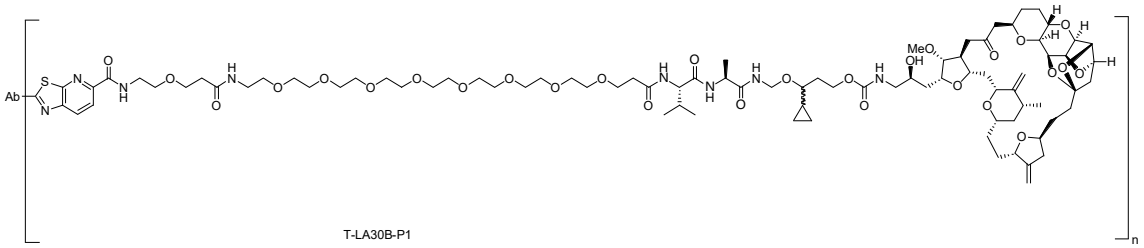
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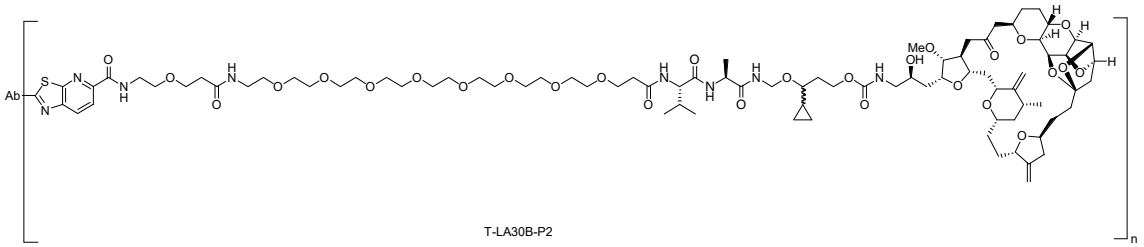
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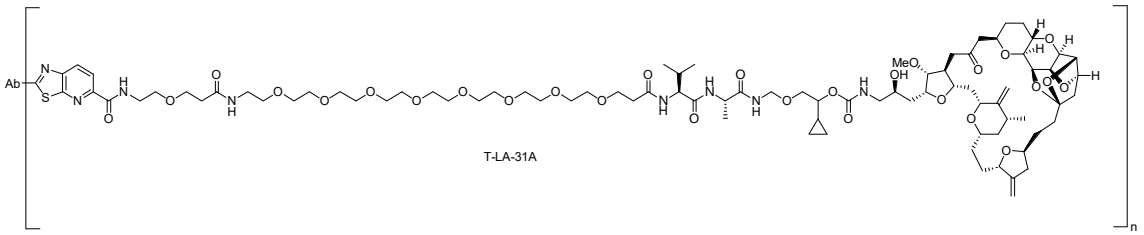
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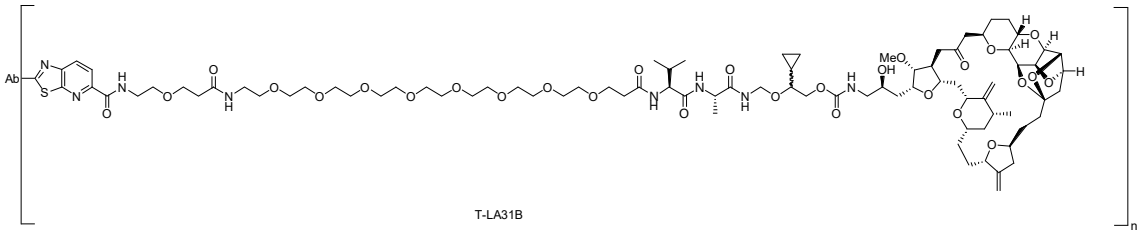
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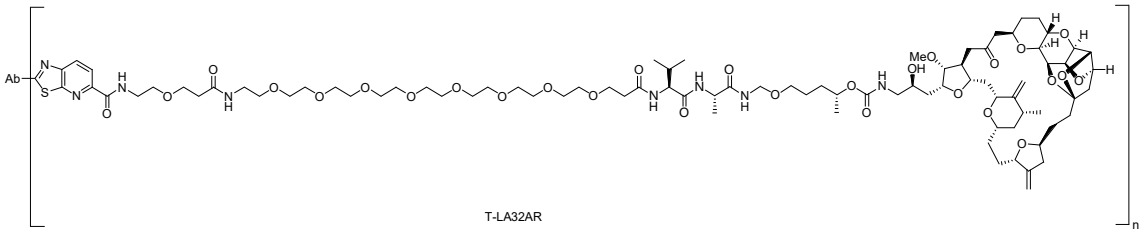
