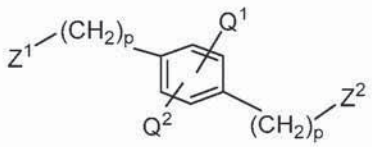
What is claimed is:

1. A compound of Formula (ID):



(ID)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each p is independently 1, 2, 3, 4, 5, 6, or 7;

Z^1 and Z^2 are independently $-C(R^{1A})(R^{2A})-(CH_2)_d-X^A$ or $-W-(CH_2)_d-C(R^3)(R^4)-Y$;

each d is independently 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9;

each R^{1A} and R^{2A} is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^{1A} and R^{2A} attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

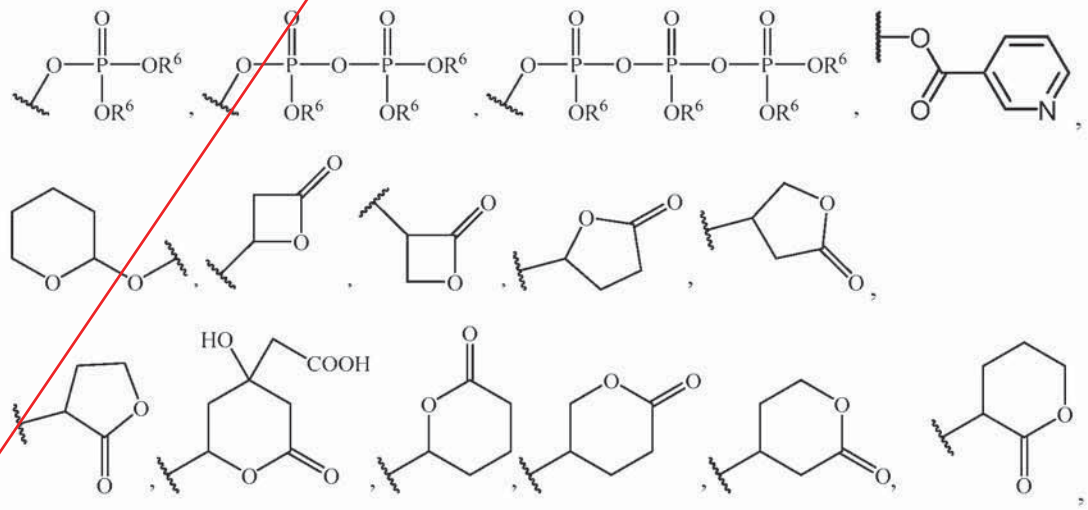
each R^3 and R^4 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, -O(C_1-C_6 alkyl), phenyl, benzyl, Cl, Br, CN, NO_2, or CF_3, or each carbon atom together with the R^3 and R^4 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

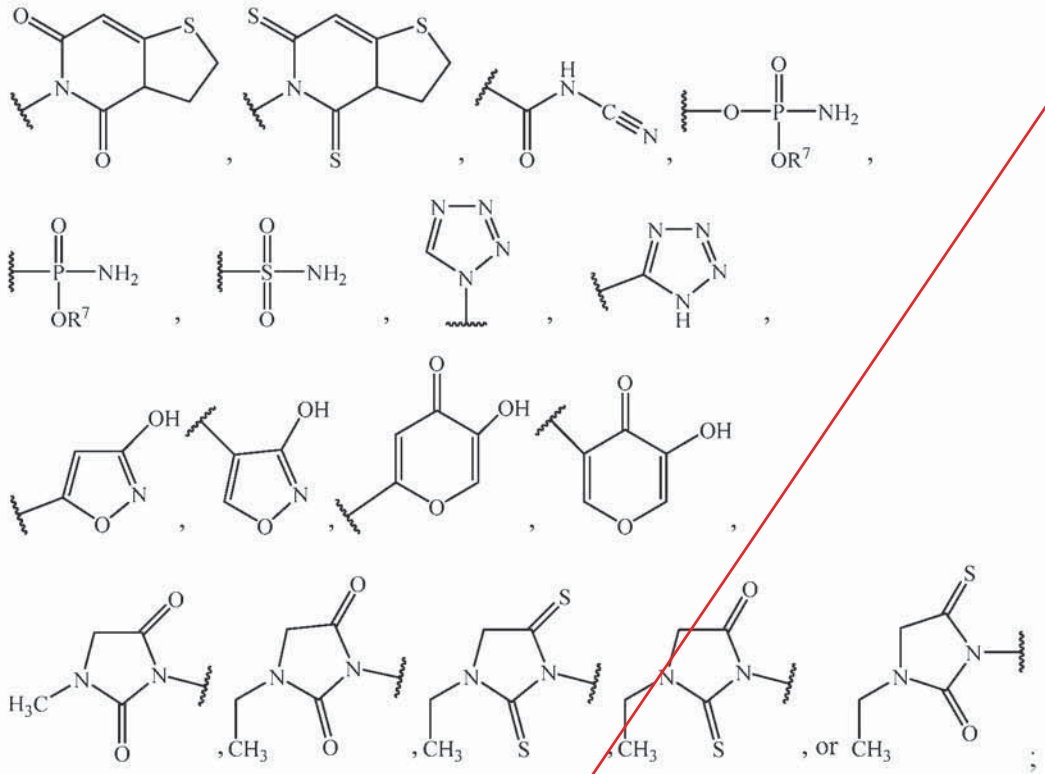
Q^1 and Q^2 are independently H, OH, -C_1-C_6 alkyl, -O(C_1-C_6 alkyl), phenoxy, aryloxy, benzyl, -S-aryl, $-SR^{1A}$, $-NR^{1A}R^{2A}$, F, Cl, Br, I, $-CF_3$, $-COR^{1A}$, heteroaryl, heterocyclyl, or -V-OH, or each carbon atom together with the Q^1 and Q^2 attached to the carbon atom independently form a heterocyclyl or a carbocyclyl group;

V is $(CH_2)_t$ or arylene;

t is 0, 1, 2, 3, or 4;

each X^A is independently H, -OH, $-SO_3H$,



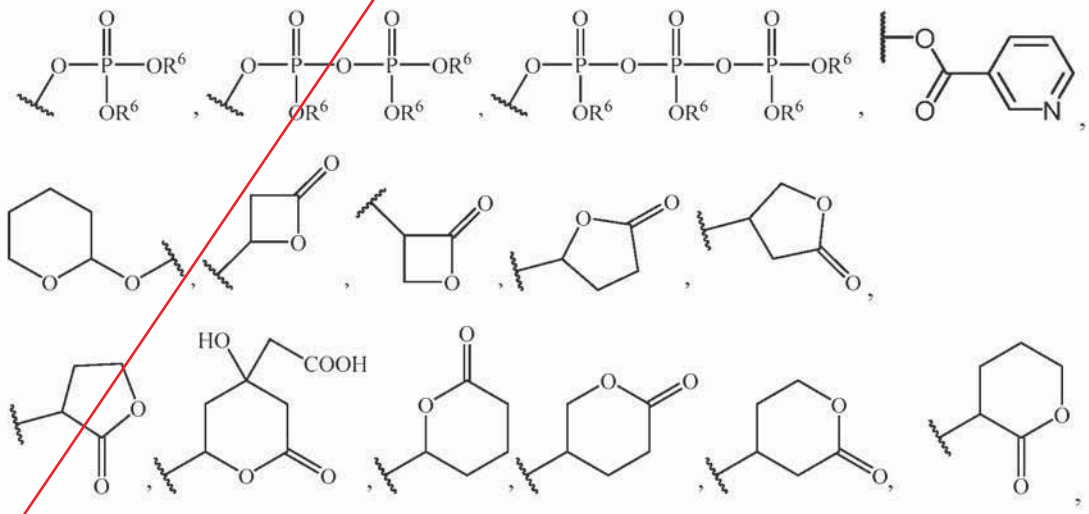


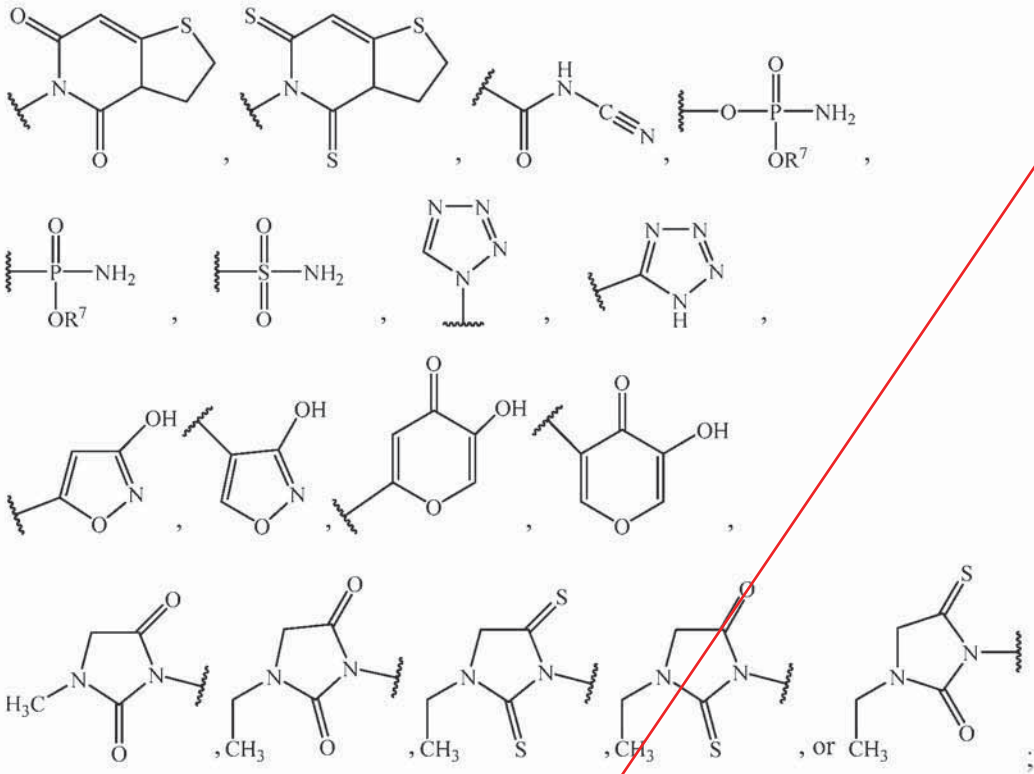
each R^6 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl, wherein the -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1-C_6 alkyl), or phenyl groups;

each R^7 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl;

each W is independently -O-, -NH-, -N(OH)-, -N(→O)-, -S-, -S(=O)-, -S(O)$_2$-, or –Se-;

each Y is independently -OH, -COOH, -COOR^5, -SO_3H,





; and

each R^5 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1-C_6 alkyl), or phenyl groups.

2. The compound or pharmaceutically acceptable salt or solvate of claim 1, wherein Z^1 and Z^2 are independently $-C(R^{1A})(R^{2A})-(CH_2)_d-X^A$.

3. The compound or pharmaceutically acceptable salt or solvate of claim 1 or 2 wherein each R^{1A} and R^{2A} is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl.

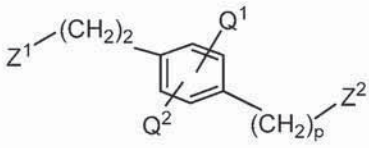
4. The compound or pharmaceutically acceptable salt or solvate of any one of claims 1-3, wherein each R^{1A} and R^{2A} is independently -C_1-C_3 alkyl, -C_2-C_3 alkenyl, or -C_2-C_3 alkynyl.

5. The compound or pharmaceutically acceptable salt or solvate of any one of claims 1-4, wherein R^{1A} and R^{2A} are methyl.

6. The compound or pharmaceutically acceptable salt or solvate of any one of claims 1-5, wherein d is 0, 1, 2, or 3.

7. The compound or pharmaceutically acceptable salt or solvate of any one of claims 1-6, wherein d is 0 or 1.

8. A compound of Formula (IG):



(IG)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each p is independently 1, 2, 3, 4, 5, 6, or 7;

Z^1 and Z^2 are independently $–C(R^1)(R^2)–(CH_2)_c–X$ or $–W–(CH_2)_c–C(R^3)(R^4)–Y$;

each c is independently 0, 1, 2, or 3;

each R^1 and R^2 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^1 and R^2 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

each R^3 and R^4 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, -O(C_1-C_6 alkyl), phenyl, benzyl, Cl, Br, CN, NO_2, or CF_3, or each carbon atom together with the R^3 and R^4 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

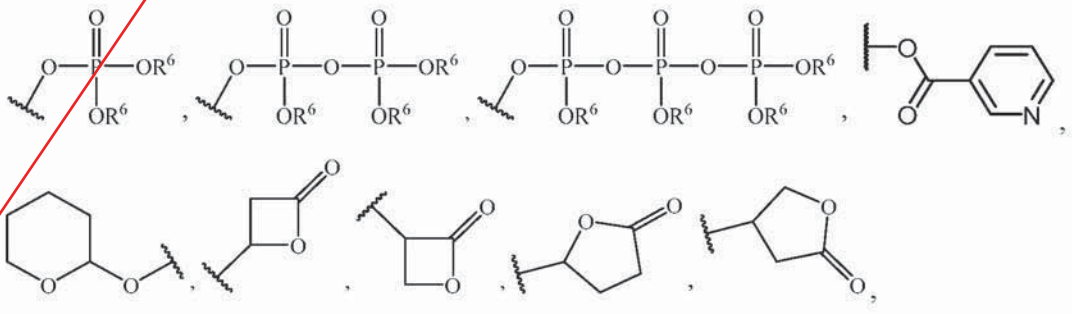
Q^1 and Q^2 are independently H, OH, -C_1-C_6 alkyl, -O(C_1-C_6 alkyl), phenoxy, aryloxy, benzyl, -S-aryl, $-SR^{1A}$, $-NR^{1A}R^{2A}$, F, Cl, Br, I, $-CF_3$, $-COR^{1A}$, heteroaryl, heterocyclyl, or -V-OH, or each carbon atom together with the Q^1 and Q^2 attached to the carbon atom independently form a heterocyclyl or a carbocyclyl group;

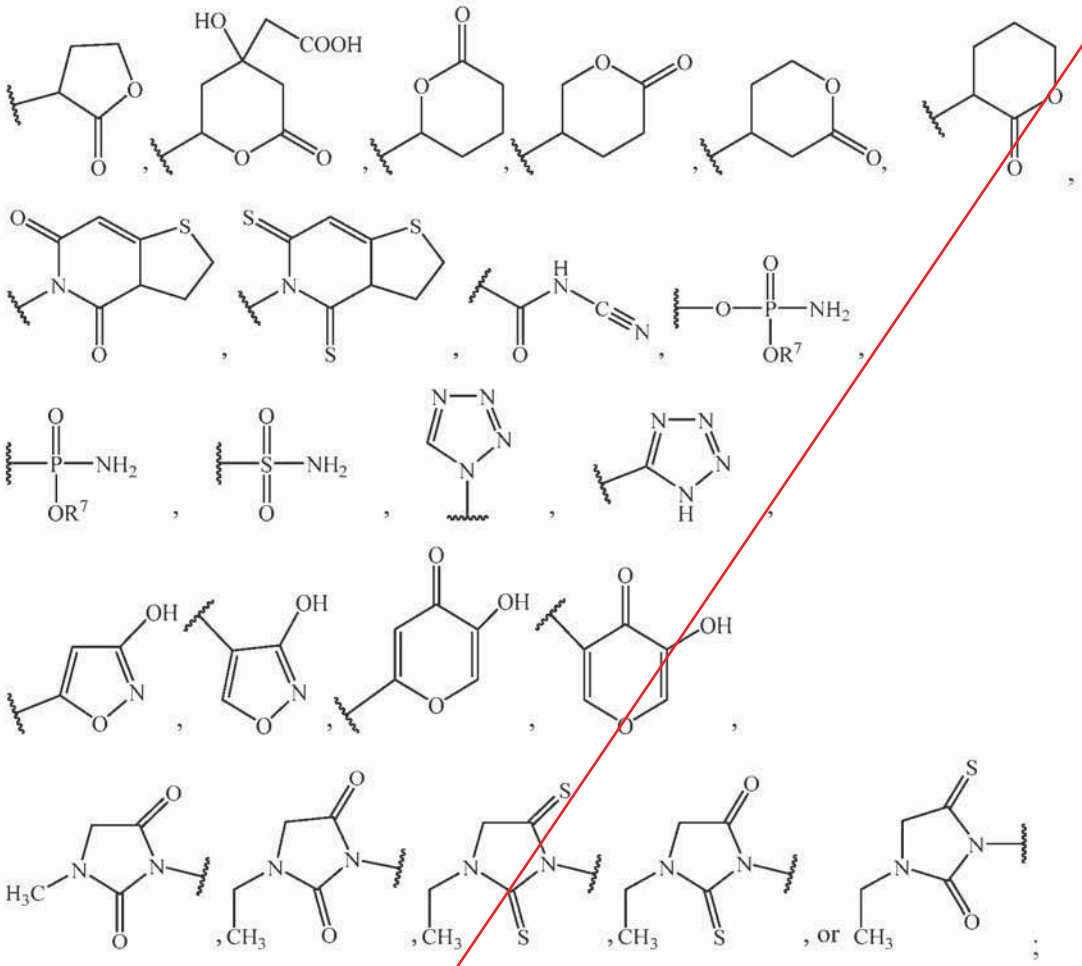
each R^{1A} and R^{2A} is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl;

V is $(CH_2)_t$ or arylene;

t is 0, 1, 2, 3, or 4;

each X and Y is independently -OH, -COOH, $-COOR^5$, $-SO_3H$,





each R^6 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl, wherein the -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups;

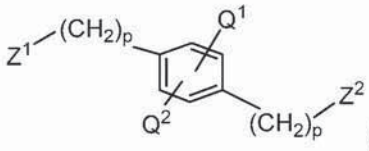
each R^7 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl;

each W is independently -O-, -NH-, -N(OH)-, -N(→O)-, -S-, -S(=O)-, -$S(O)_2$-, or –Se-; and

each R^5 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups.

9. The compound of claim 8, wherein p is 2.

10. A compound of Formula (ID):



(ID)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each p is independently 4, 5, 6, or 7;

Z^1 and Z^2 are independently $–C(R^1)(R^2)–(CH_2)_c–X$ or $–W–(CH_2)_c–C(R^3)(R^4)–Y$;

each c is independently 0, 1, 2, or 3;

each R^1 and R^2 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^1 and R^2 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

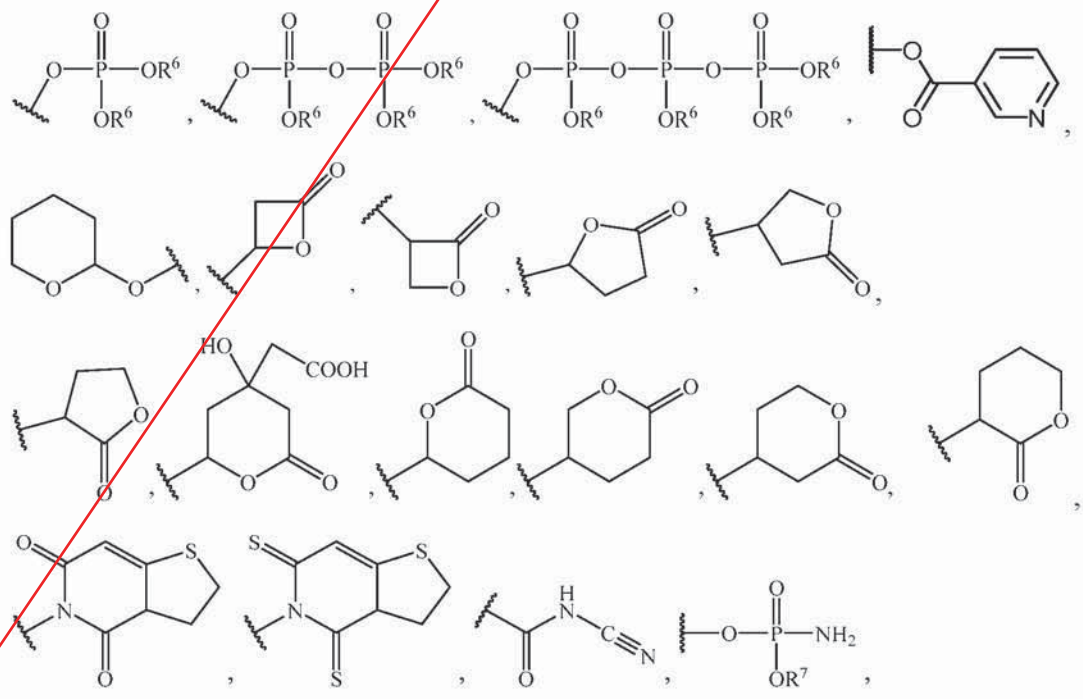
each R^3 and R^4 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, -O(C_1-C_6 alkyl), phenyl, benzyl, Cl, Br, CN, NO_2, or CF_3, or each carbon atom together with the R^3 and R^4 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

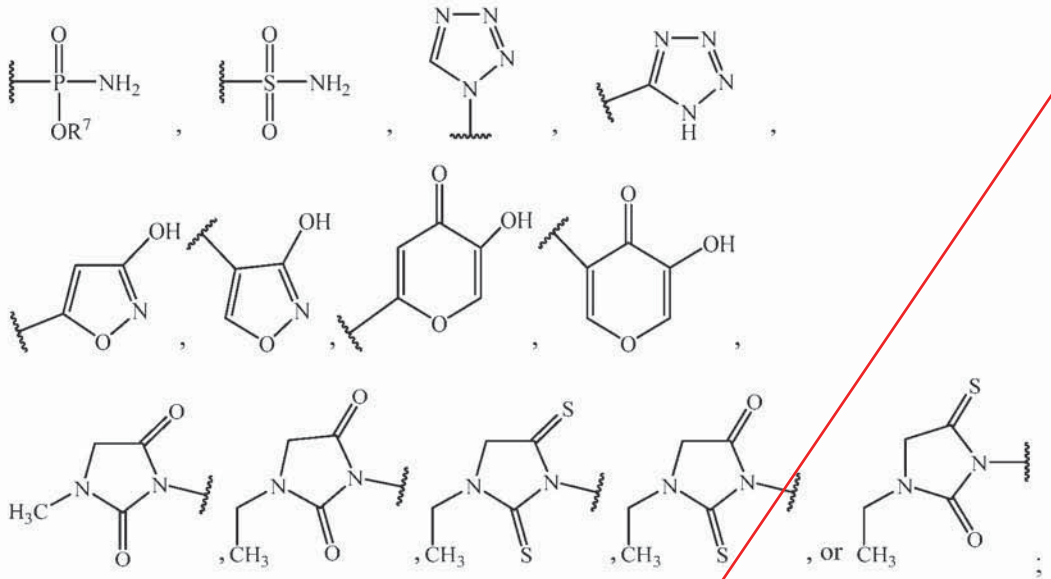
Q^1 and Q^2 are independently H, OH, -C_1-C_6 alkyl, -O(C_1-C_6 alkyl), phenoxy, aryloxy, benzyl, -S-aryl, $-SR^{1A}$, $-NR^{1A}R^{2A}$, F, Cl, Br, I, $-CF_3$, $-COR^{1A}$, heteroaryl, heterocyclyl, or -V-OH, or each carbon atom together with the Q^1 and Q^2 attached to the carbon atom independently form a heterocyclyl or a carbocyclyl group;

V is $(CH_2)_t$ or arylene;

t is 0, 1, 2, 3, or 4;

each X and Y is independently -OH, -COOH, $-COOR^5$, $-SO_3H$,





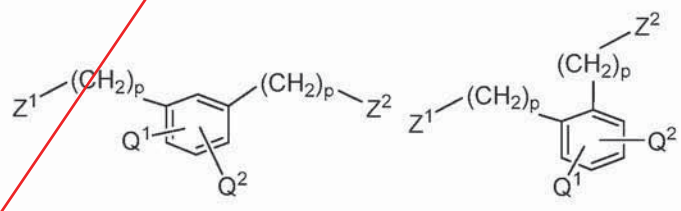
each R^6 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl, wherein the -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups;

each R^7 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl;

each W is independently -O-, -NH-, -N(OH)-, -N(→O)-, -S-, -S(=O)-, -$S(O)_2$-, or –Se-; and

each R^5 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups.

11. A compound of Formula (IE) or Formula (IF):



(IE) (IF)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each p is independently 1, 2, 3, 4, 5, 6, or 7;

each Z^1 and Z^2 is independently –$C(R^1)(R^2)$–$(CH_2)_c$–X or –W–$(CH_2)_c$–$C(R^3)(R^4)$–Y;

each c is independently 0, 1, 2, or 3;

each R^1 and R^2 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^1 and R^2 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

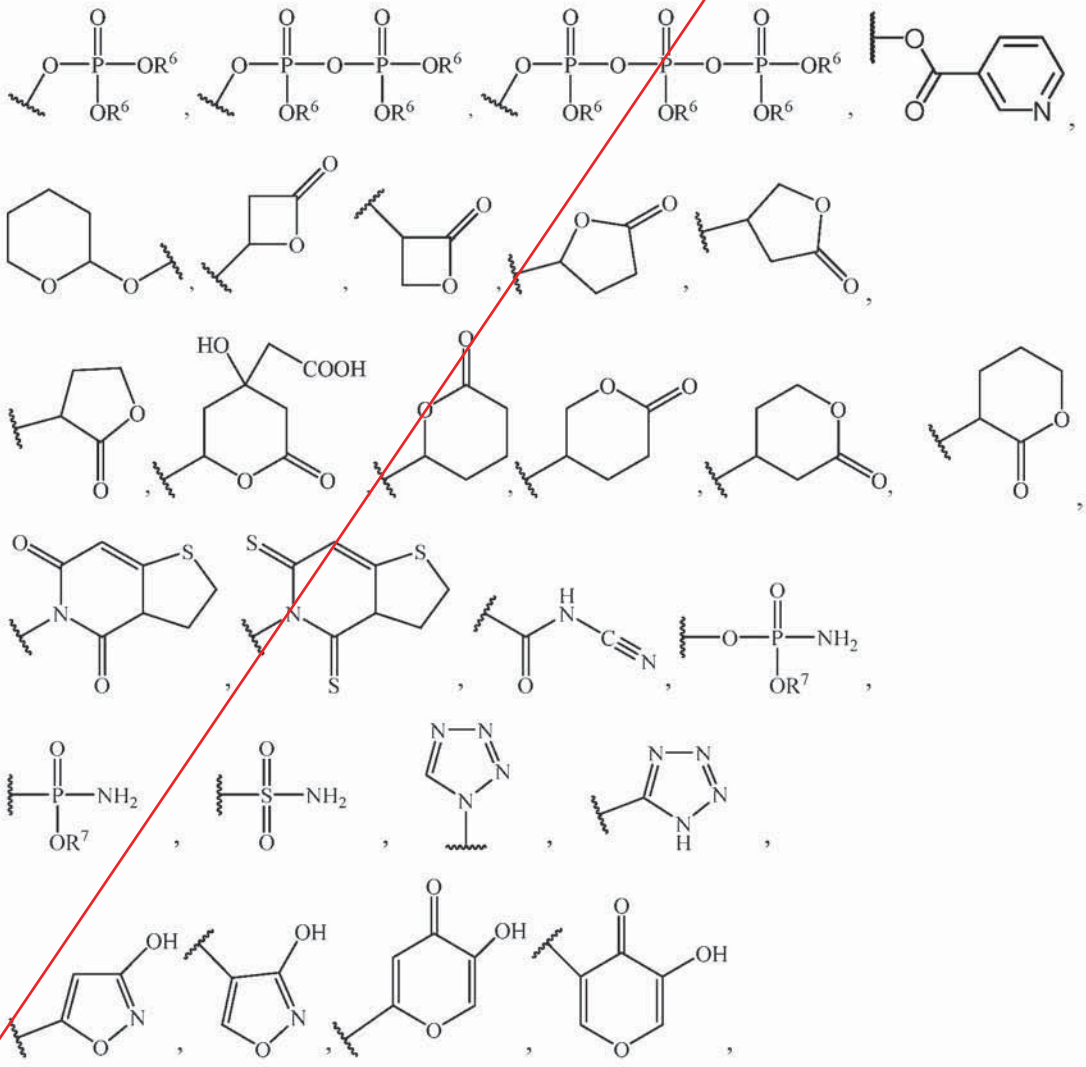
each R^3 and R^4 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, -O(C_1-C_6 alkyl), phenyl, benzyl, Cl, Br, CN, NO_2, or CF_3, or each carbon atom together with the R^3 and R^4 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

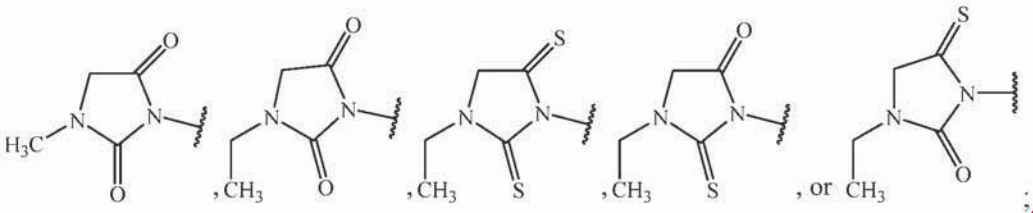
Q^1 and Q^2 are independently H, OH, -C_1-C_6 alkyl, -O(C_1-C_6 alkyl), phenoxy, aryloxy, benzyl, -S-aryl, -SR^{1A}, -$NR^{1A}R^{2A}$, F, Cl, Br, I, -CF_3, -COR^{1A}, heteroaryl, heterocyclyl, or -V-OH, or each carbon atom together with the Q^1 and Q^2 attached to the carbon atom independently form a heterocyclyl or a carbocyclyl group;

V is $(CH_2)_t$ or arylene;

t is 0, 1, 2, 3, or 4;

each X and Y is independently -OH, -COOH, -$COOR^5$, -SO_3H,





each R^6 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl, wherein the -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups;

each R^7 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl;

each W is independently -O-, -NH-, -N(OH)-, -N(→O)-, -S-, -S(=O)-, -$S(O)_2$-, or –Se-; and

each R^5 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups.

12. The compound or pharmaceutically acceptable salt or solvate of claim 10 or 11, wherein Z^1 and Z^2 are each independently –$C(R^1)(R^2)$–$(CH_2)_c$–X.

13. The compound or pharmaceutically acceptable salt or solvate of any one of claims 10-12, wherein X is –COOH or -$COOR^5$.

14. The compound or pharmaceutically acceptable salt or solvate of any one of claims 10-13, wherein each R^1 and R^2 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl.

15. The compound or pharmaceutically acceptable salt or solvate of any one of claims 10-14, wherein each R^1 and R^2 is independently -C_1–C_3 alkyl, -C_2–C_3 alkenyl, or -C_2–C_3 alkynyl.

16. The compound or pharmaceutically acceptable salt or solvate of any one of claims 10-15, wherein R^1 and R^2 are methyl.

17. The compound or pharmaceutically acceptable salt or solvate of any one of claims 10-16, wherein c is 0 or 1.

18. The compound or pharmaceutically acceptable salt or solvate of any one of claims 1-11, wherein one or both of Z^1 and Z^2 is $–W–(CH_2)_c–C(R^3)(R^4)–Y$.

19. The compound or pharmaceutically acceptable salt or solvate of claim 18, wherein R^3 and R^4 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl.

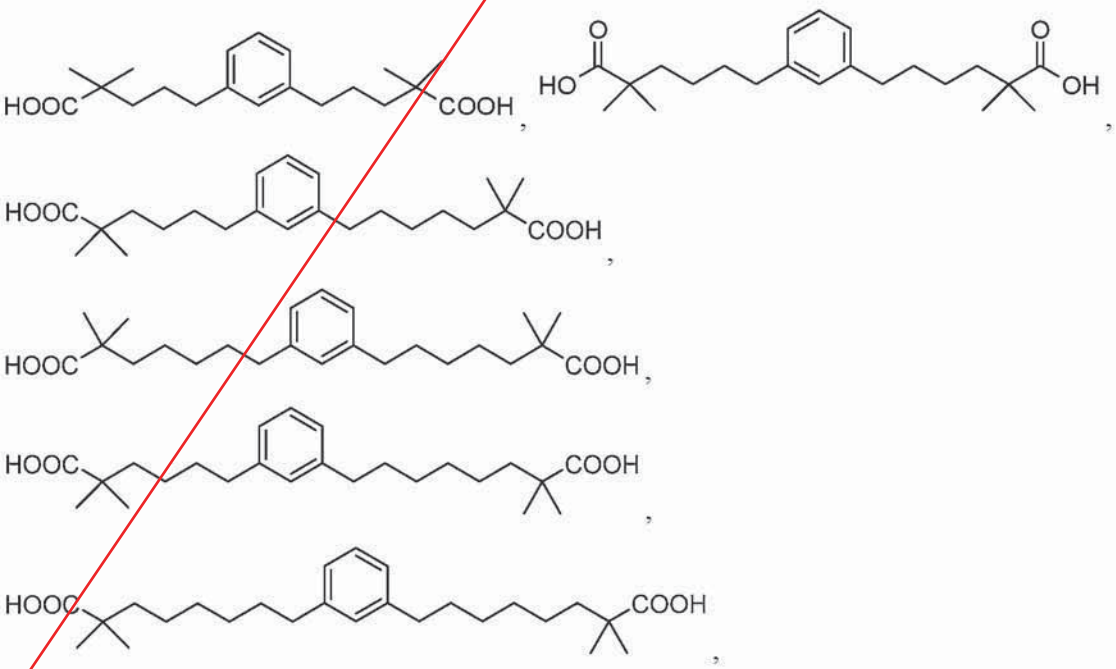
20. The compound or pharmaceutically acceptable salt or solvate of claim 18, wherein Y is –COOH or -$COOR^5$.

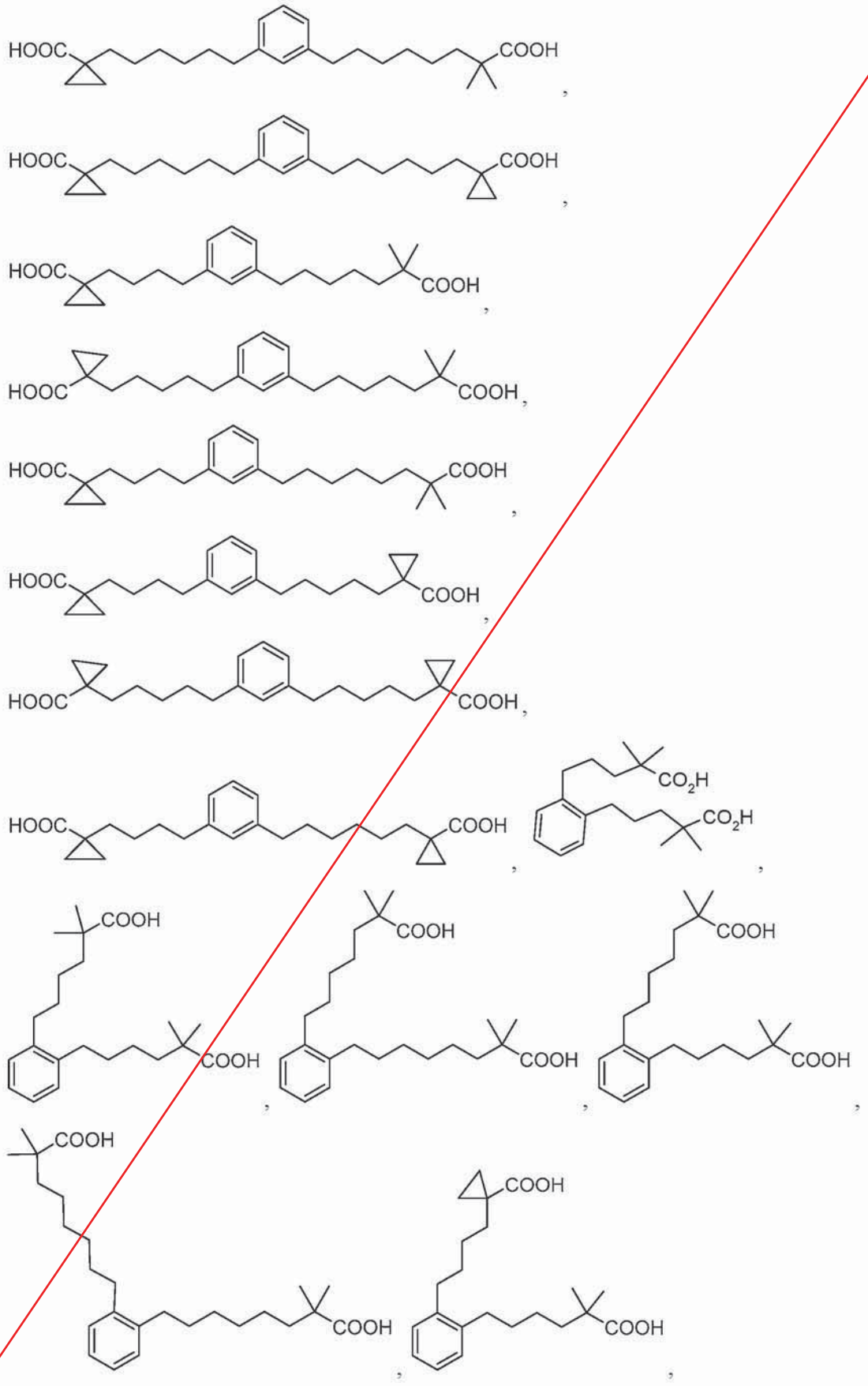
21. The compound or pharmaceutically acceptable salt or solvate of claim 20, wherein R^5 is -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl.

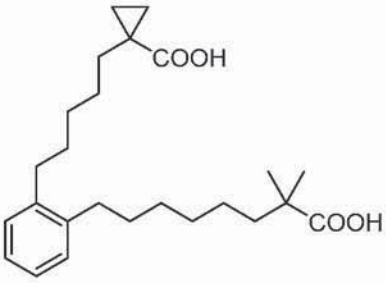
22. The compound or pharmaceutically acceptable salt or solvate of claim 20, wherein R^5 is -C_1-C_3 alkyl, -C_2-C_3 alkenyl, or -C_2-C_3 alkynyl.

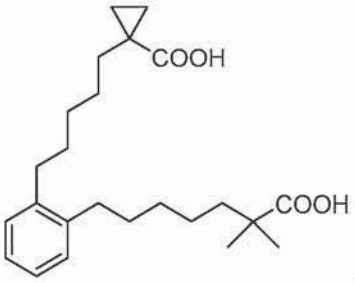
23. The compound or pharmaceutically acceptable salt or solvate of any one of claims 1-8 and 10-22, wherein p is 4, 5, 6, or 7.

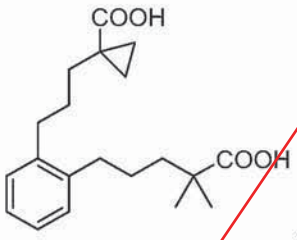
24. The compound of claim 11, wherein the compound has the structure

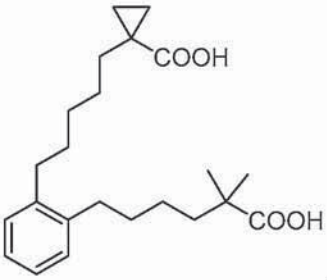


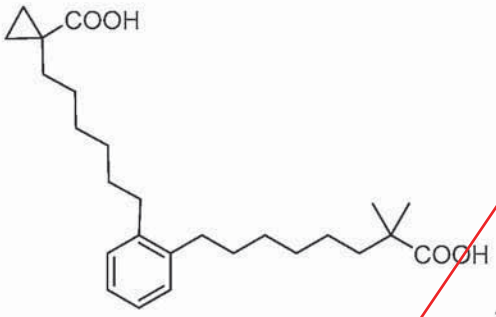


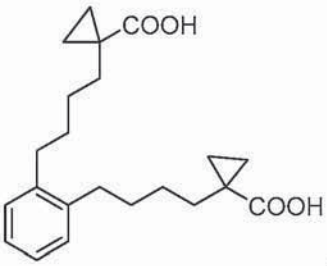


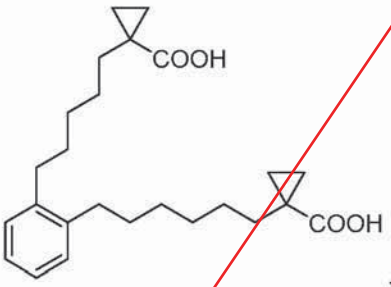
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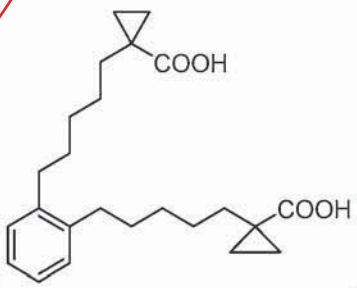
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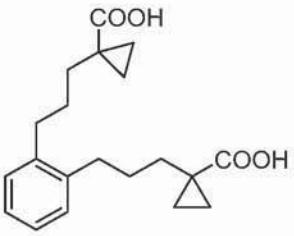
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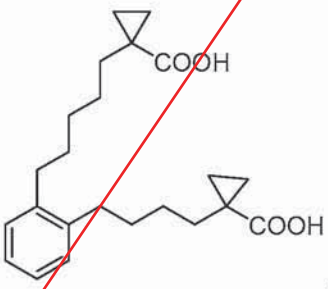
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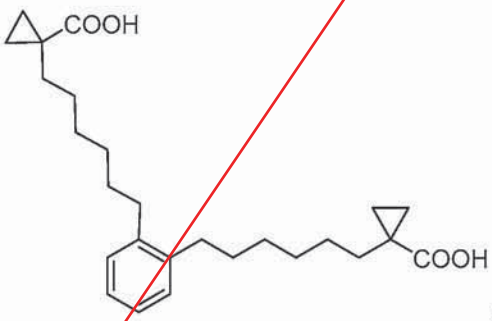
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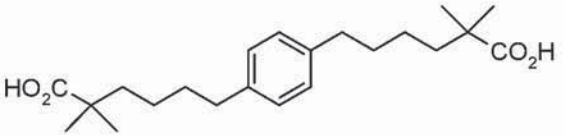
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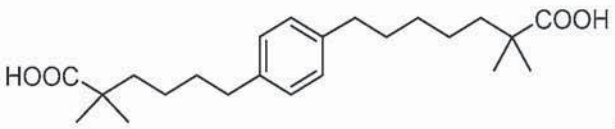
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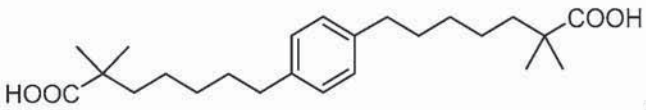
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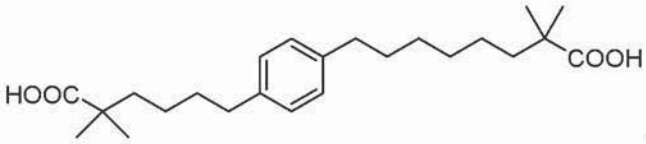
; or a pharmaceutically acceptable salt or solvate thereof.

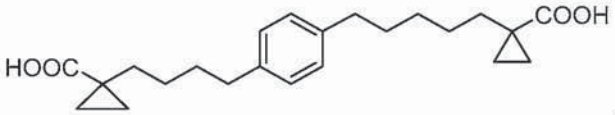
25. The compound of claim 10, wherein the compound has the structure

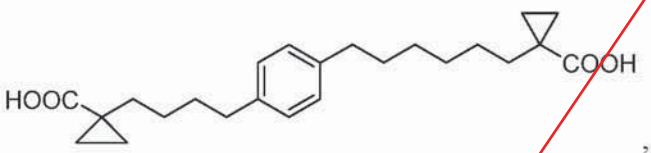


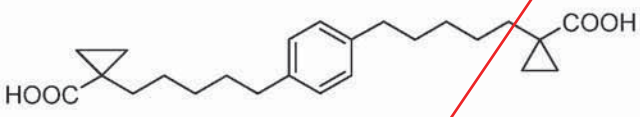
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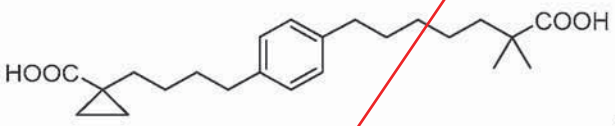
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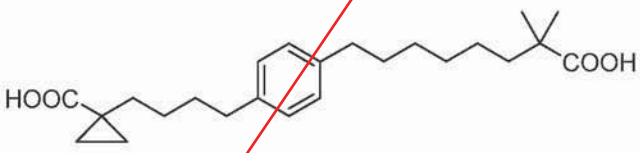
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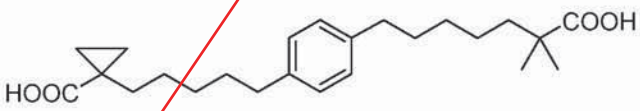
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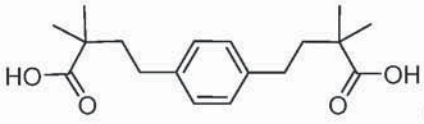
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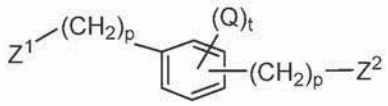
; or a pharmaceutically acceptable salt or solvate thereof.

26. The compound of claim 8, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

27. A compound of Formula (IH):



(IH)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each p is independently 1, 2, 3, 4, 5, 6, or 7;

each Z^1 and Z^2 is independently $–C(R^1)(R^2)–(CH_2)_c–X$ or $–W–(CH_2)_c–C(R^3)(R^4)–Y$;

each c is independently 0, 1, 2, or 3;

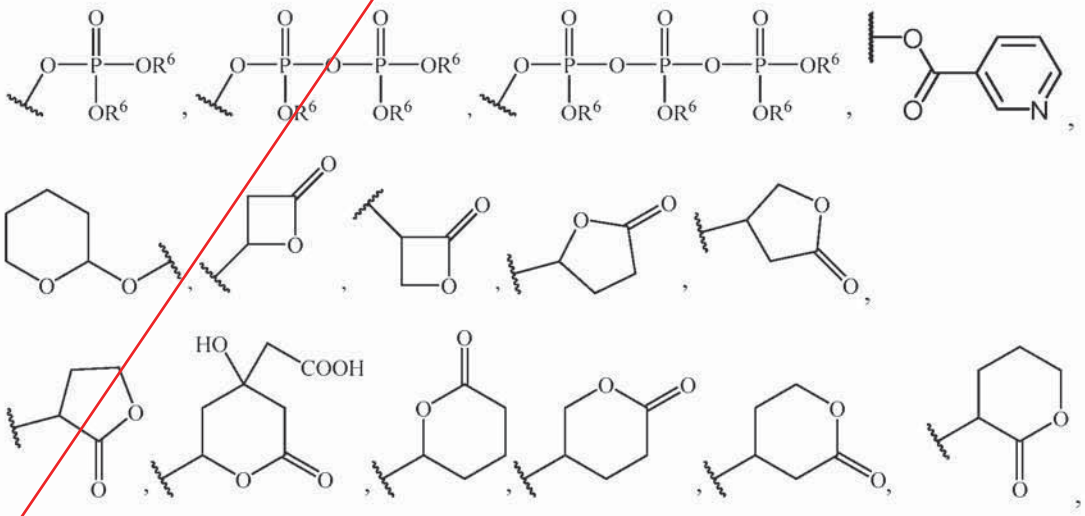
each R^1 and R^2 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^1 and R^2 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

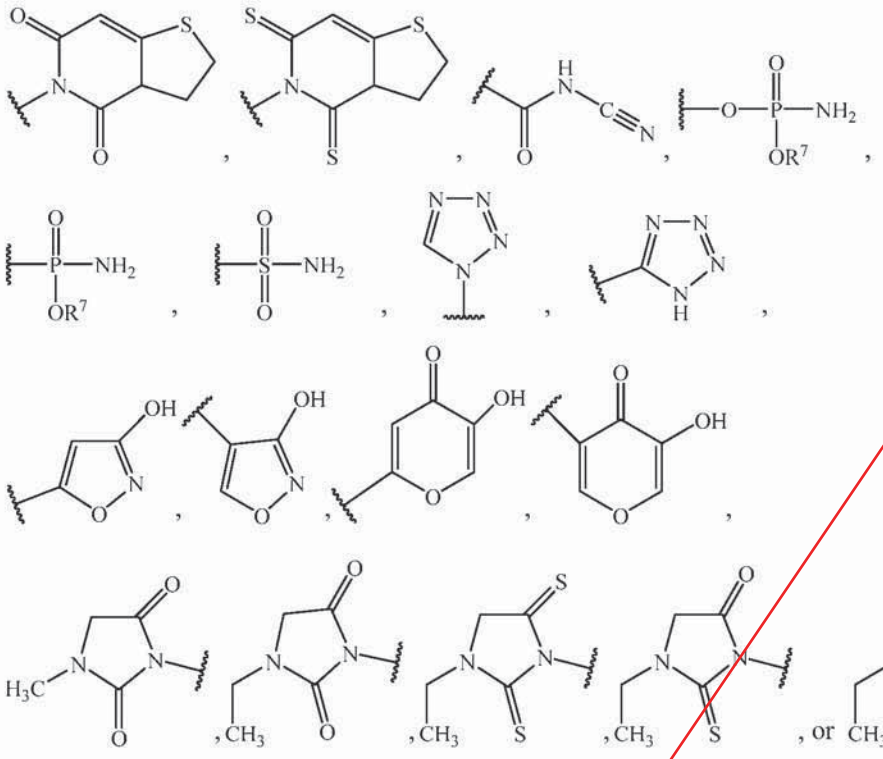
each R^3 and R^4 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, -O(C_1-C_6 alkyl), phenyl, benzyl, Cl, Br, CN, NO_2, or CF_3, or each carbon atom together with the R^3 and R^4 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

Q is independently -OH, methyl, or methoxy;

t is 1, 2, 3, or 4;

each X and Y is independently -OH, -COOH, -$COOR^5$, -SO_3H,





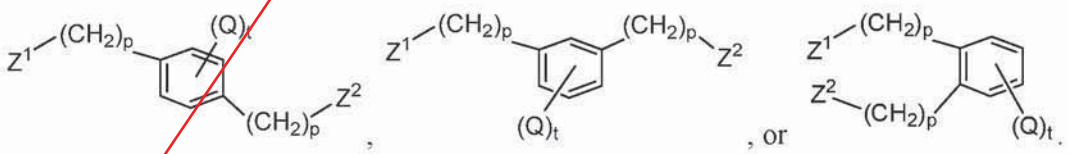
each R^6 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl, wherein the -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups;

each R^7 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl;

each W is independently -O-, -NH-, -N(OH)-, -N(→O)-, -S-, -S(=O)-, -$S(O)_2$-, or –Se-; and

each R^5 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups.