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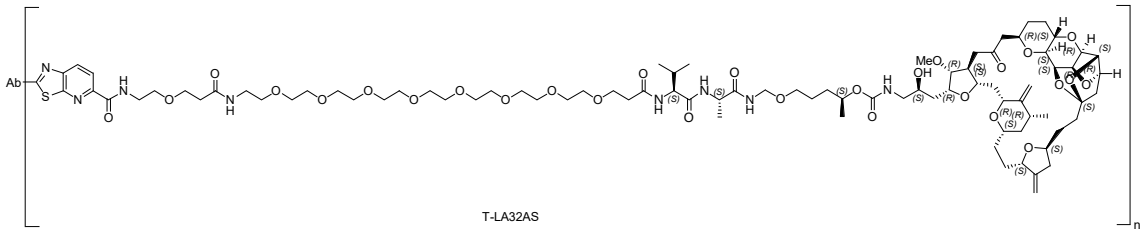
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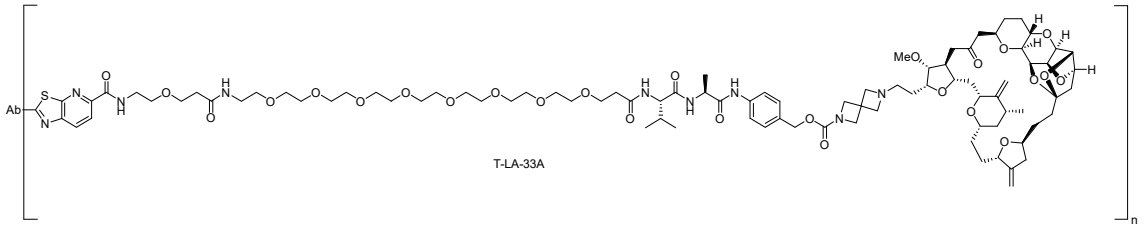
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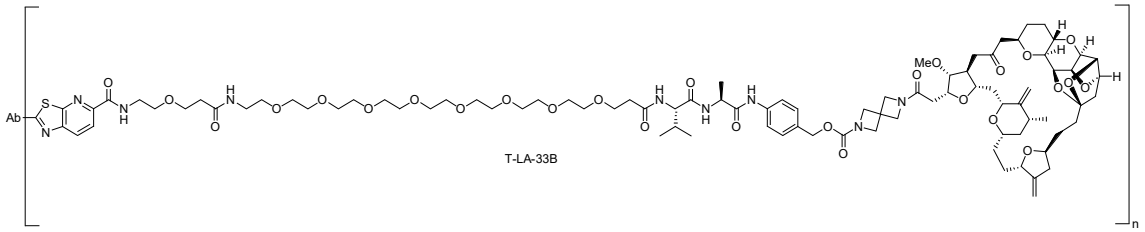
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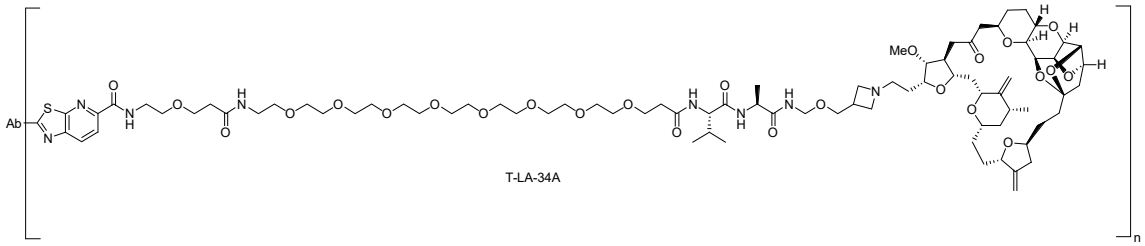