28. The compound of claim 27, wherein the compound has the structure of Formula (IJ), Formula (IK), or Formula (IL), or a pharmaceutically acceptable salt or solvate thereof:



(IJ) (IK) (IL)

29. The compound of claim 28, wherein t is 1, 2, or 3.

30. The compound or pharmaceutically acceptable salt or solvate of any one of claims 27-29, wherein Z^1 and Z^2 are each independently $–C(R^1)(R^2)–(CH_2)_c–X$.

31. The compound or pharmaceutically acceptable salt or solvate of any one of claims 27-30, wherein X is –COOH or -$COOR^5$.

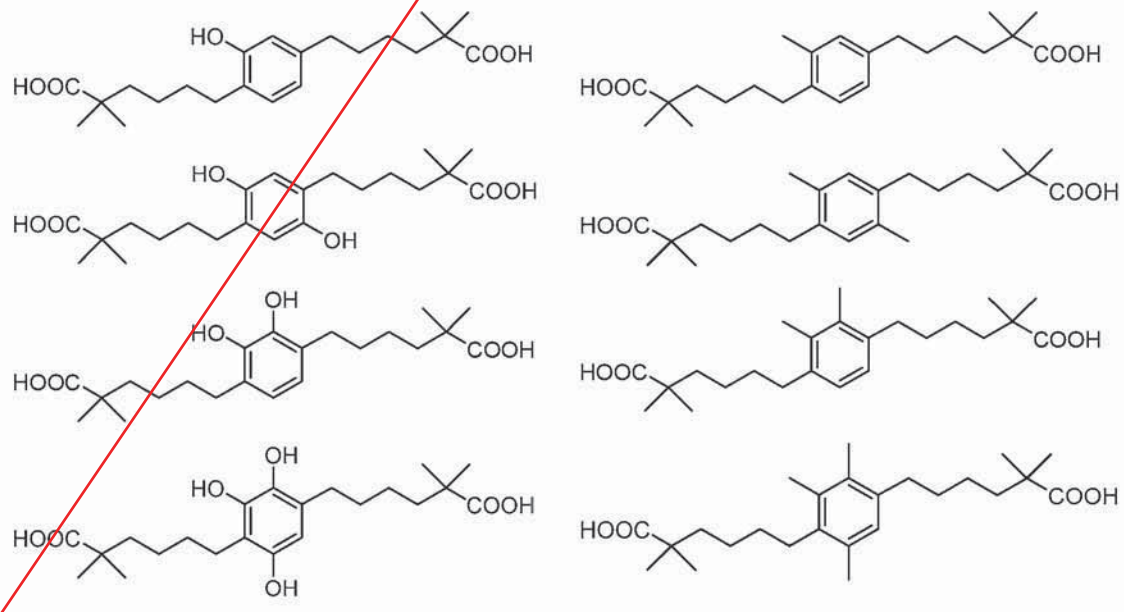
32. The compound or pharmaceutically acceptable salt or solvate of any one of claims 27-31, wherein each R^1 and R^2 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl.

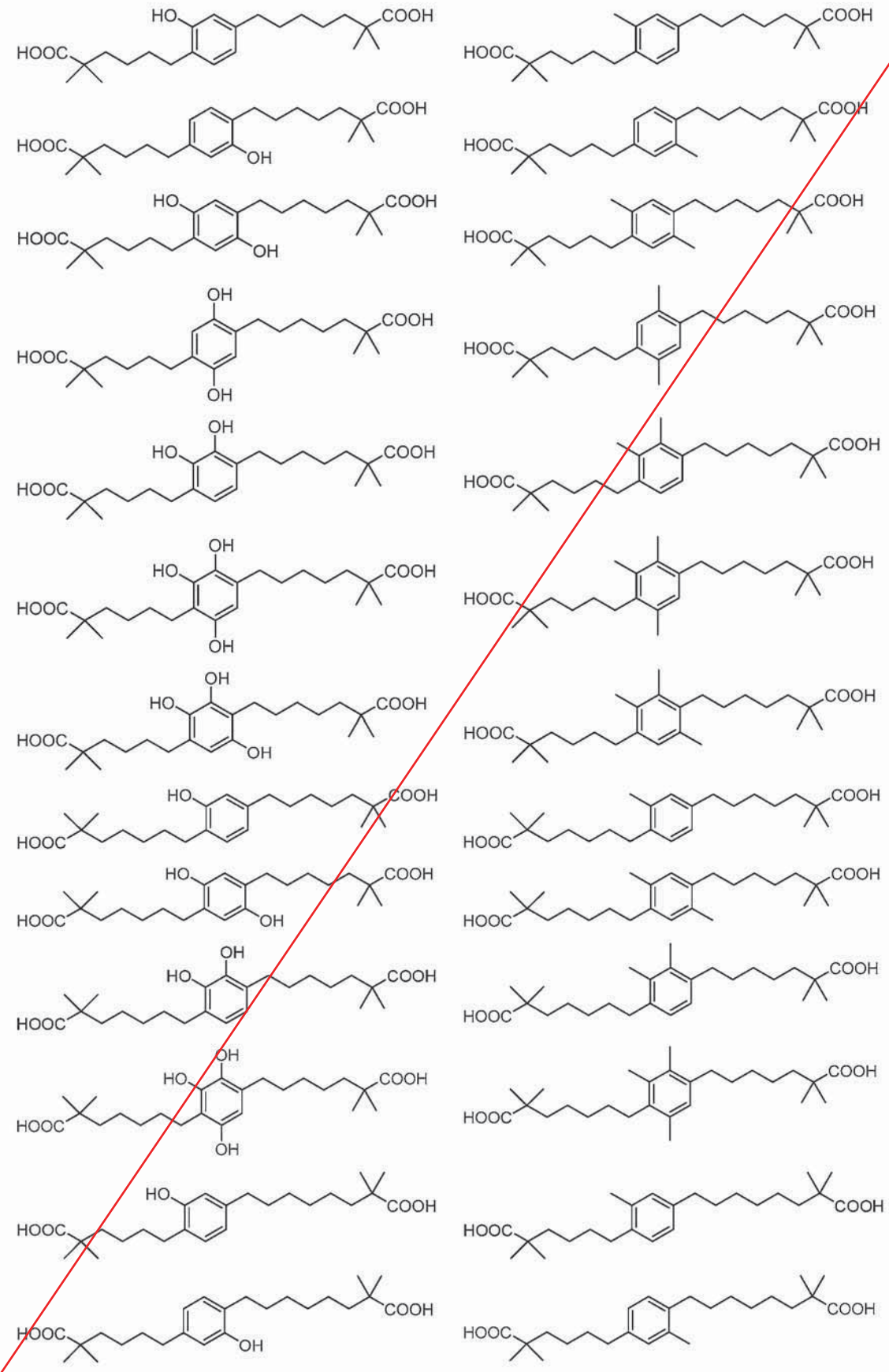
33. The compound or pharmaceutically acceptable salt or solvate of any one of claims 27-32, wherein each R^1 and R^2 is independently -C_1–C_3 alkyl, -C_2–C_3 alkenyl, or -C_2–C_3 alkynyl.

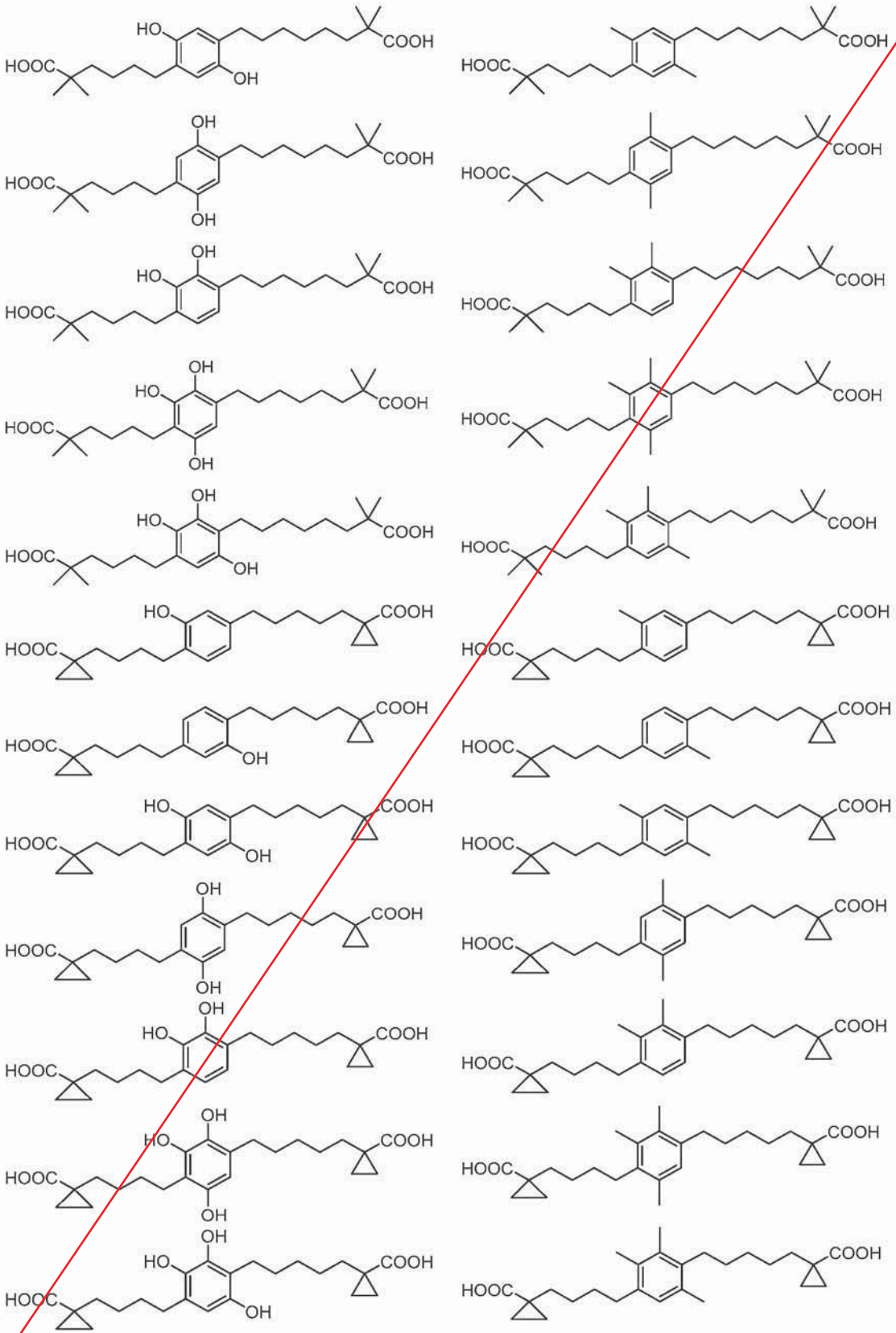
34. The compound or pharmaceutically acceptable salt or solvate of any one of claims 27-33, wherein R^1 and R^2 are methyl.

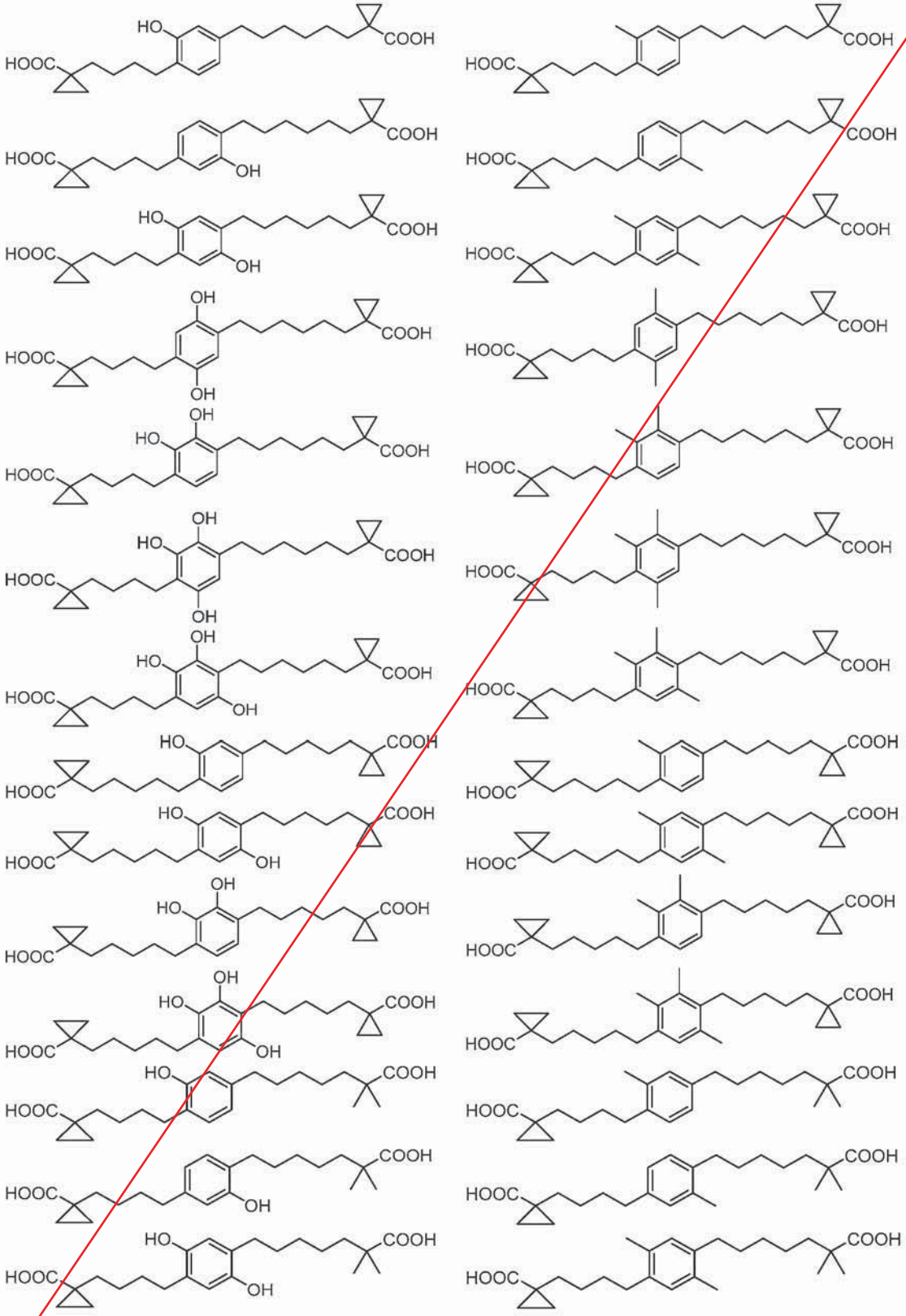
35. The compound or pharmaceutically acceptable salt or solvate of any one of claims 27-34, wherein c is 0 or 1.

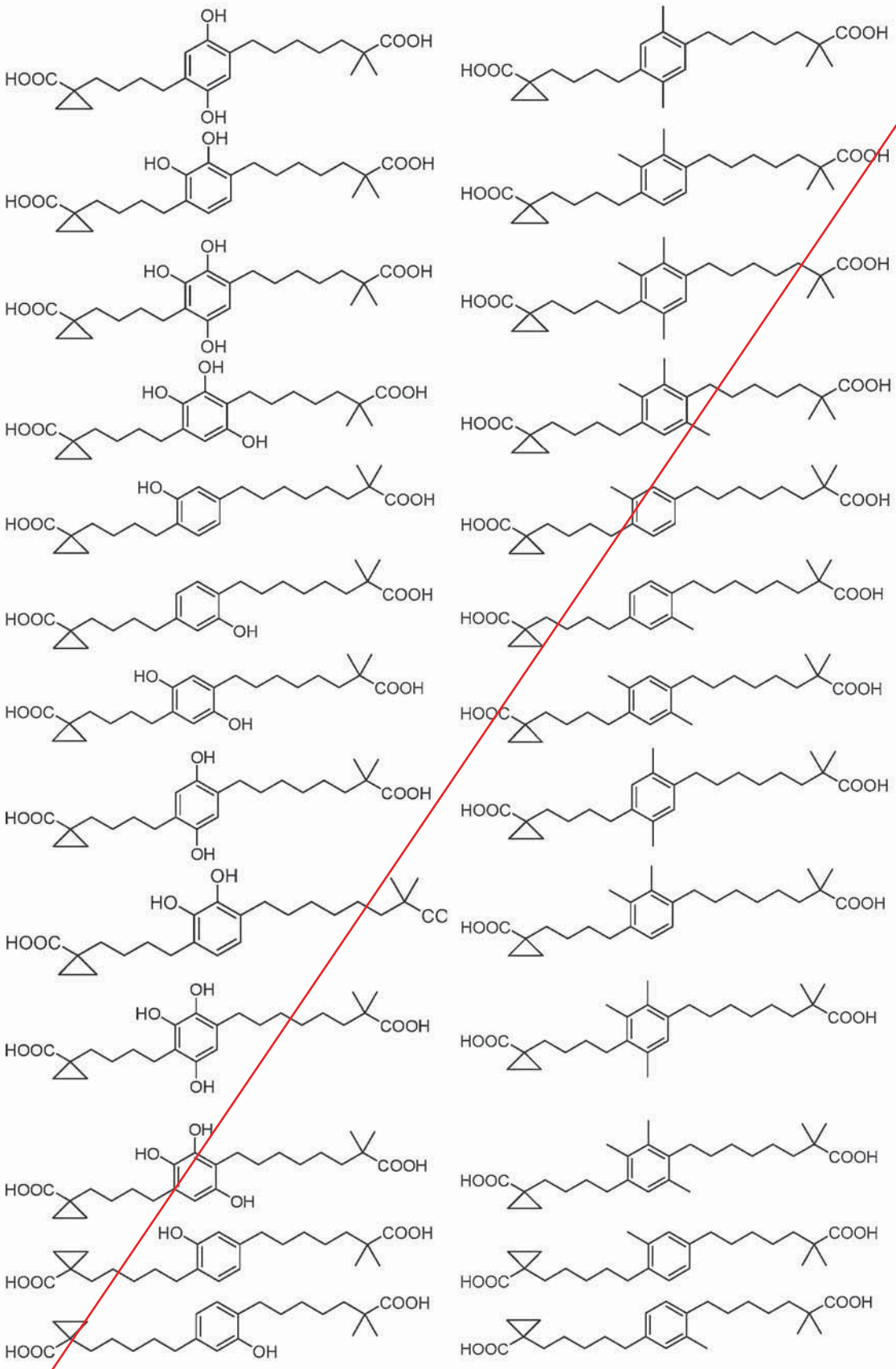
36. The compound of claim 27, wherein the compound has one of the following structures:

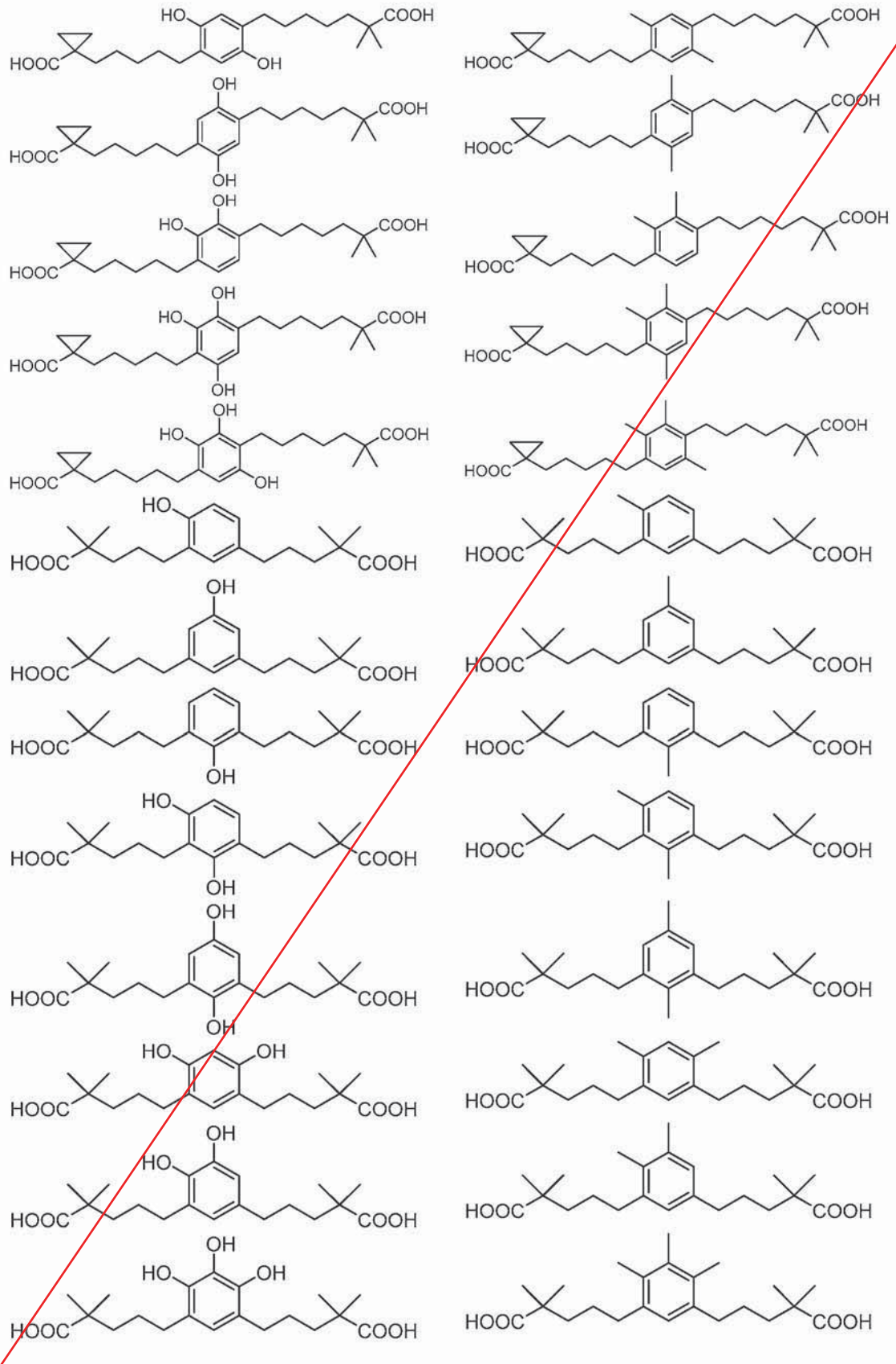


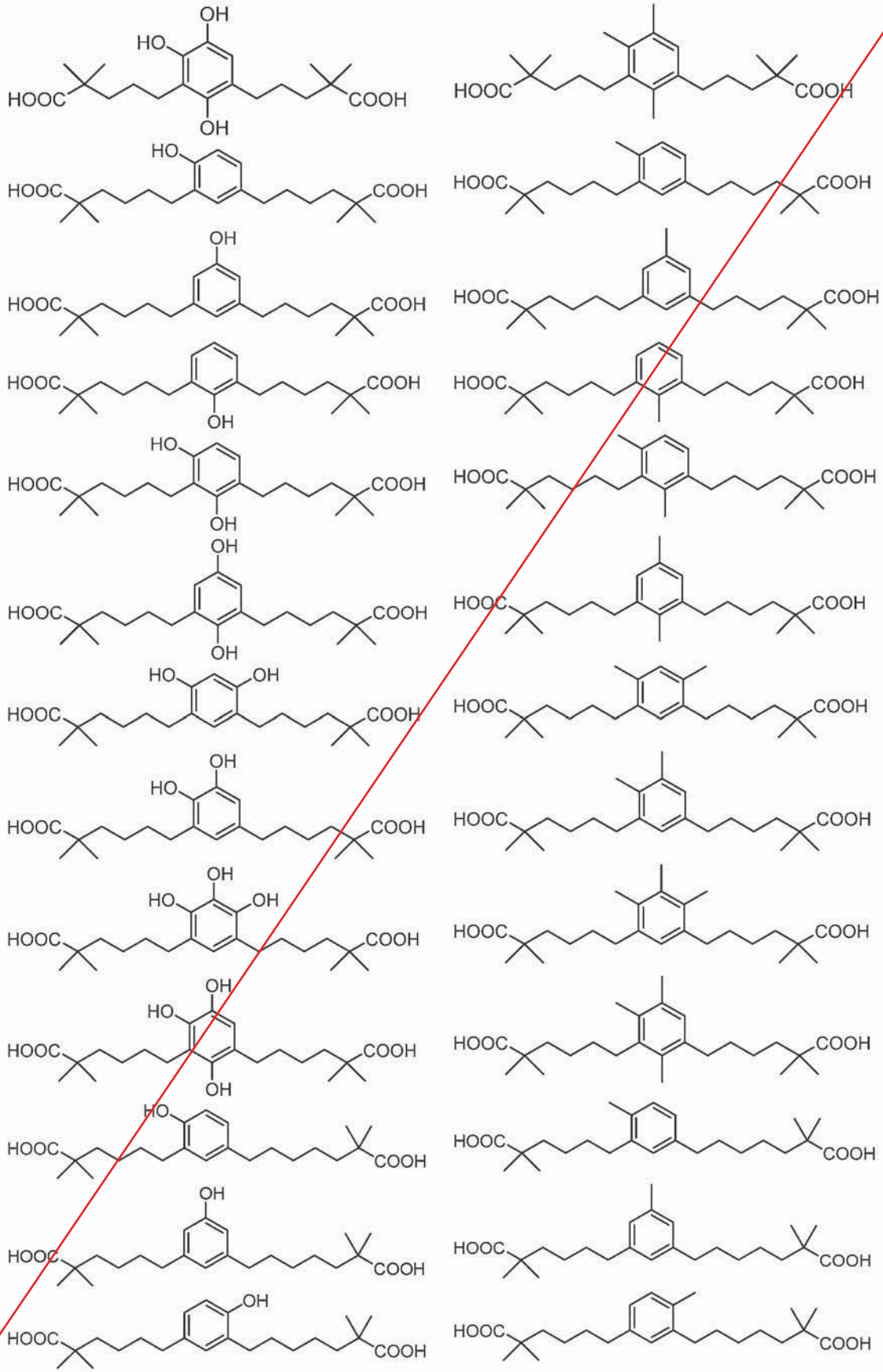


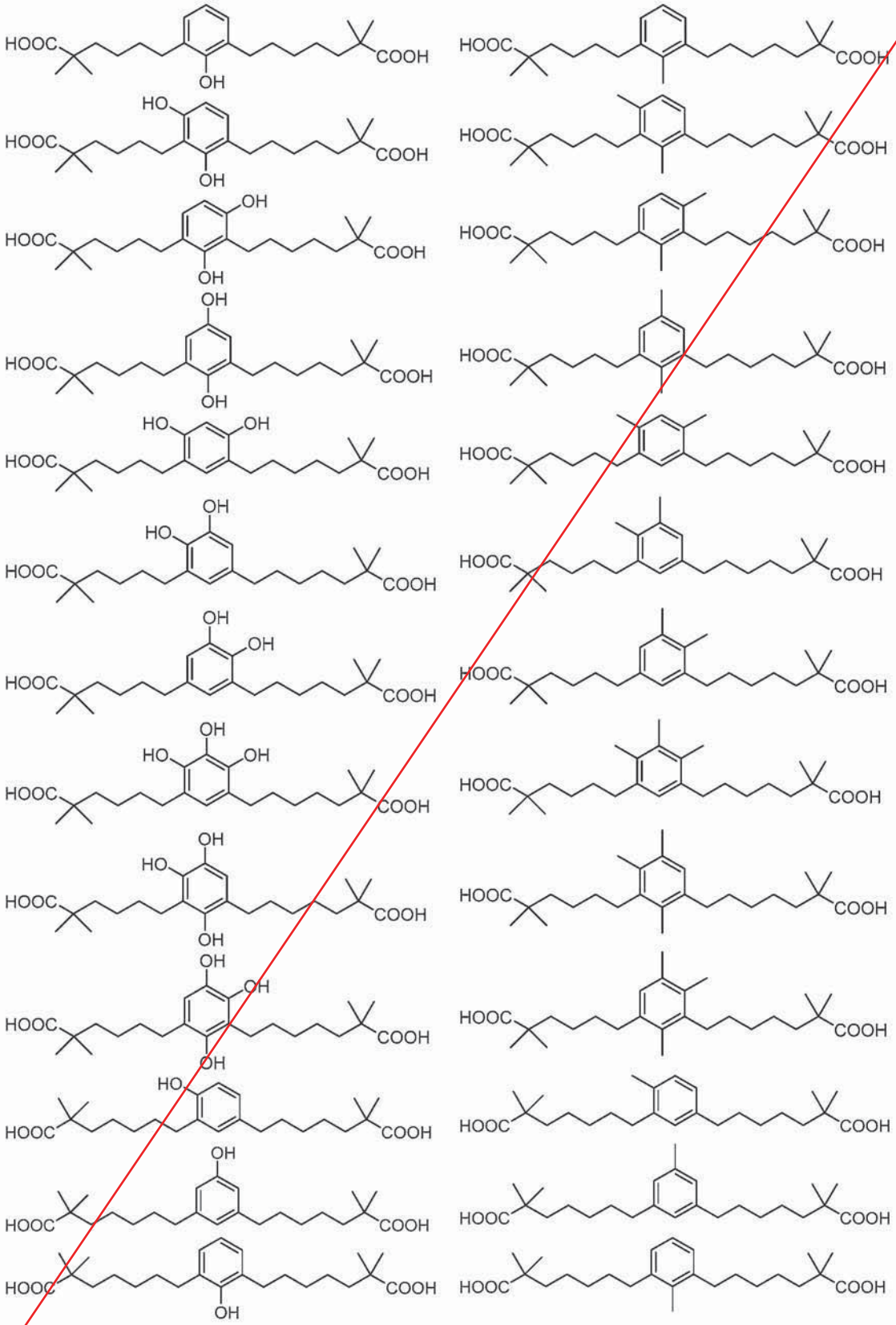


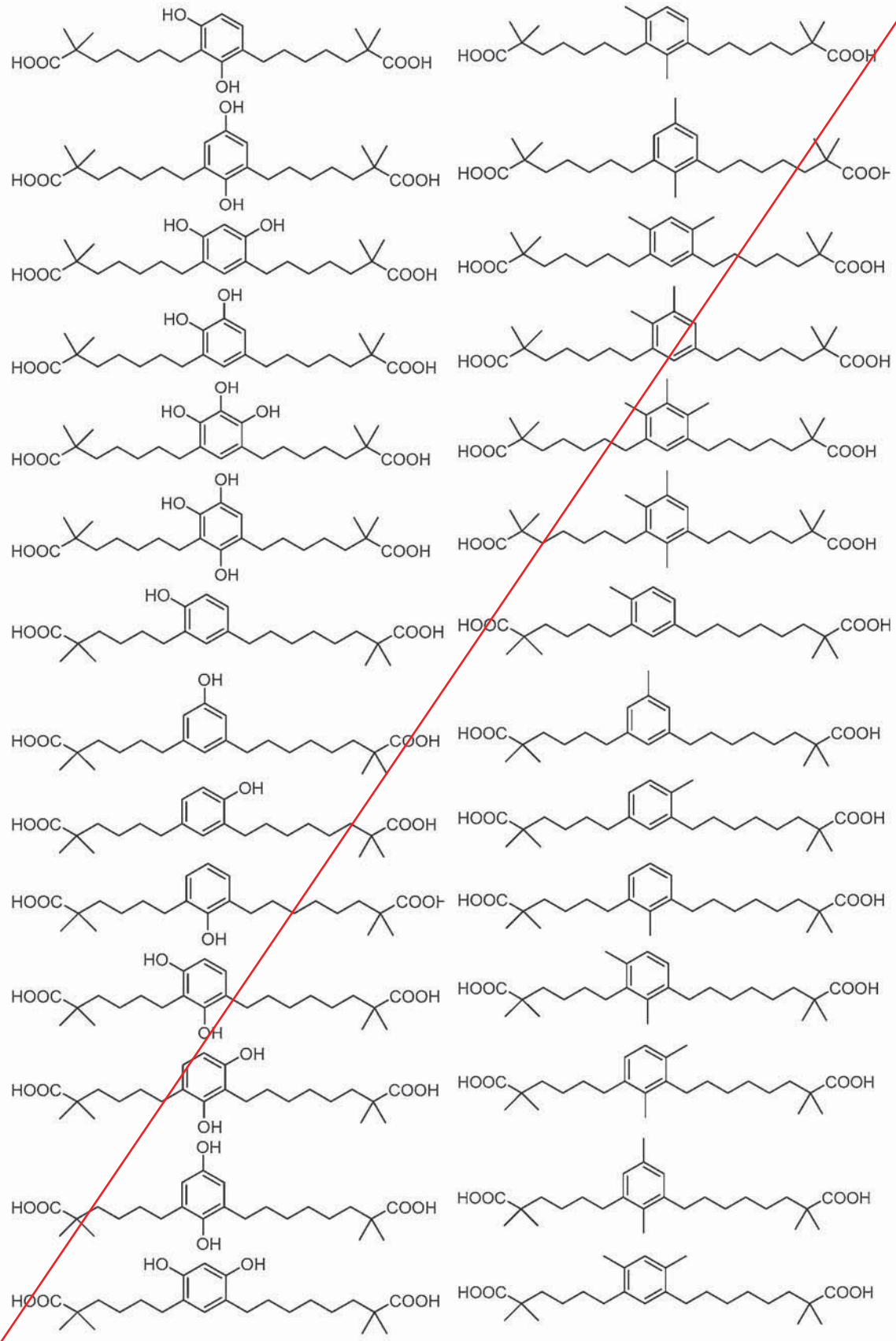


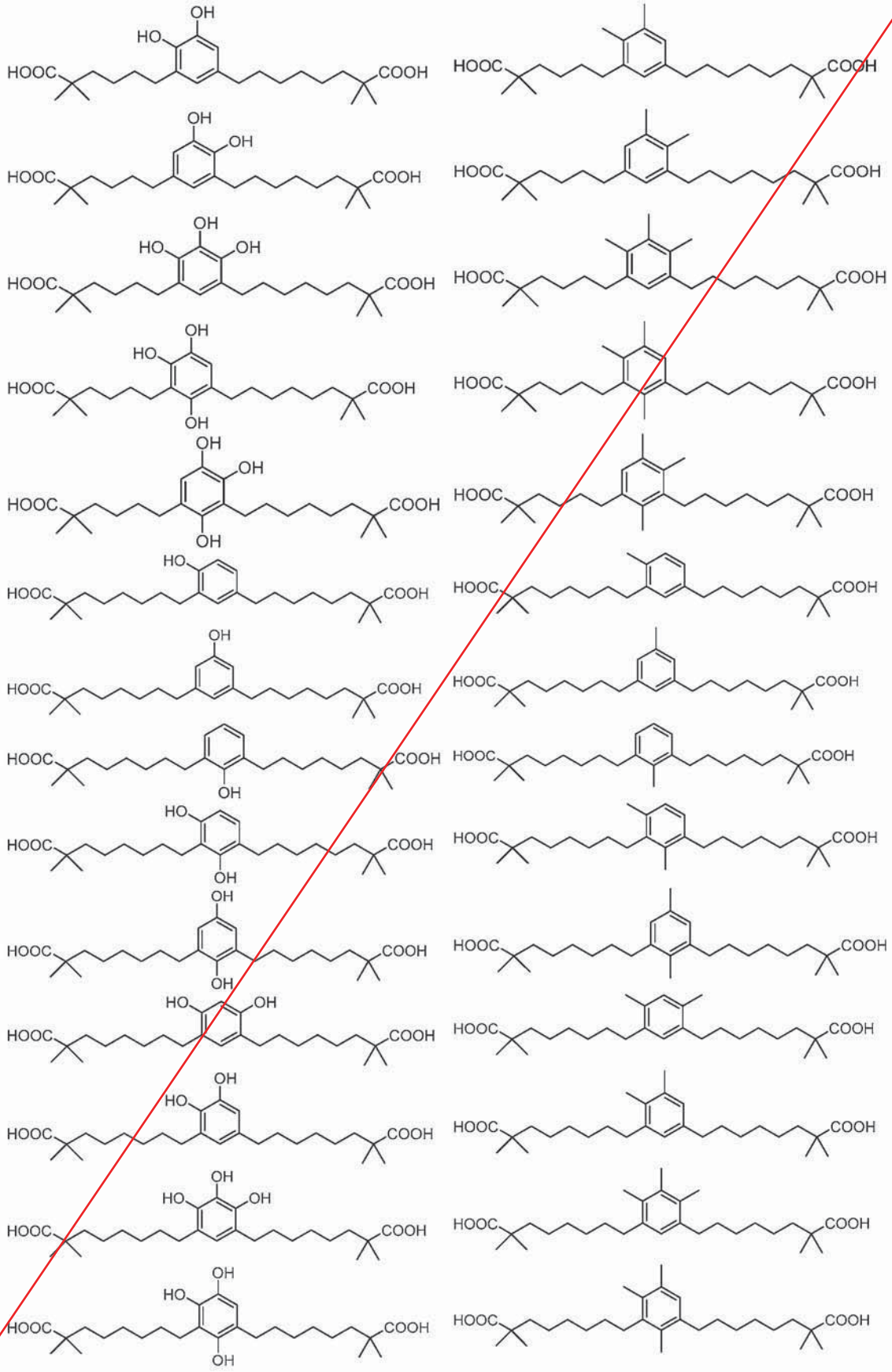


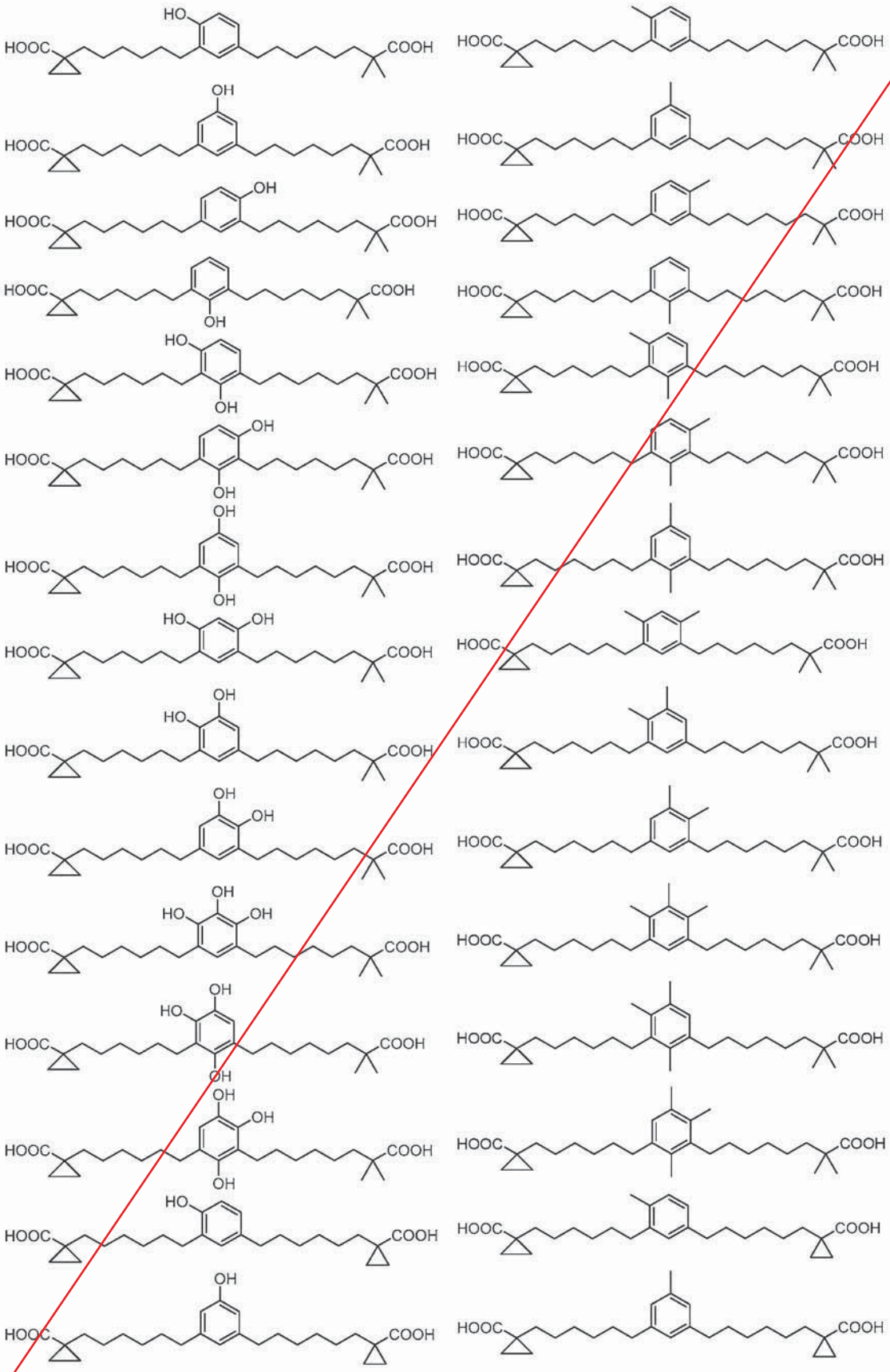


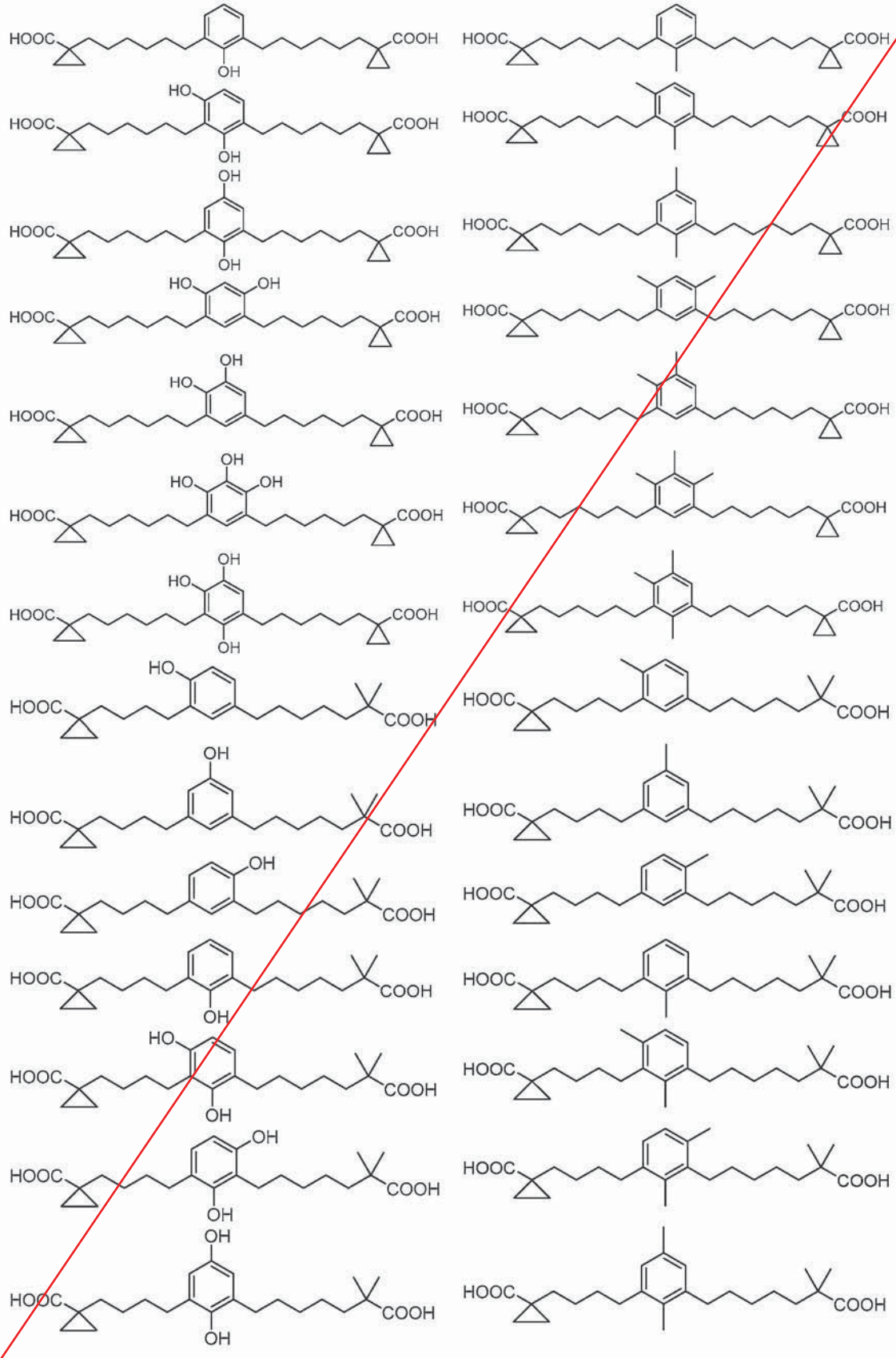


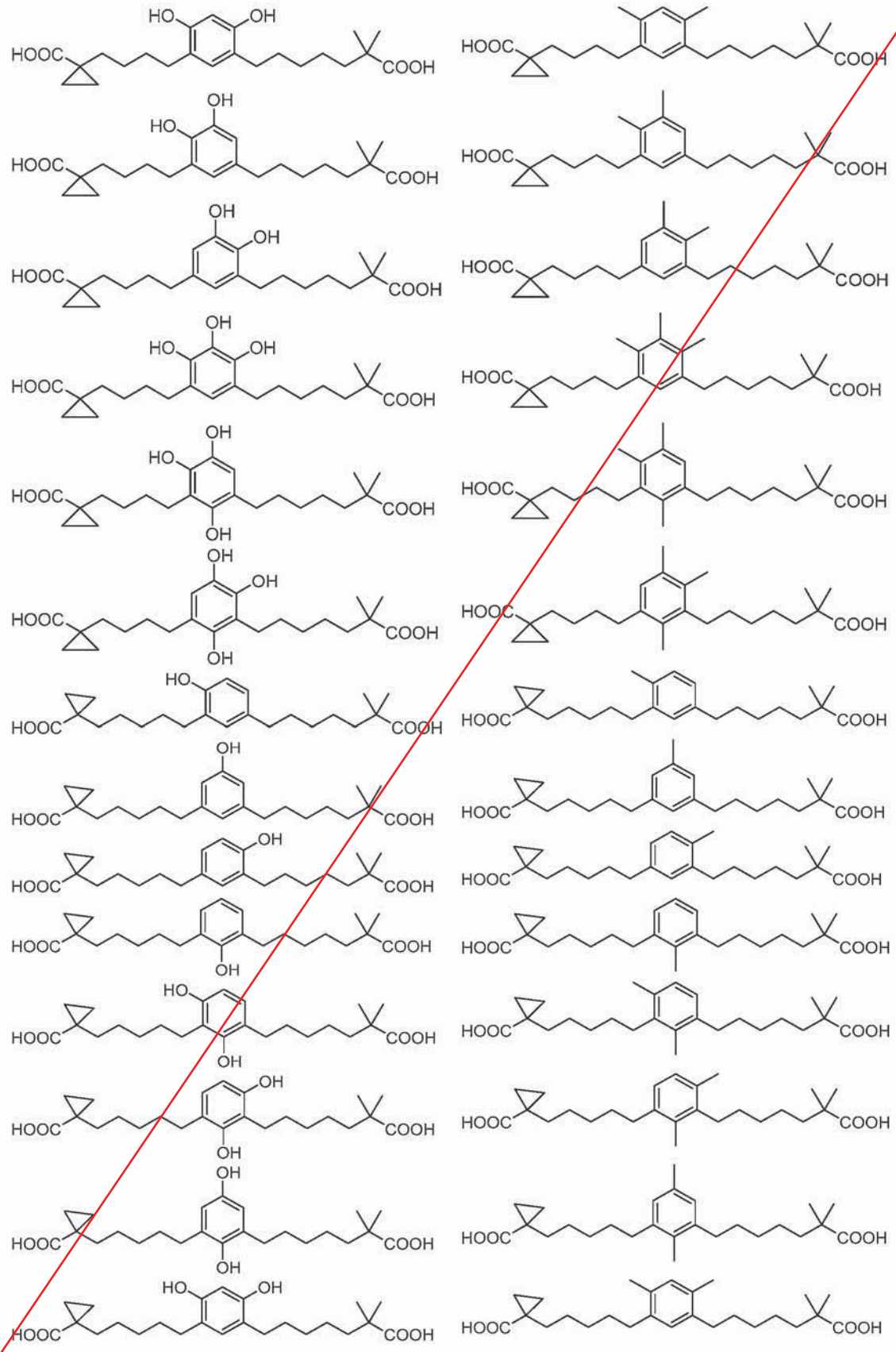


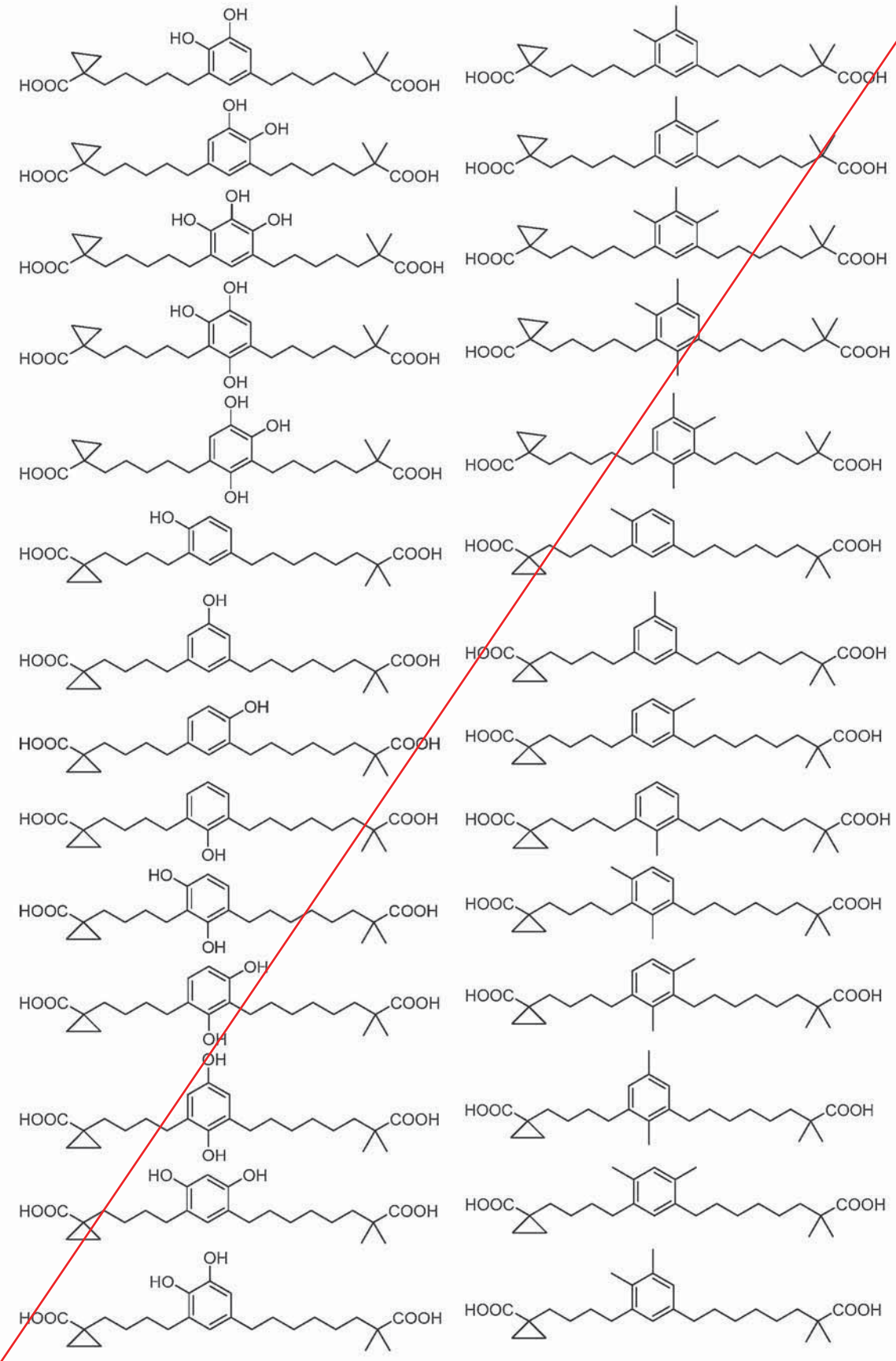


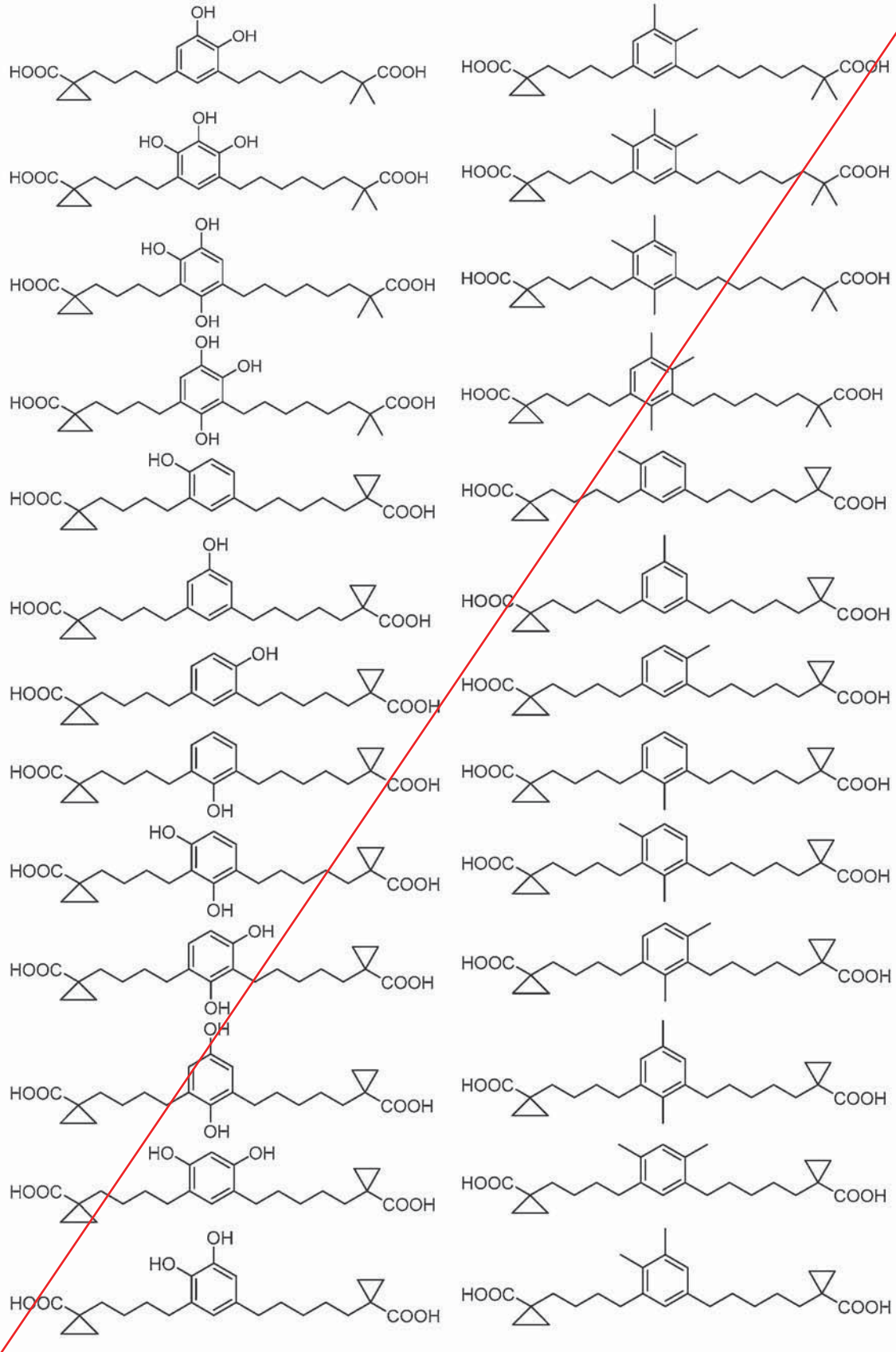


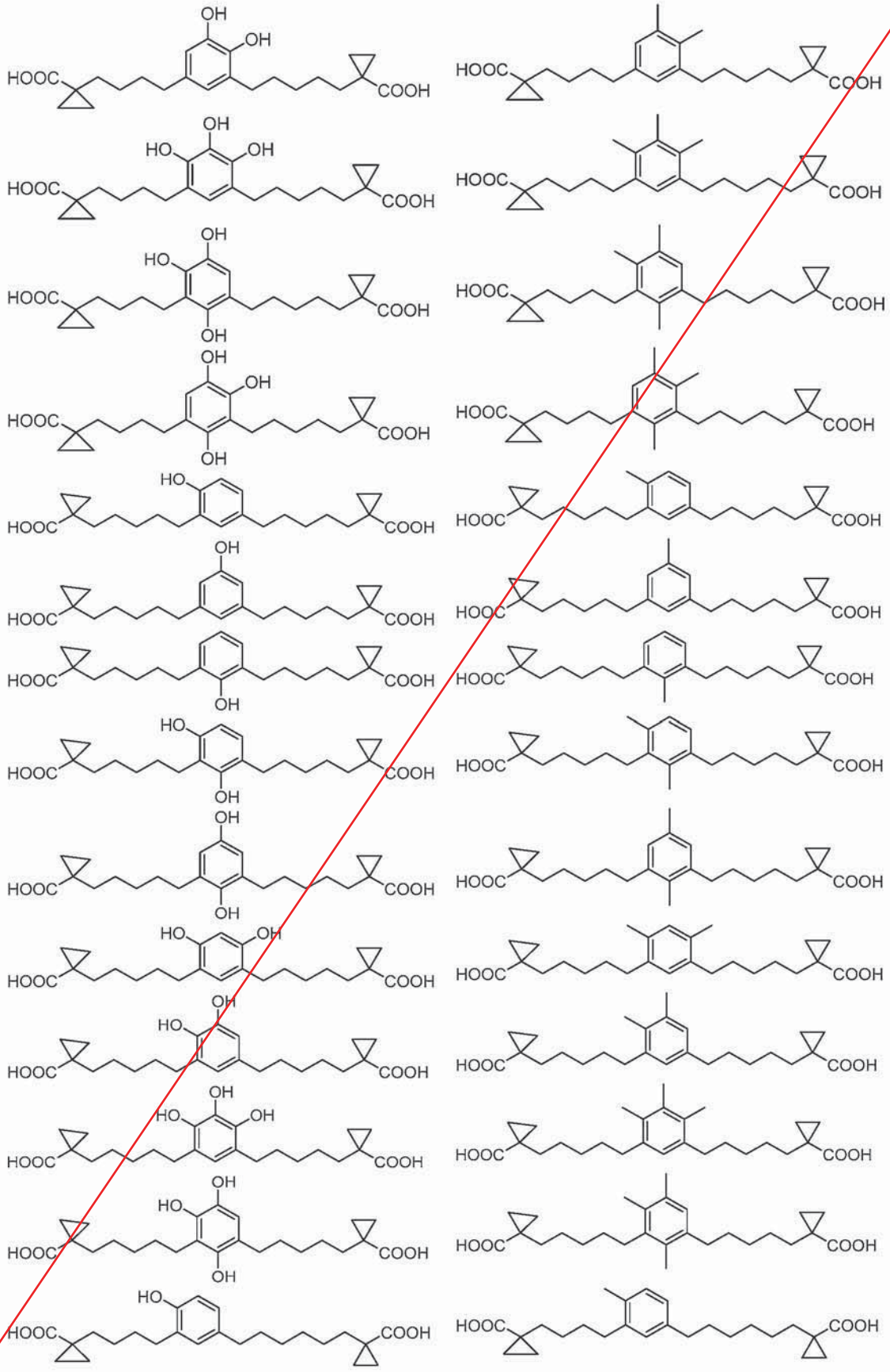


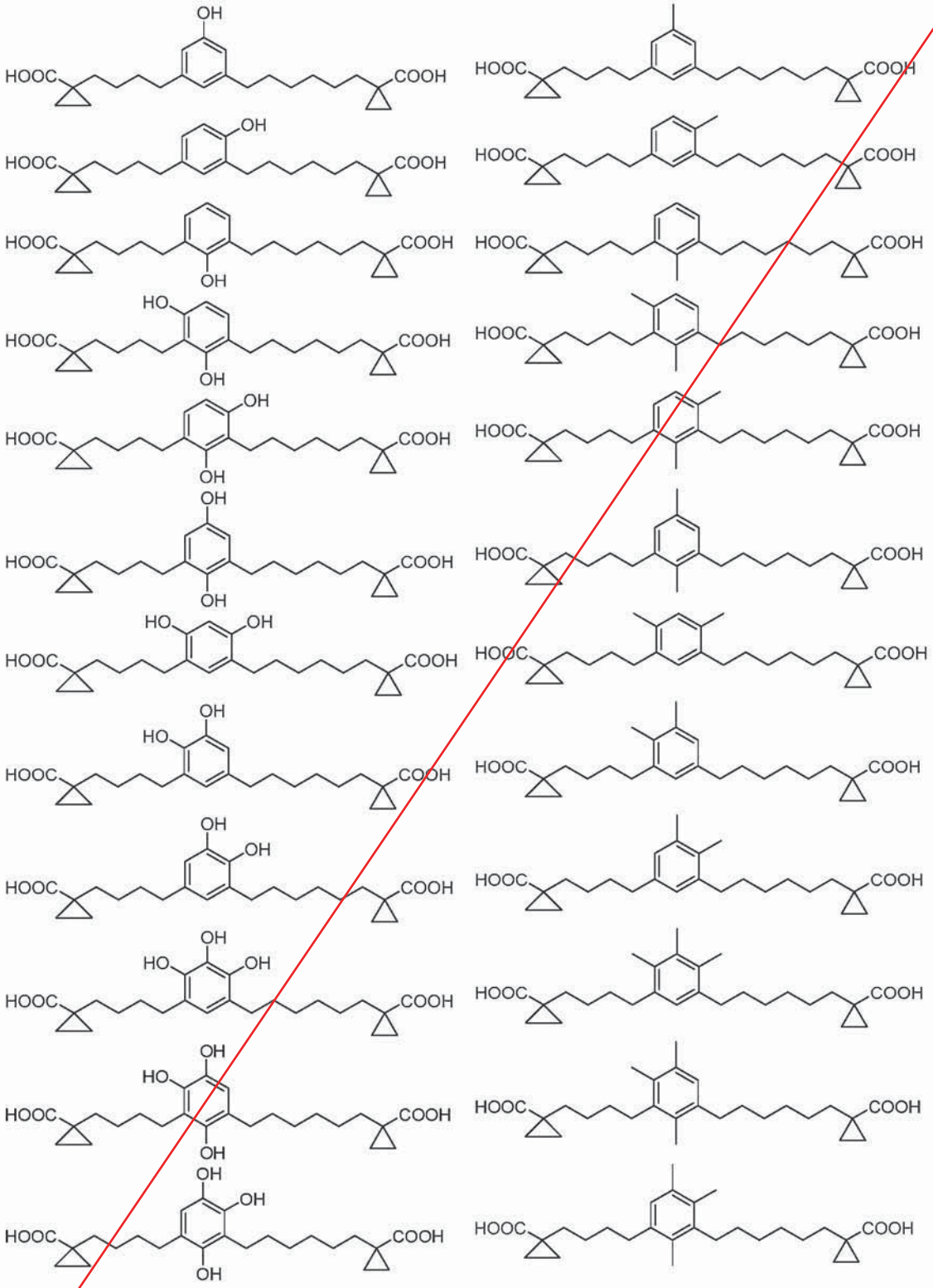


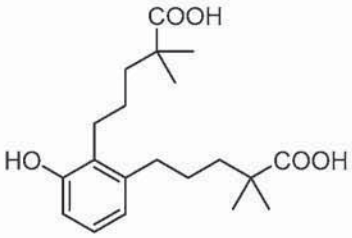
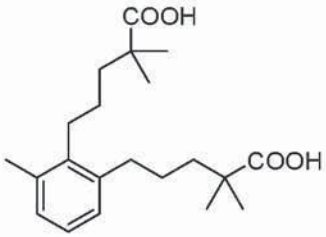
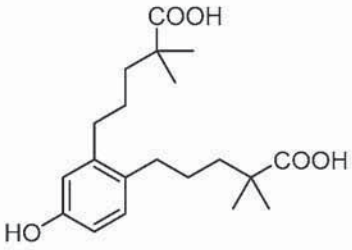
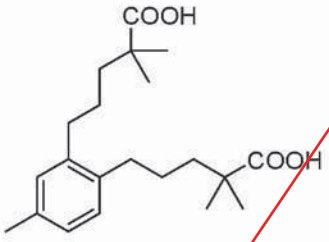
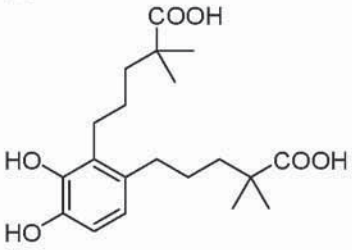
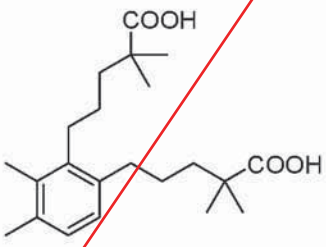