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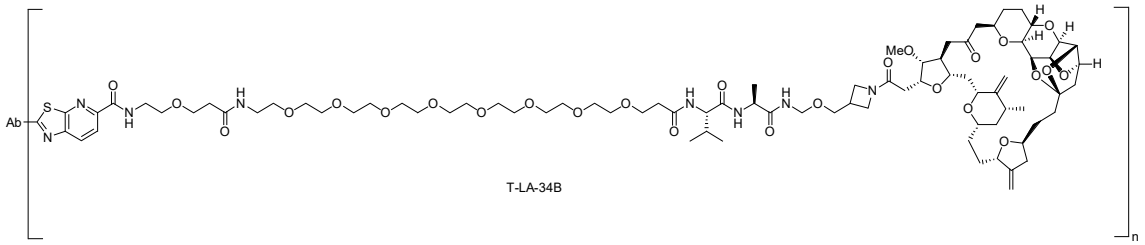
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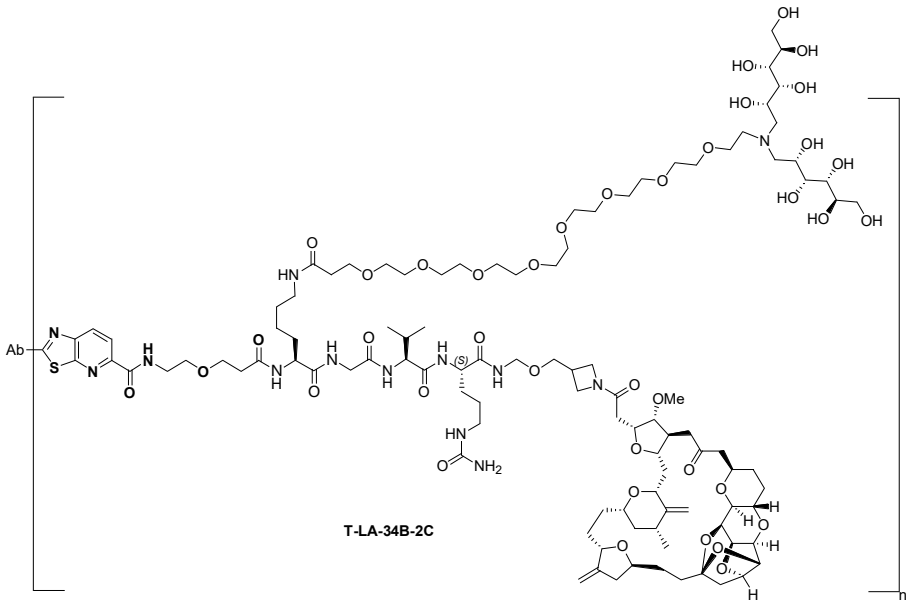
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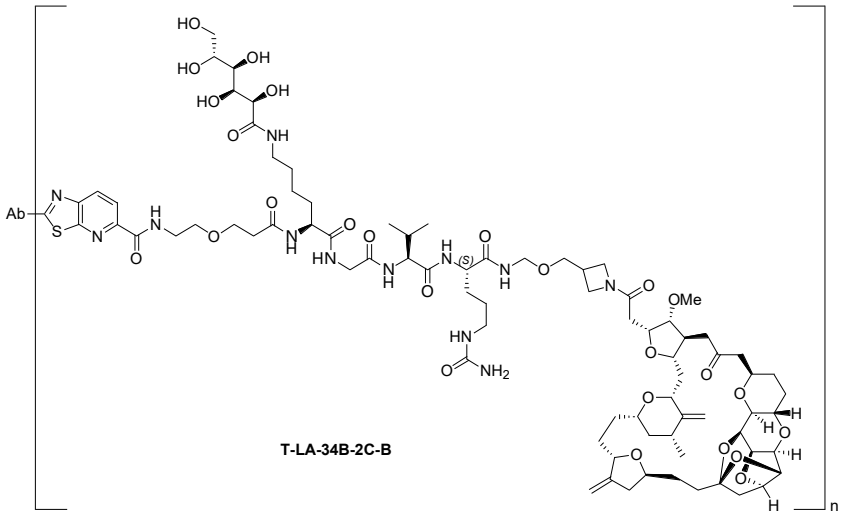
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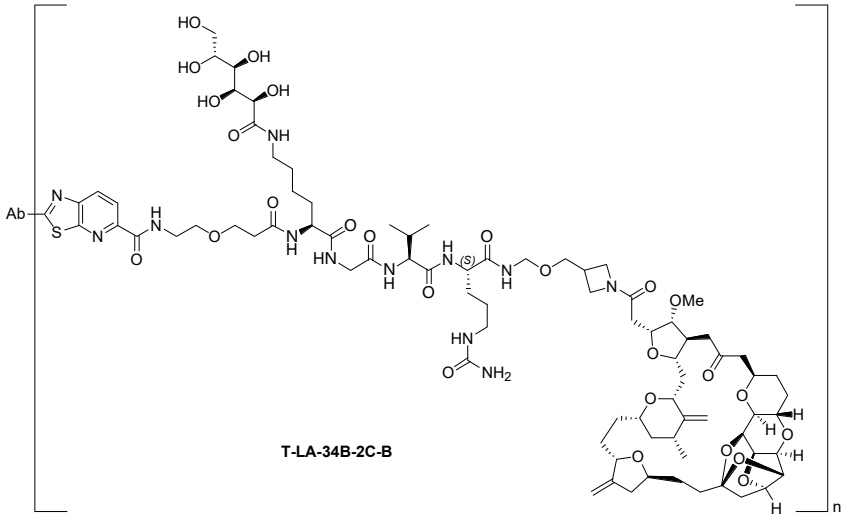