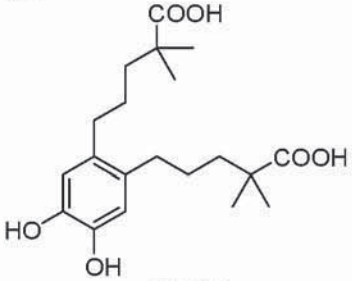
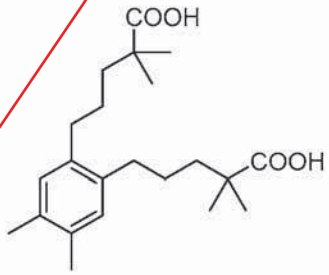
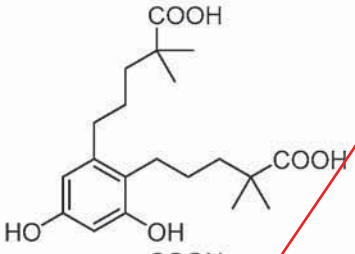
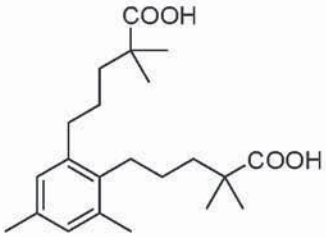
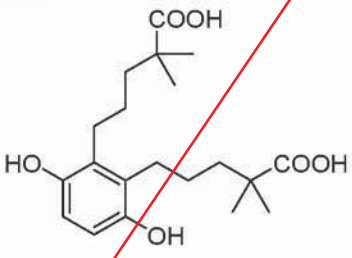
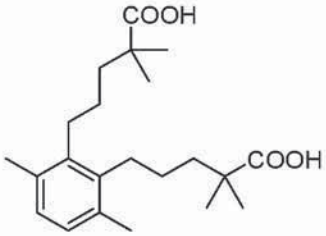


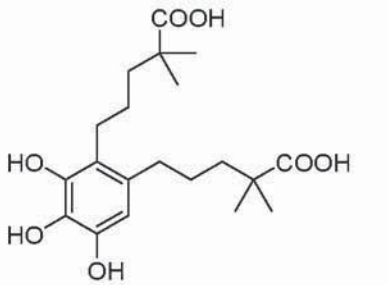
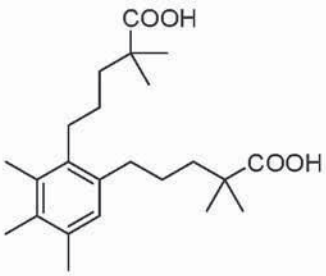
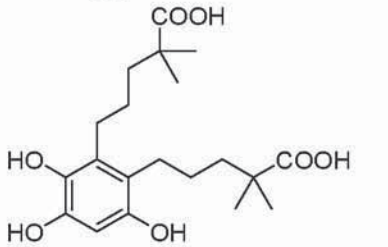
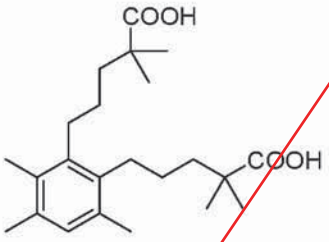
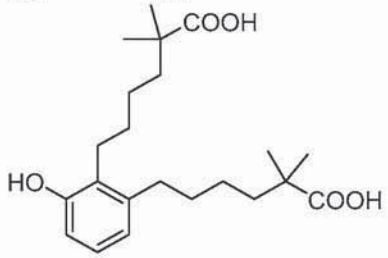
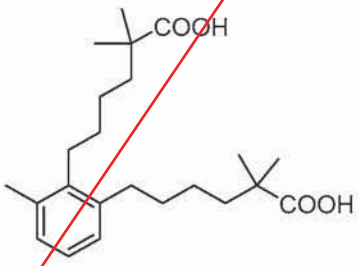
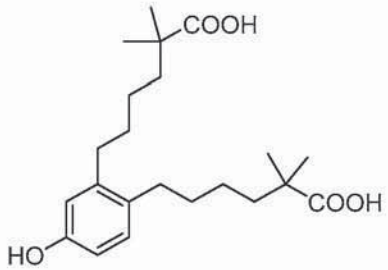
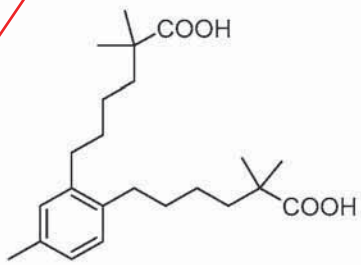
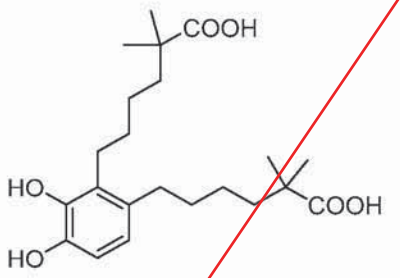
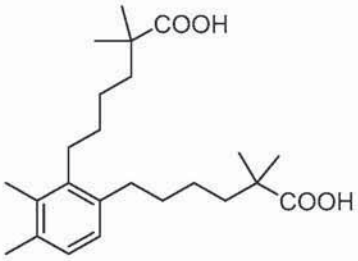
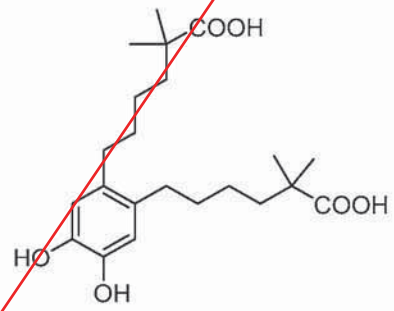
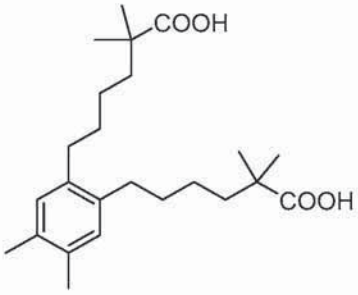


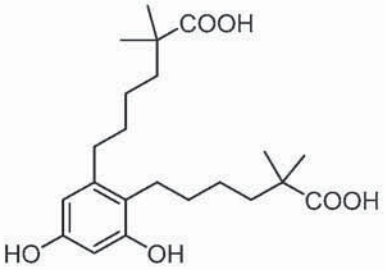
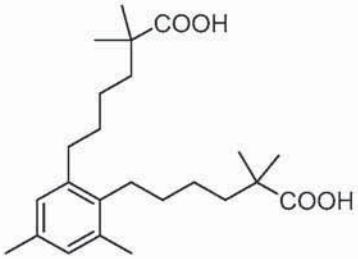
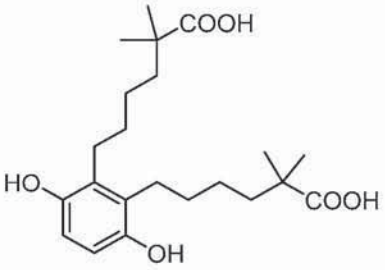
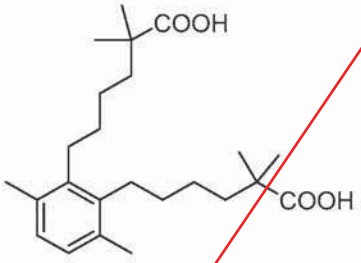
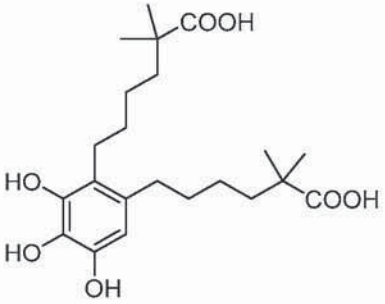
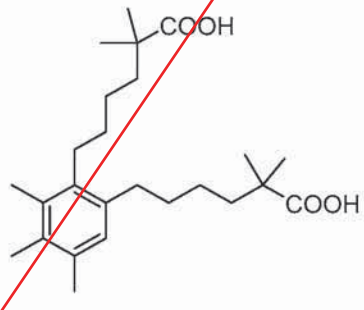
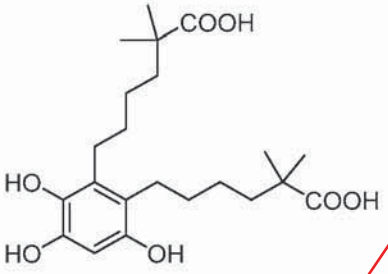
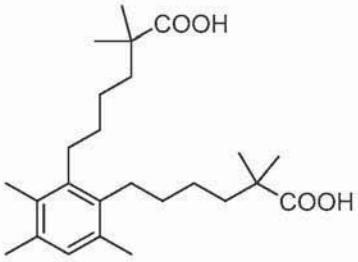
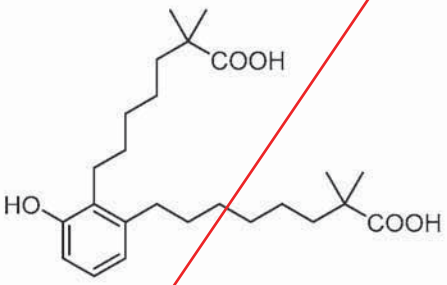
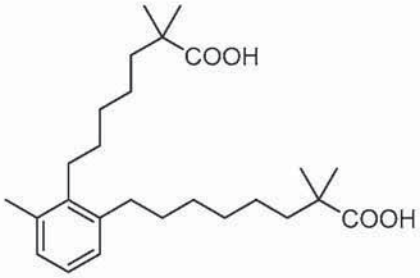
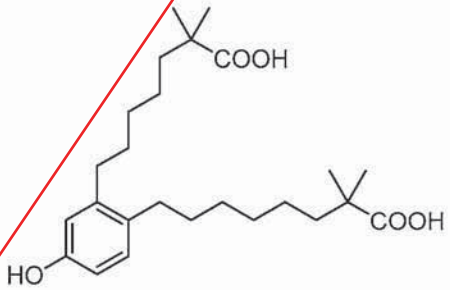
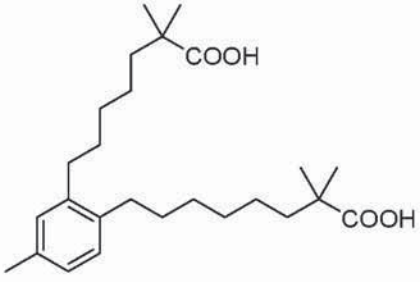


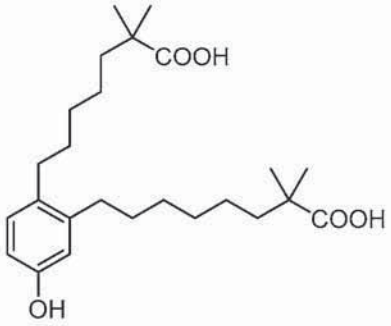


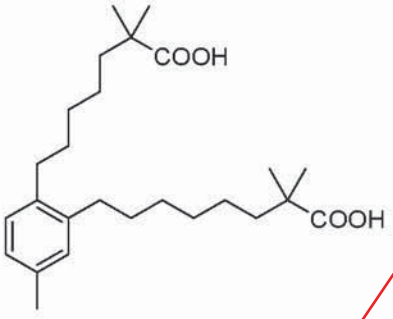


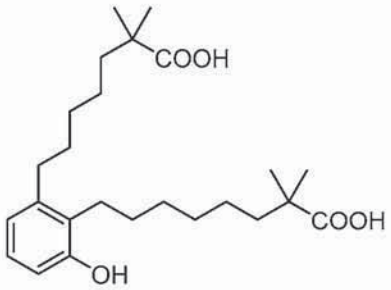













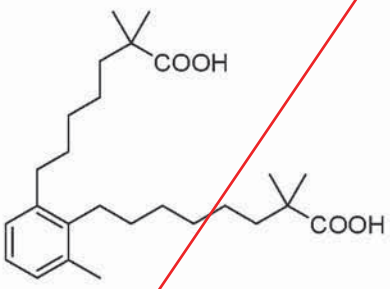













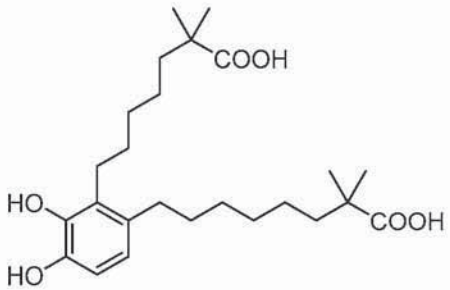













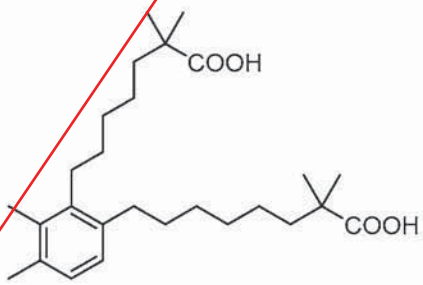

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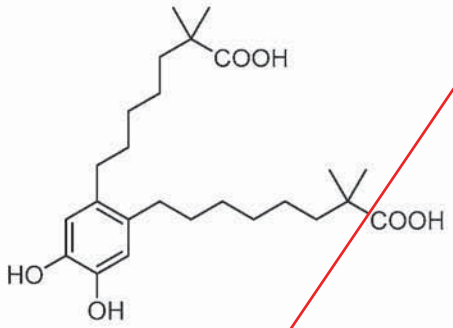

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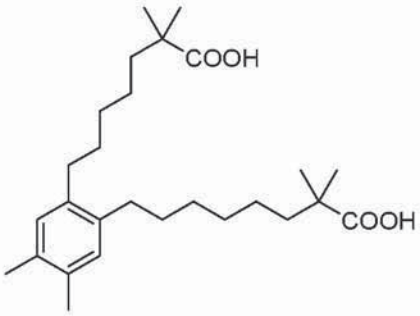

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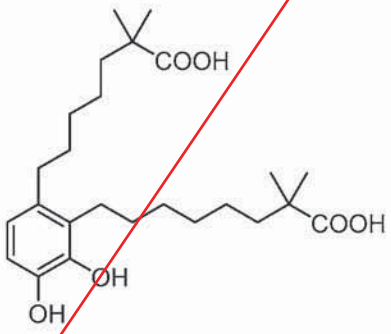

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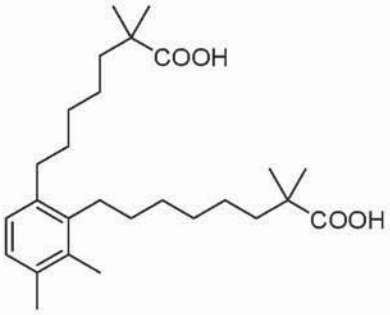

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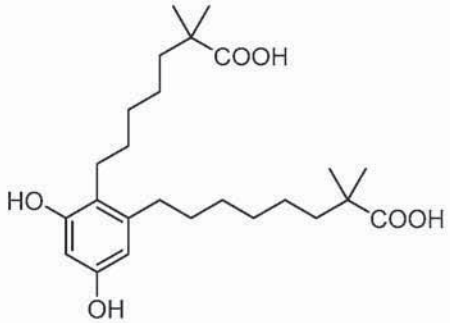

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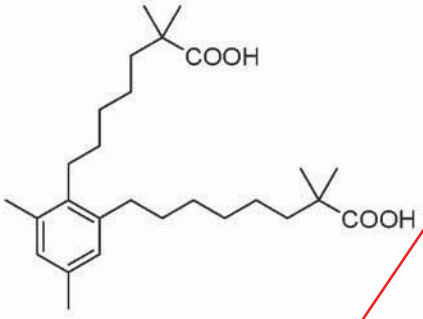

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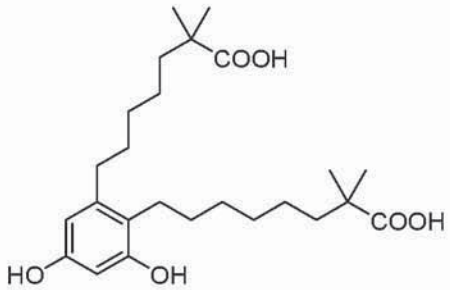

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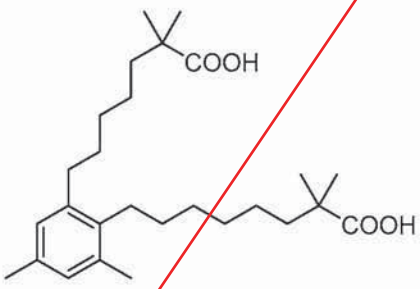

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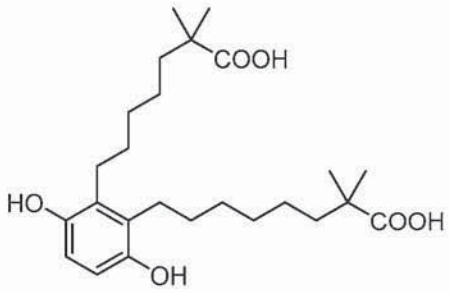

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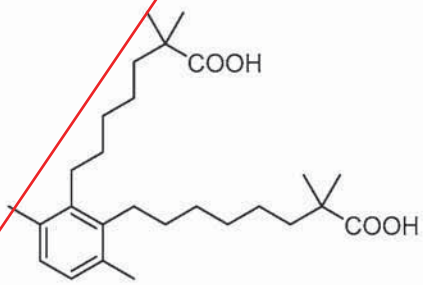

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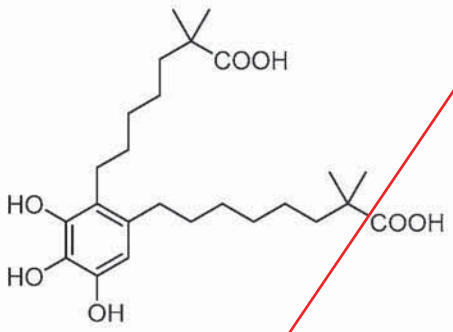

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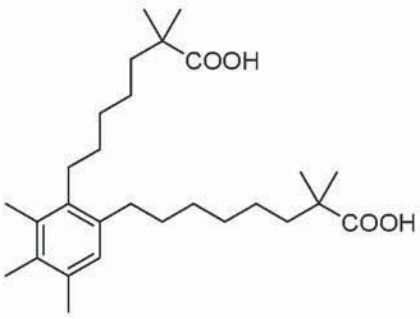

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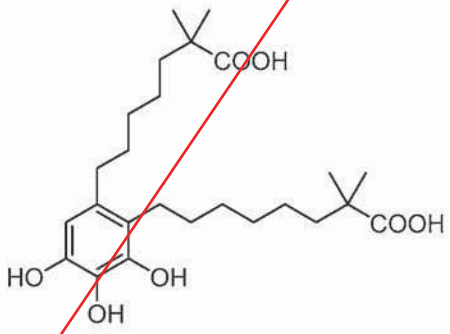

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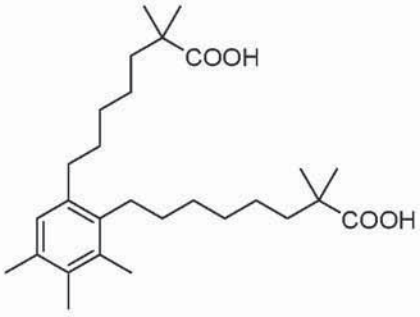

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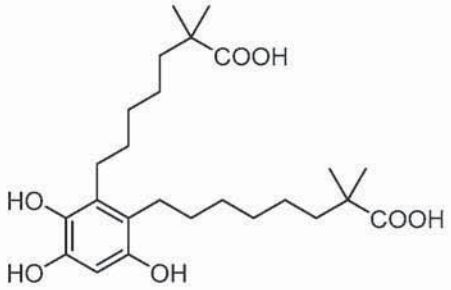

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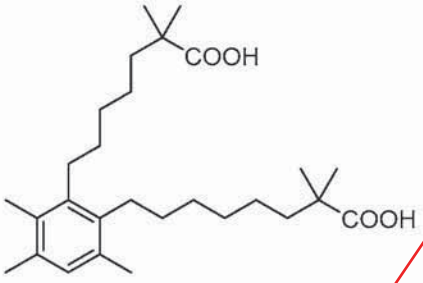

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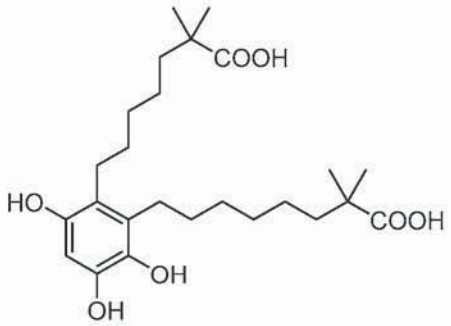

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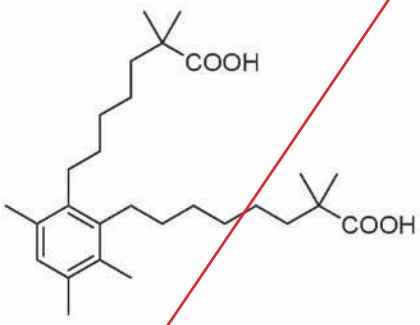

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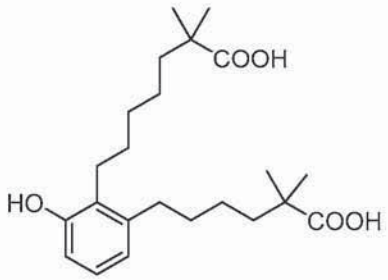

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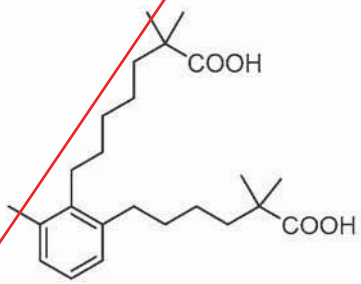

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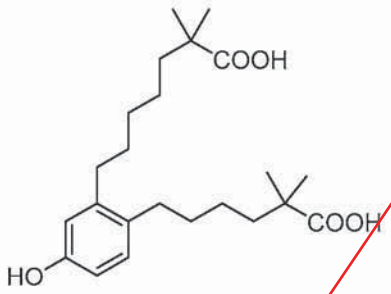

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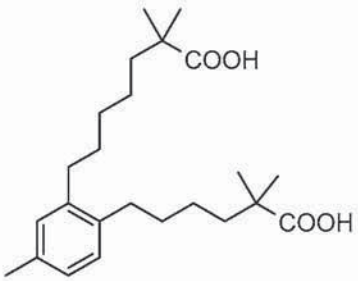

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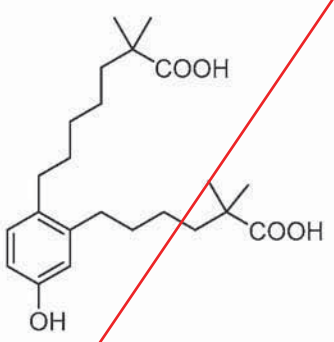

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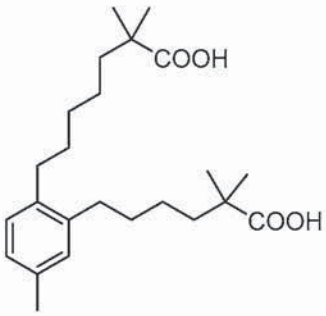

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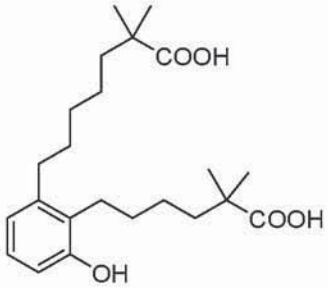

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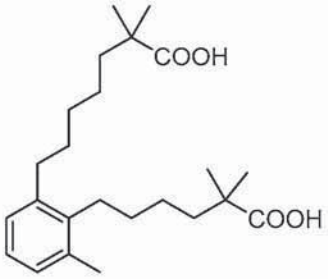

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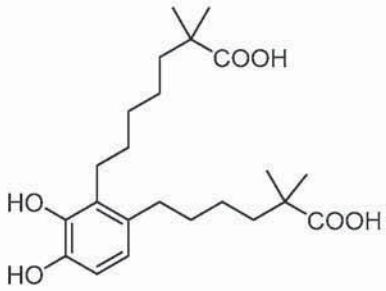

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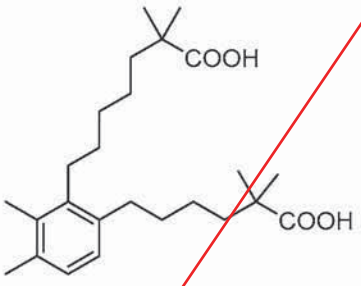

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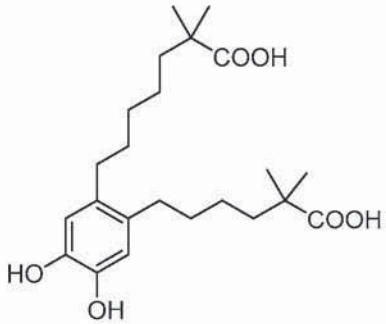

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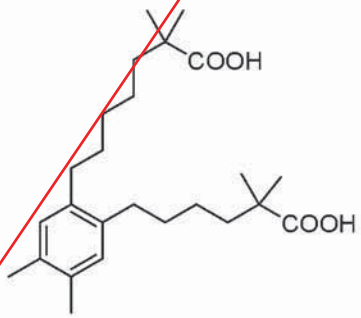

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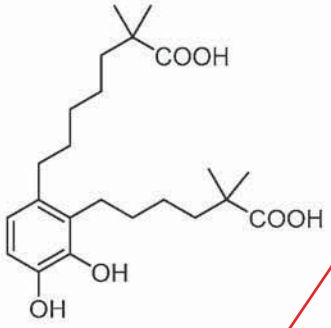

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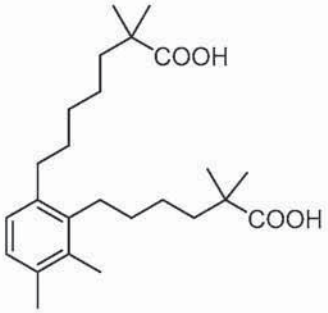

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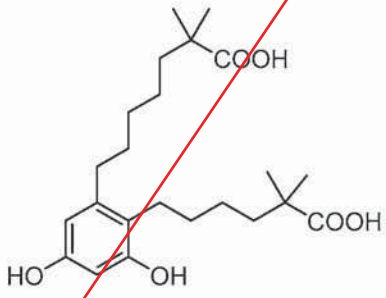

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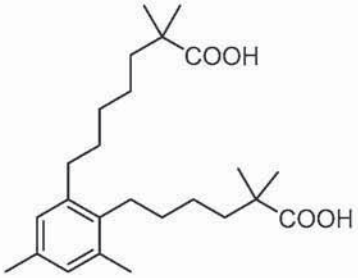

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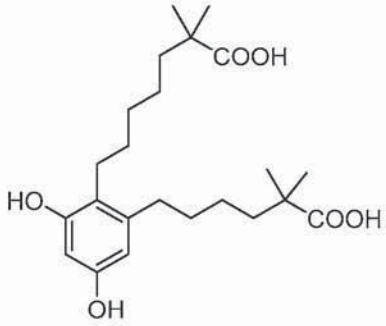

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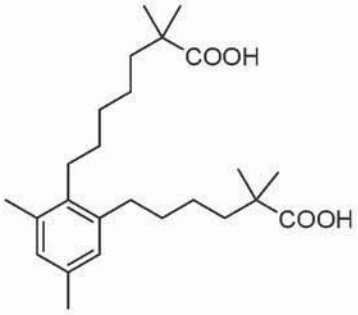

COOH
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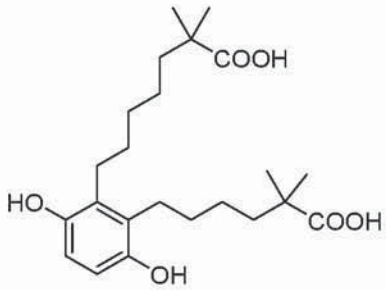

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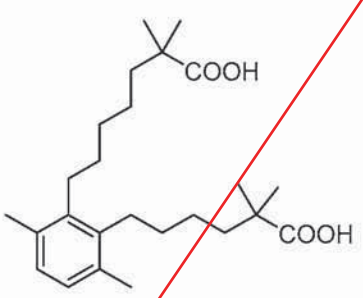