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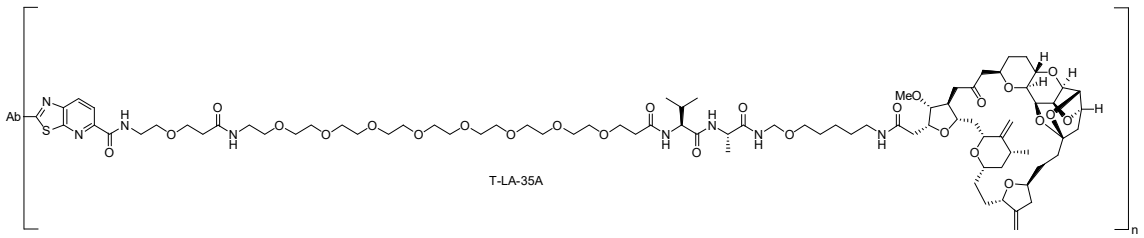
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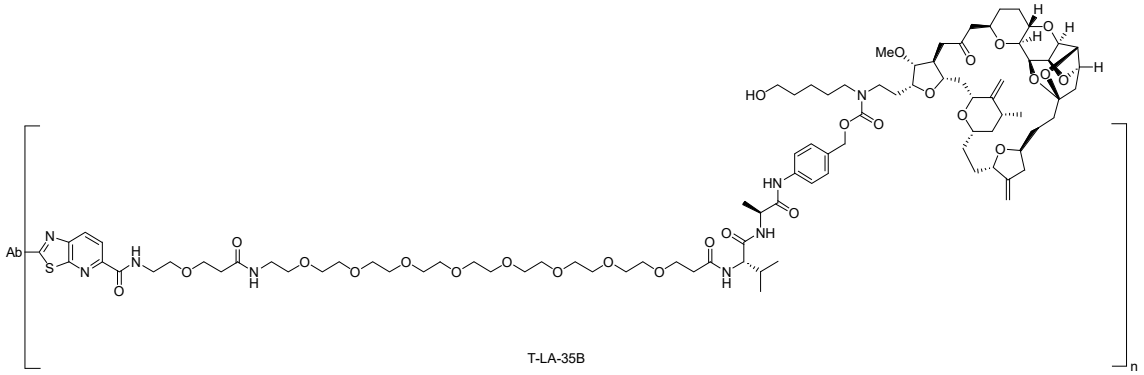
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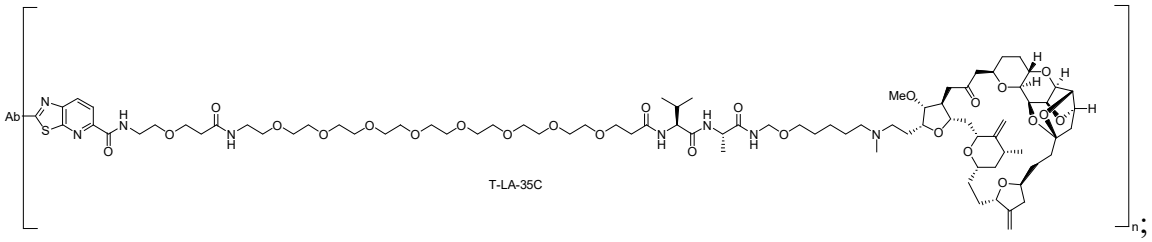
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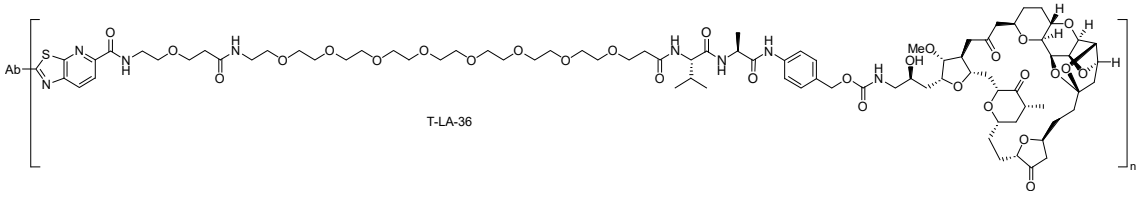