COOH
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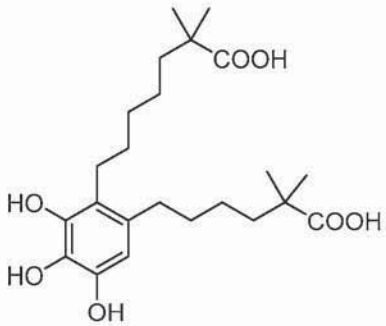

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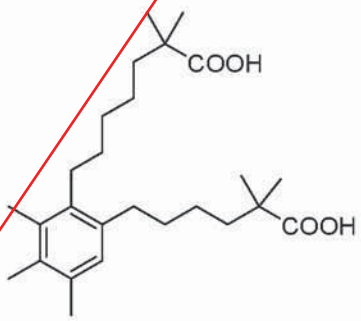

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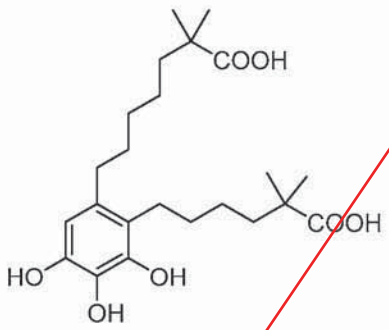

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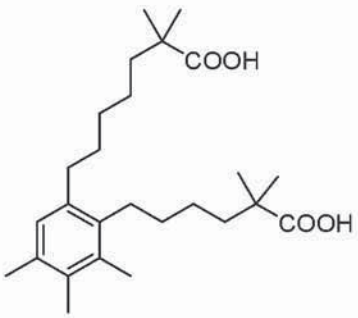

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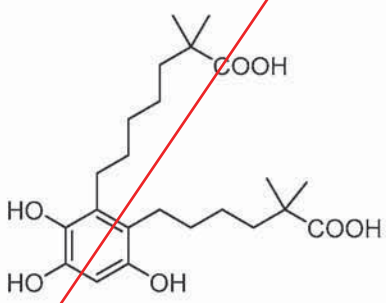

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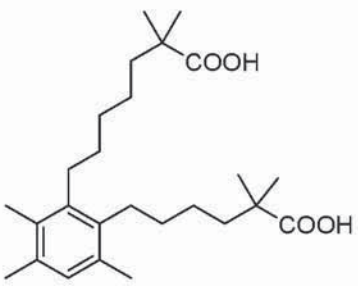

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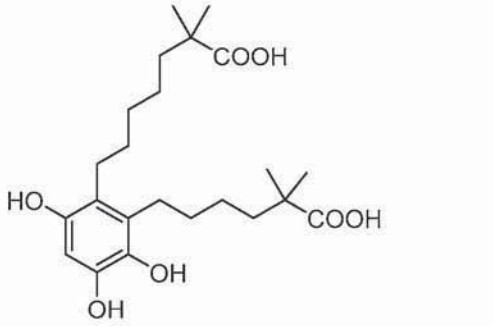

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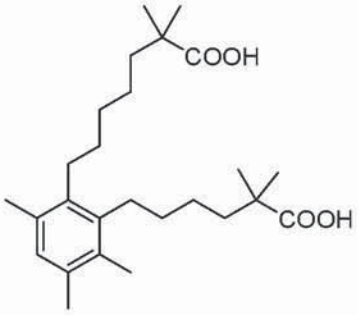

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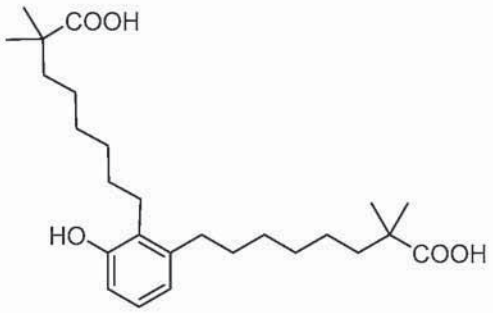

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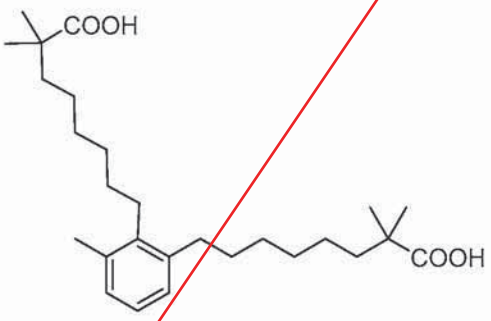

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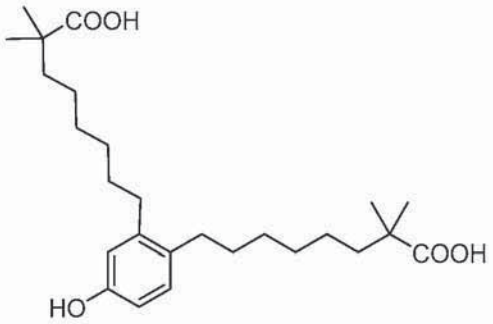

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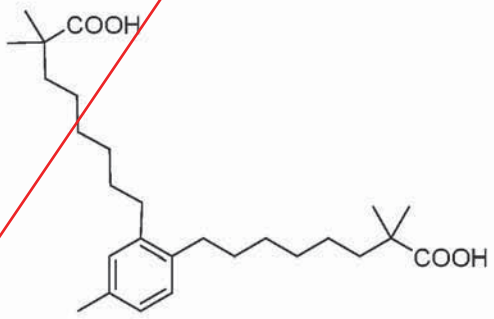

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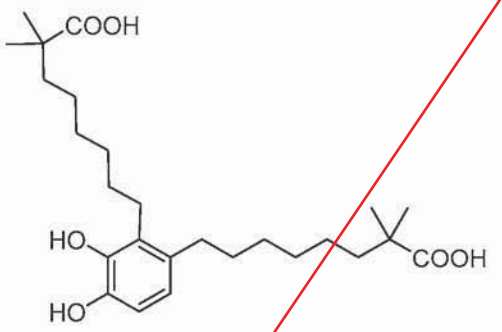

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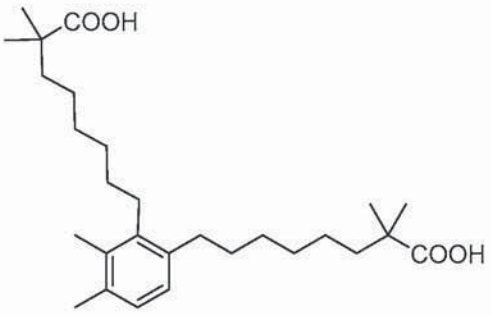

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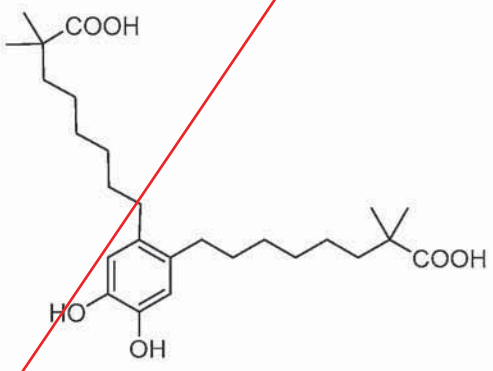

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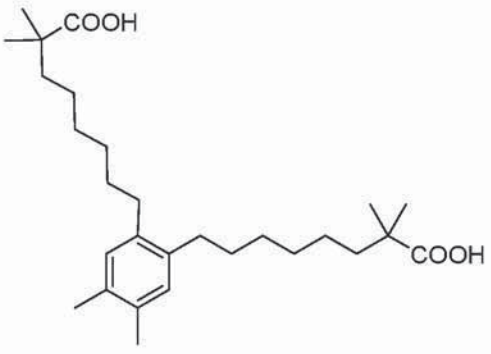

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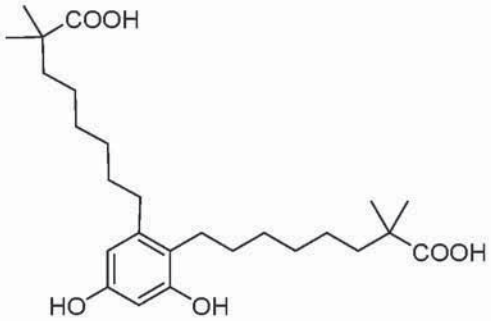

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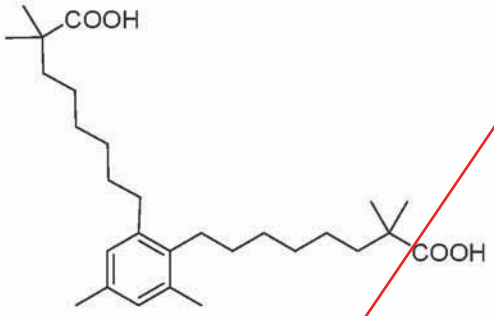

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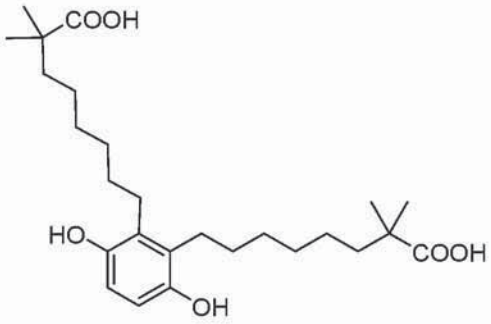

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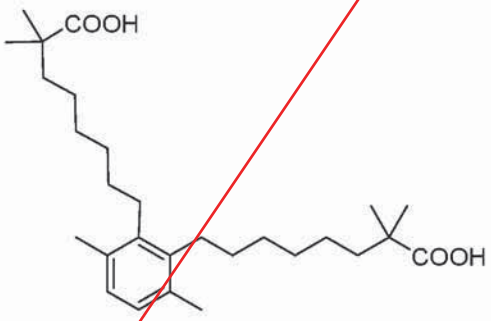

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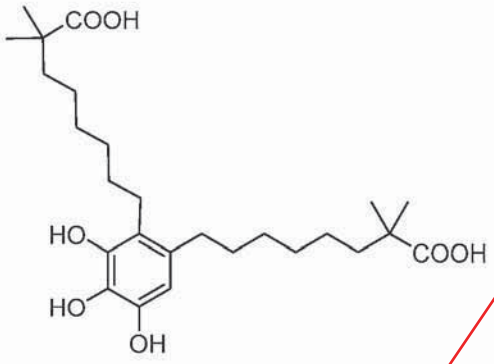

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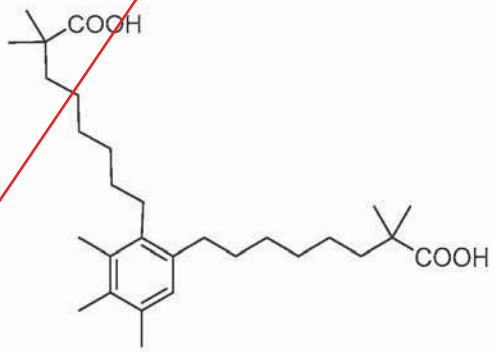

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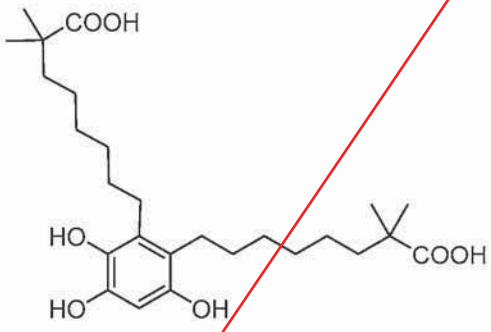

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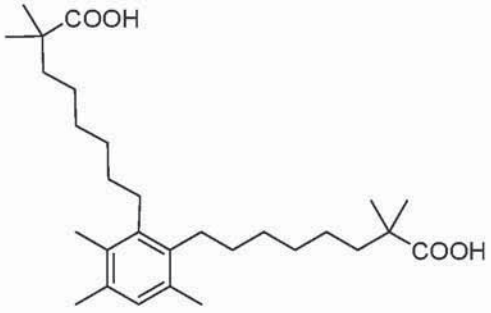

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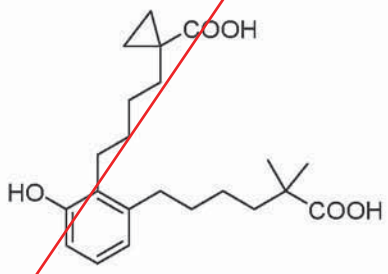

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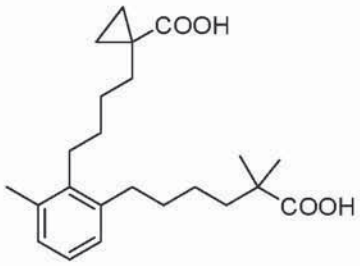

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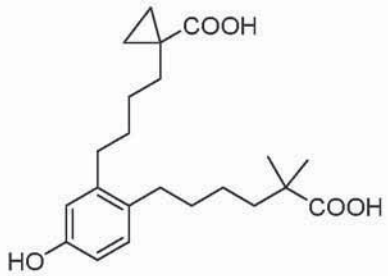

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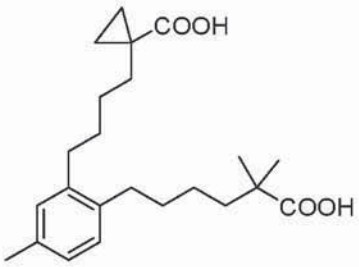

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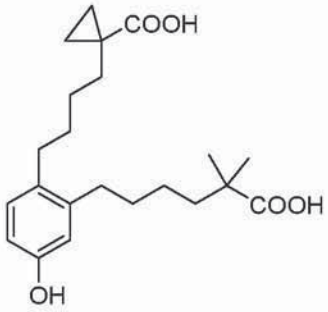

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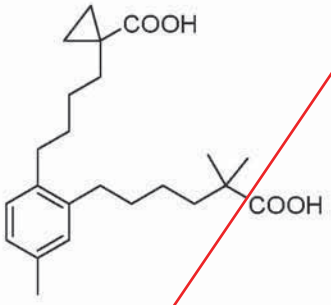

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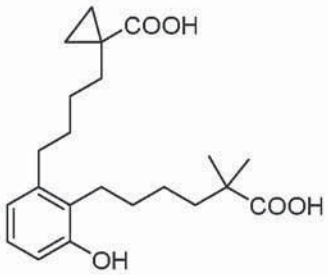

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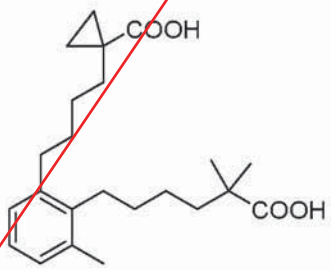

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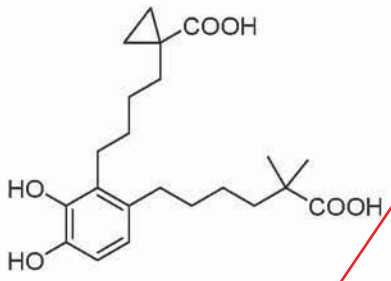

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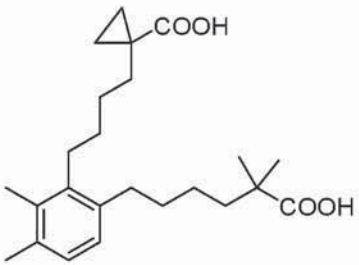

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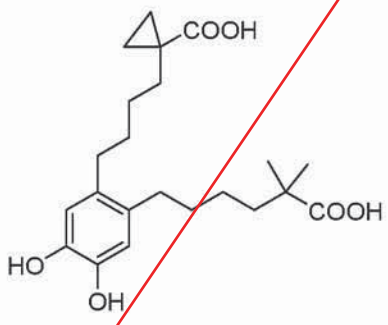

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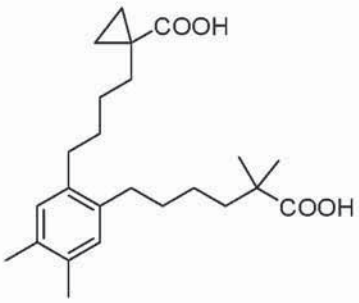

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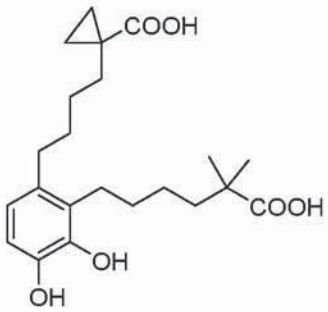

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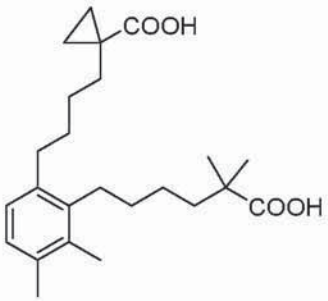

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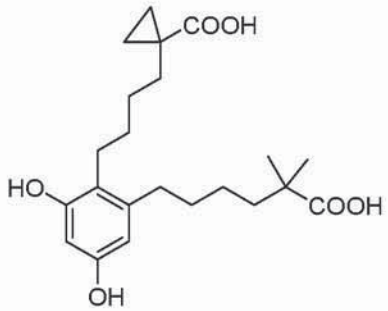

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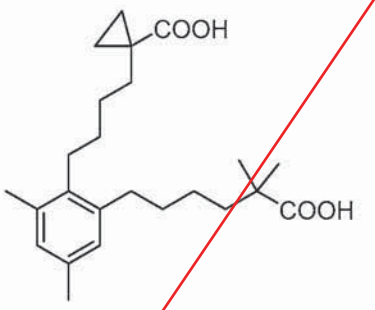

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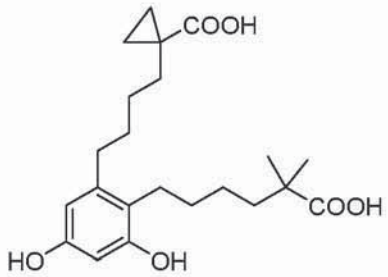

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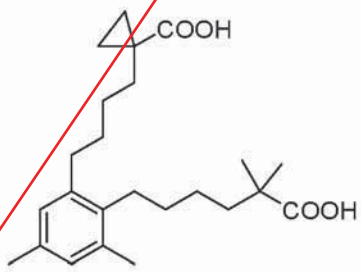

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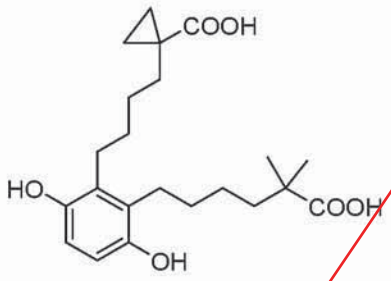

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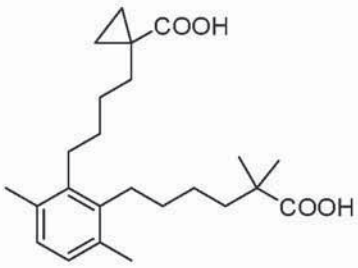

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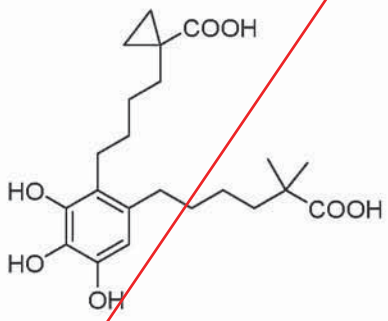

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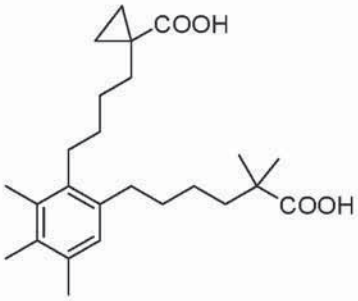

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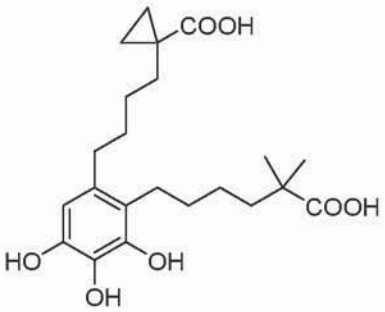

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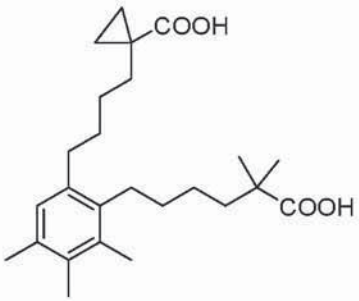

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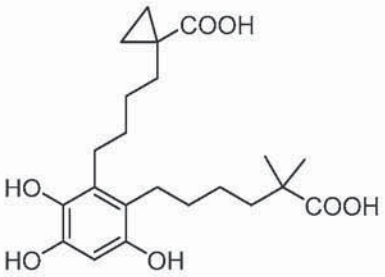

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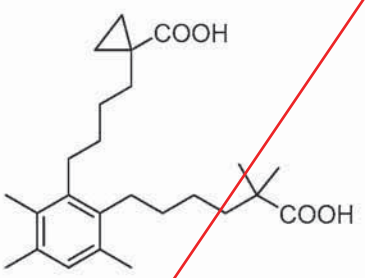

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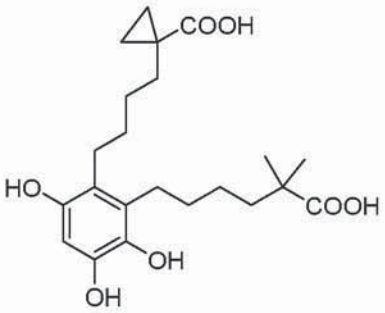

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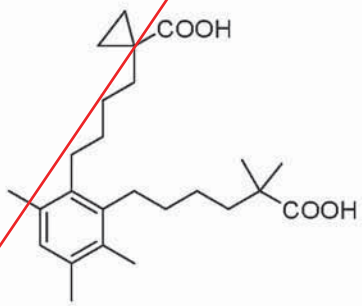

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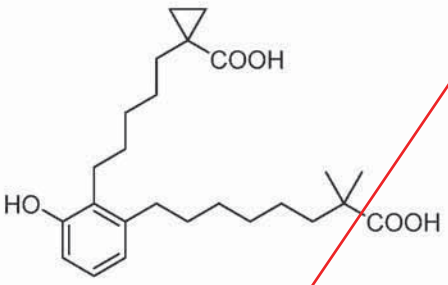

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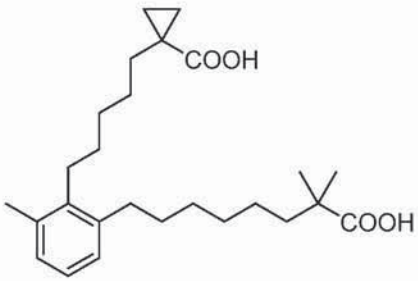

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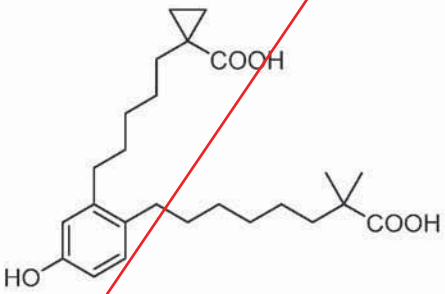

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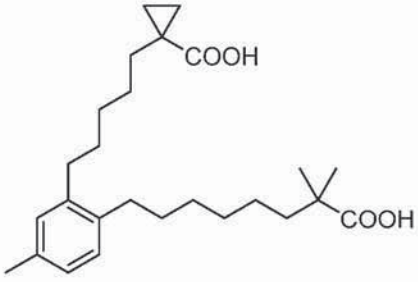

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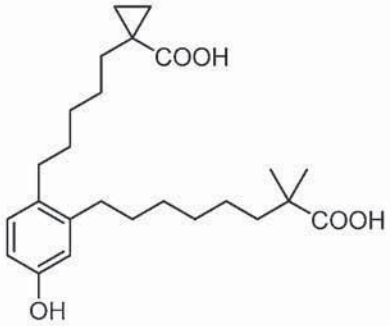