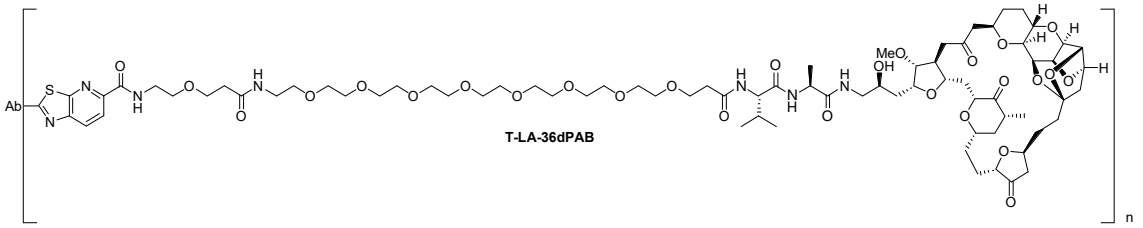
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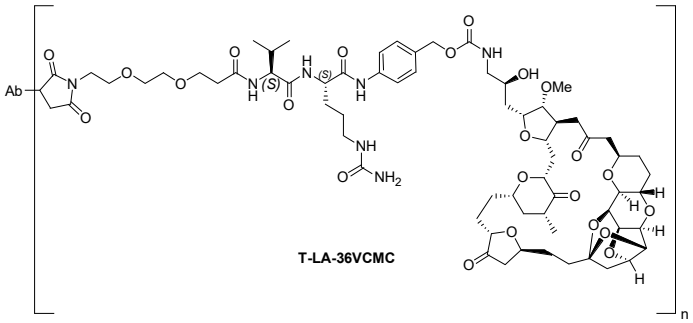


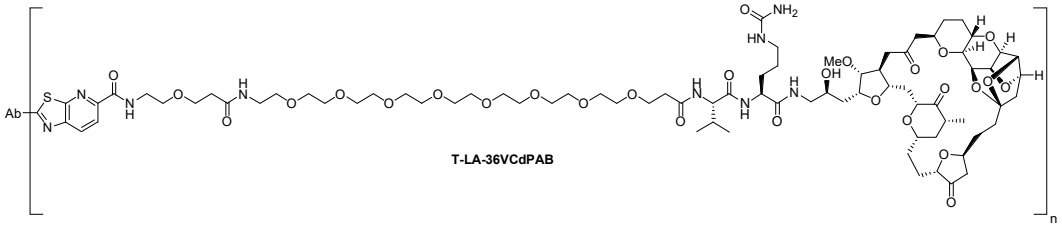
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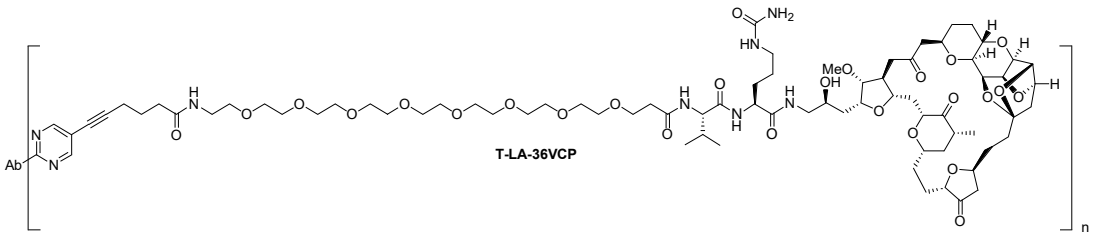
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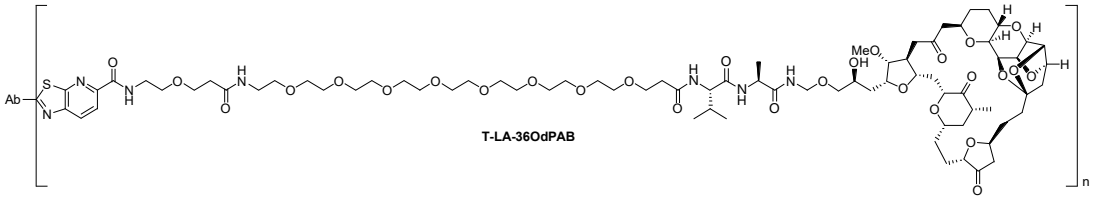


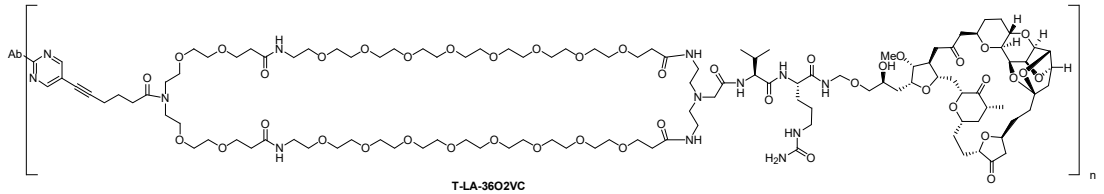




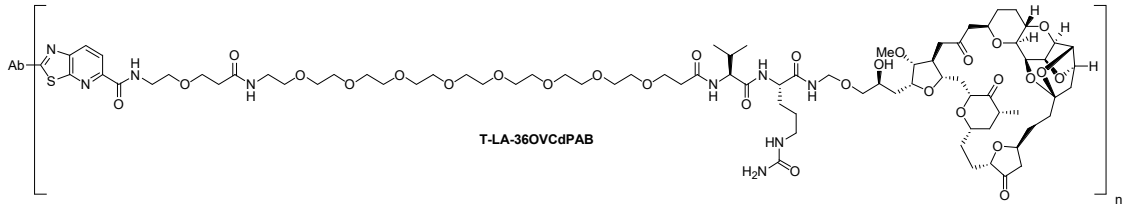




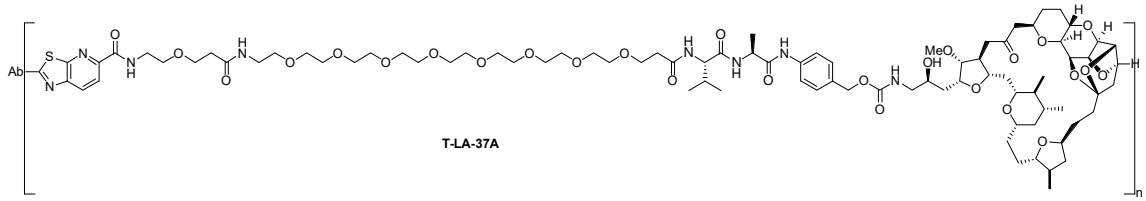




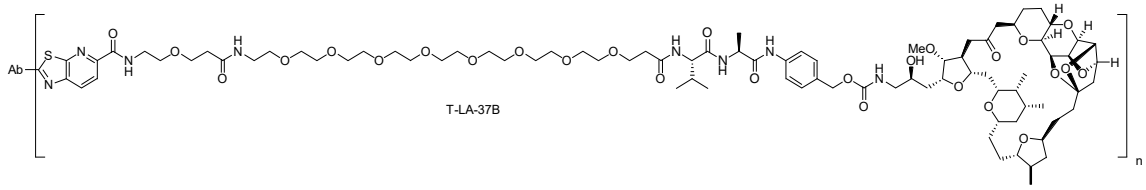
T-LA-36O2VC



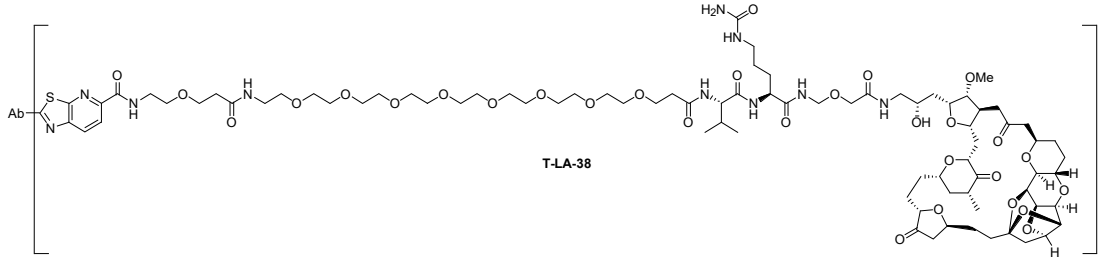
T-LA-36OVCdPAB



T-LA-37A



T-LA-37B



T-LA-38

25. A pharmaceutical composition, comprising the eribulin derivative of any one of claims 1 to 17 or the antibody-drug conjugate of any one of claims 18 to 24, and one or more pharmaceutically acceptable carriers or excipients.

26. Use of the eribulin derivative of any one of claims 1 to 17 in preparation of an antibody-drug conjugate.

27. Use of the eribulin derivative of any one of claims 1 to 17, the antibody-drug conjugate of any one of claims 18 to 24, or the pharmaceutical composition of claim 25 in preparation of a medicament for treating tumors or cancers.

28. The use of claim 27, wherein the tumor or cancer is selected from a solid tumor or hematological tumor, and is preferably selected from breast cancer, gastric cancer, colon cancer, pancreatic cancer, kidney cancer, ovarian cancer, lung cancer, soft tissue sarcoma, liposarcoma, non-small cell lung cancer, melanoma, head and neck cancer, cervical cancer, and prostate cancer, and is more preferably HER-2-positive breast cancer, triple-negative breast cancer, HER-2-positive triple-negative breast cancer, clear cell renal cell carcinoma, small cell lung cancer, non-small cell

lung cancer, and large cell lung cancer.