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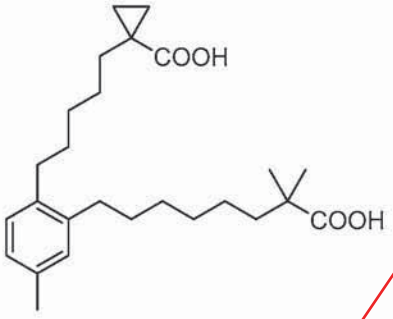

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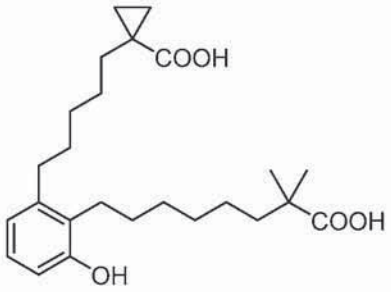

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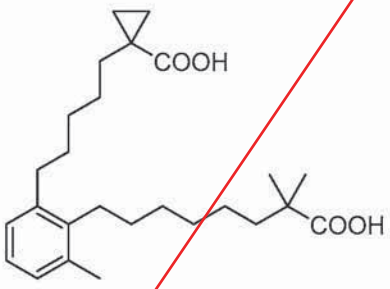

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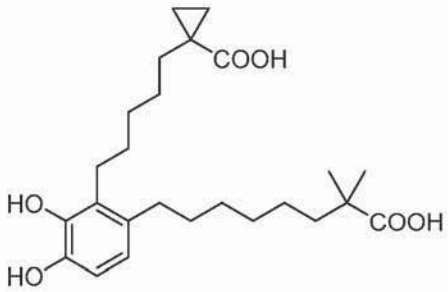

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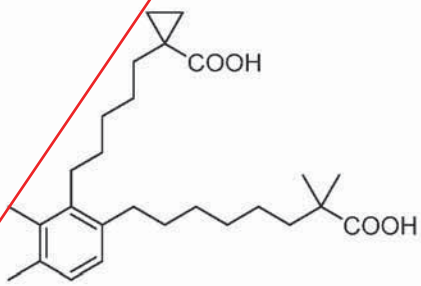

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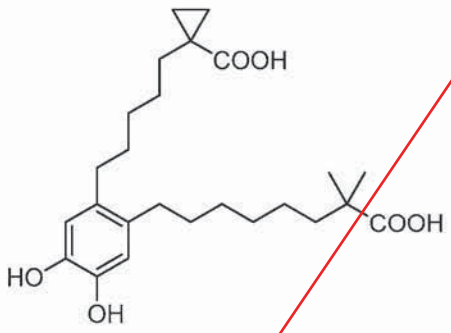

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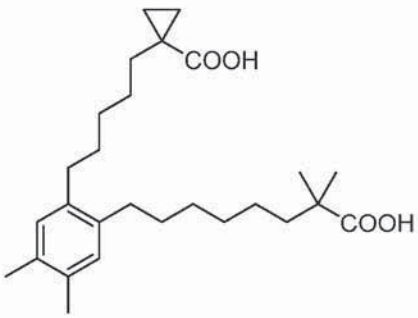

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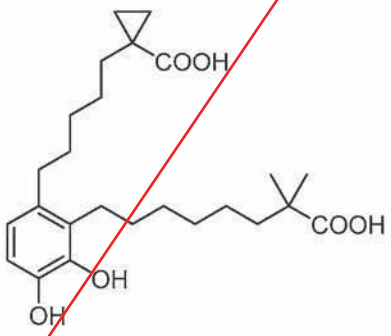

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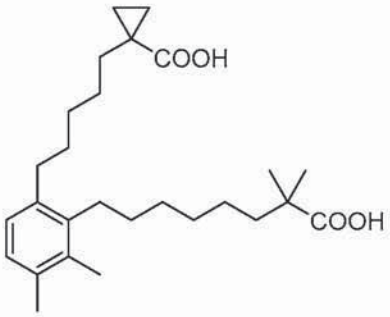

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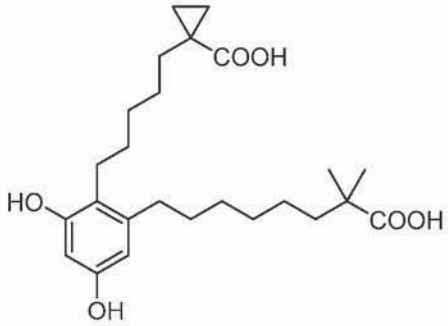

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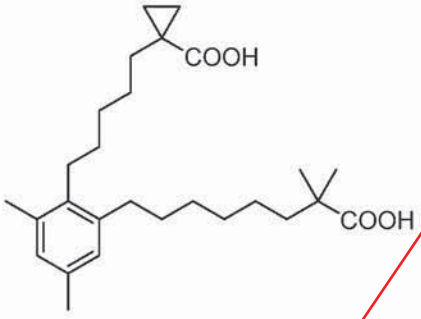

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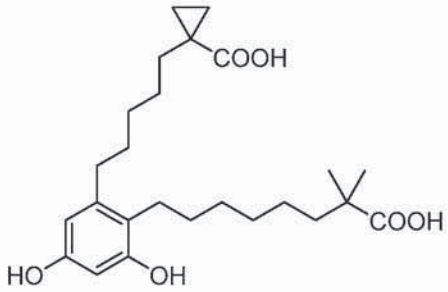

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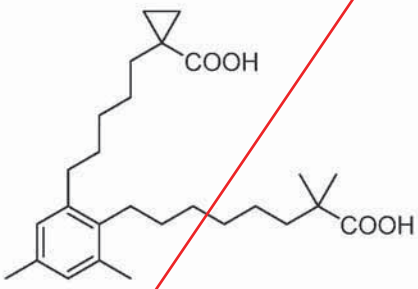

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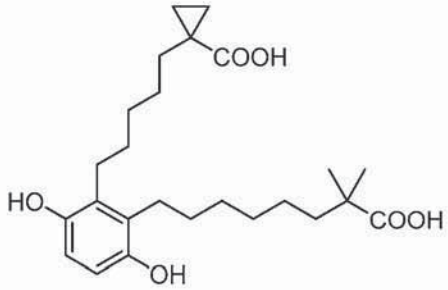

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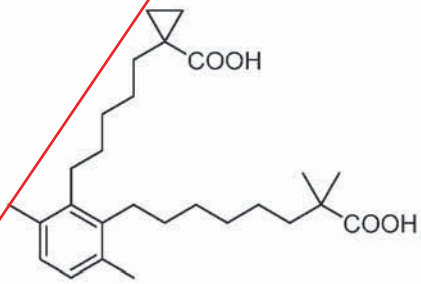

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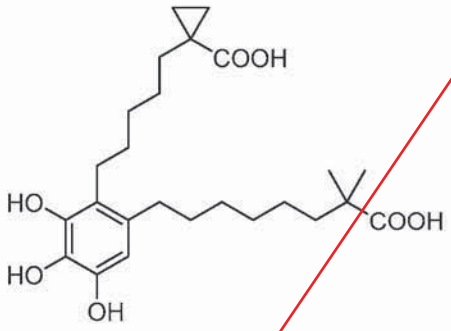

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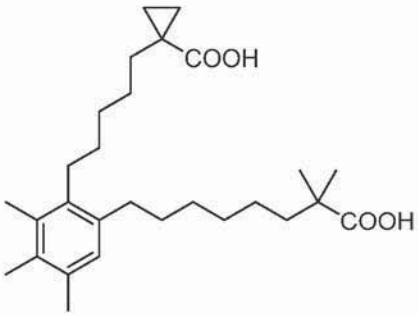

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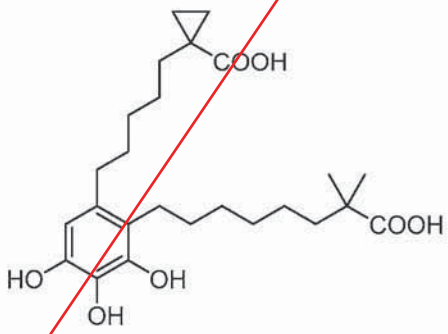

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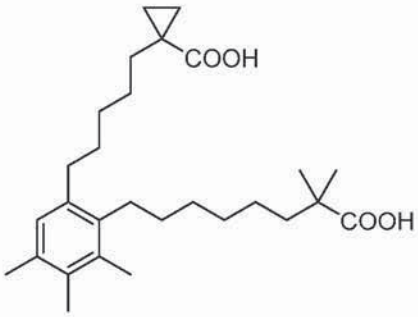

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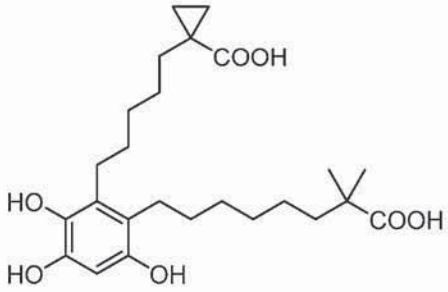

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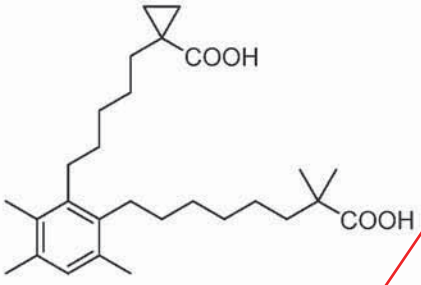

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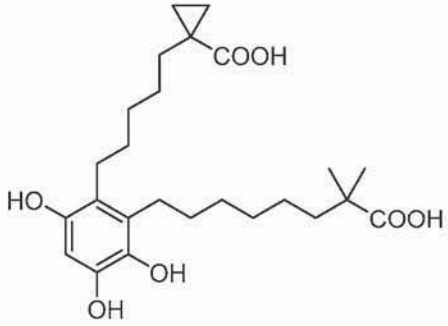

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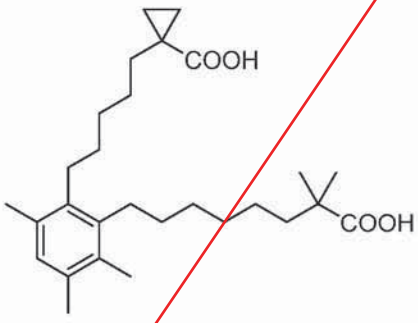

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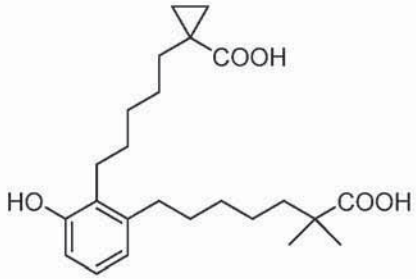

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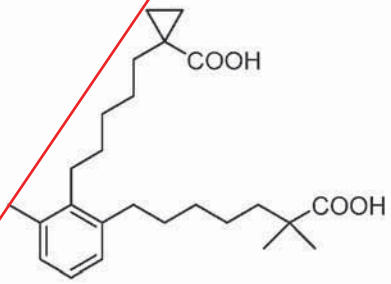

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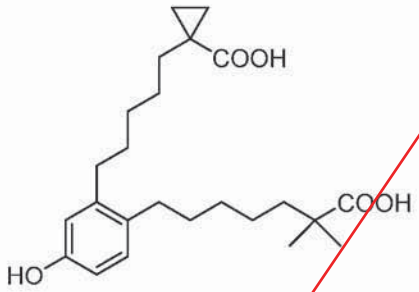

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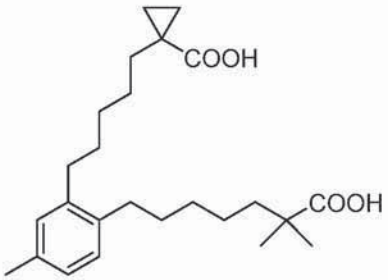

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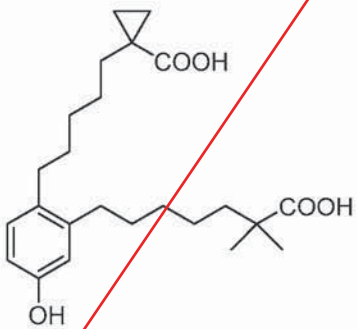

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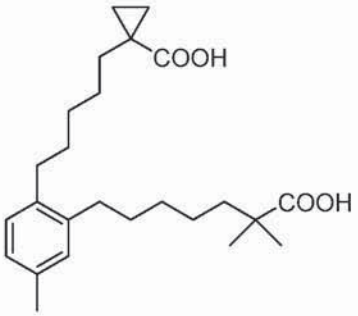

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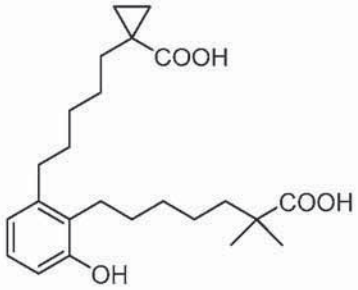

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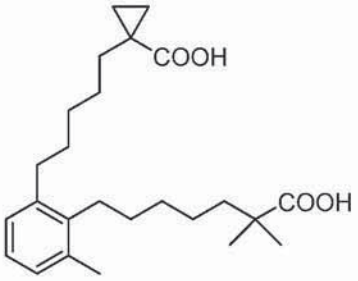

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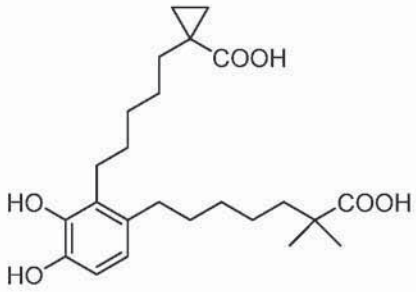

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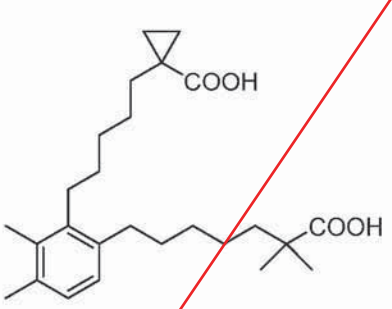

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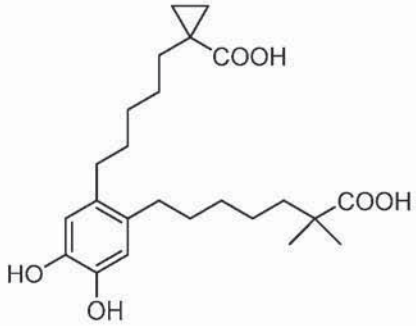

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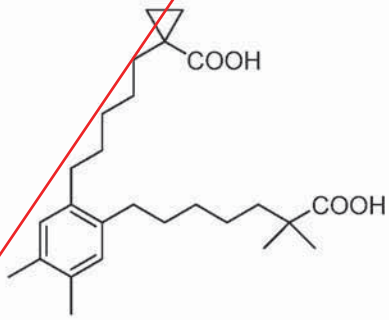

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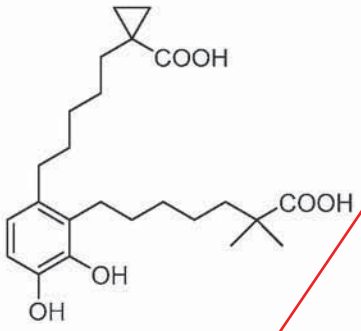

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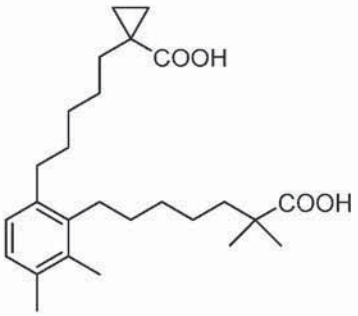

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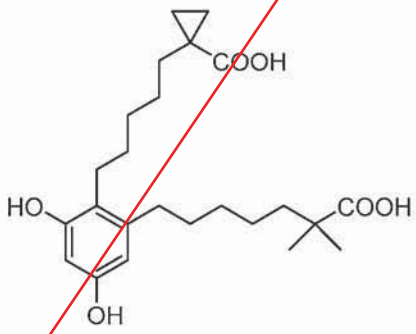

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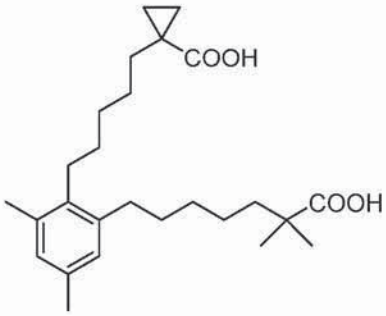

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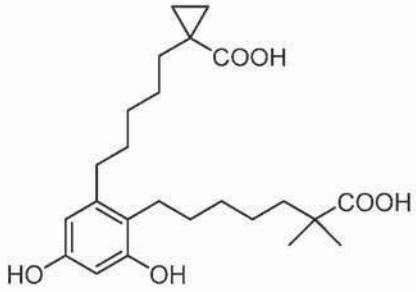

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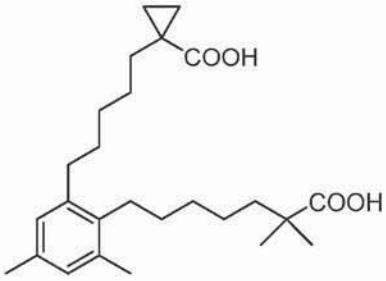

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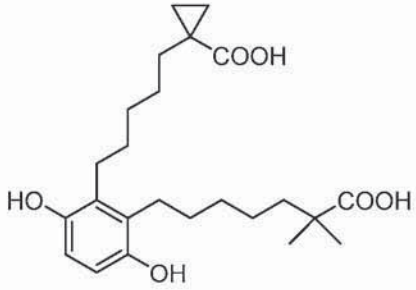

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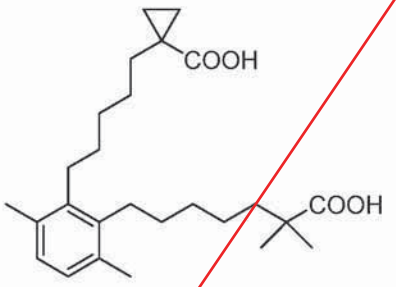

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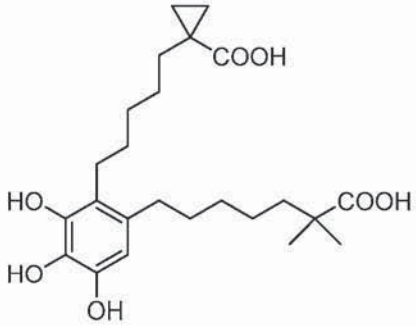

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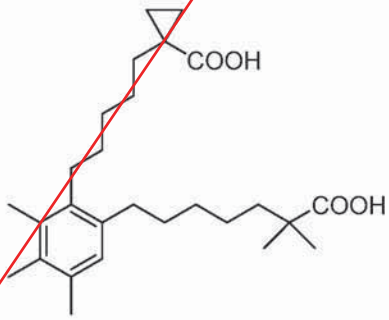

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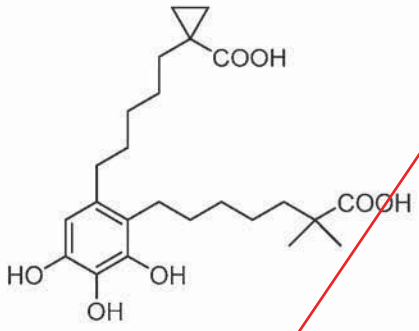

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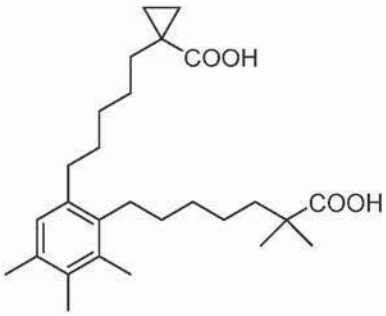

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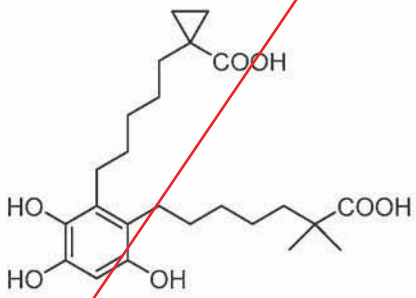

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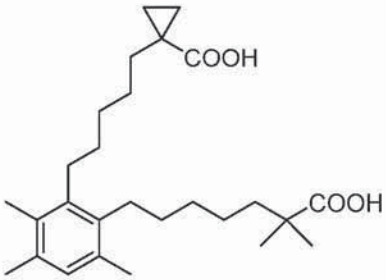

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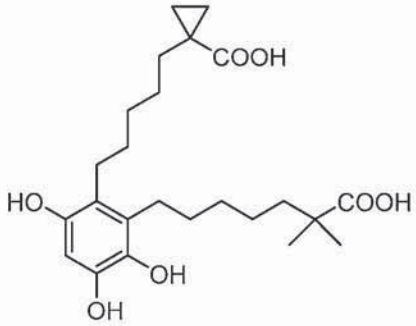

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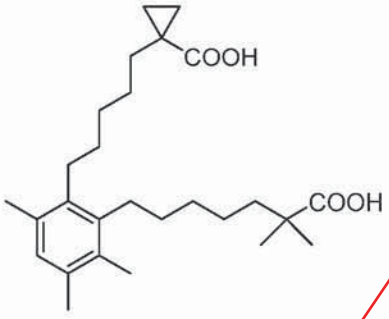

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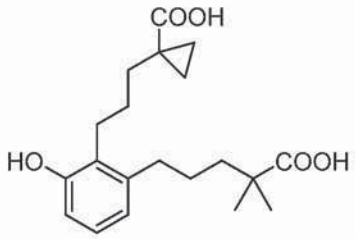

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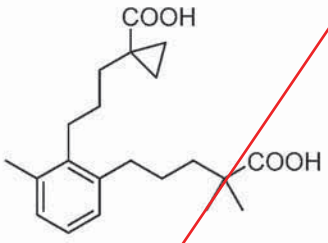

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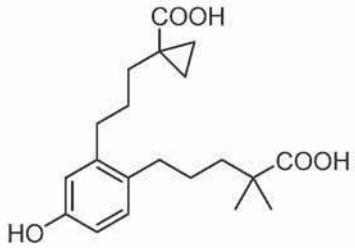

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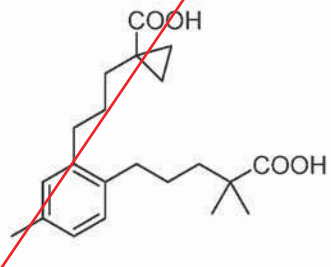

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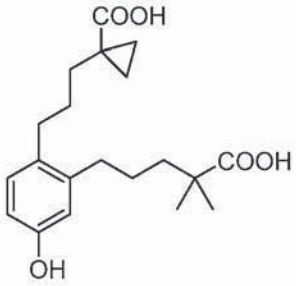

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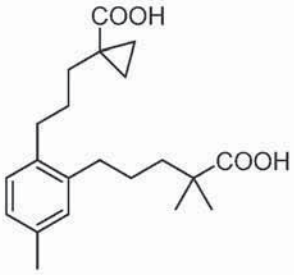

COOH
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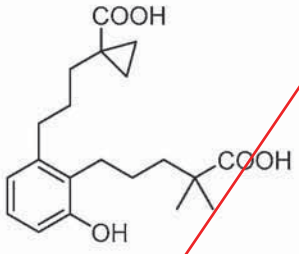

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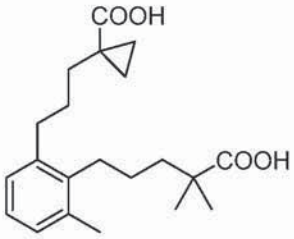

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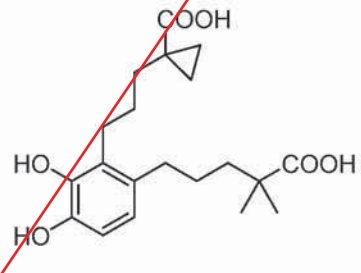

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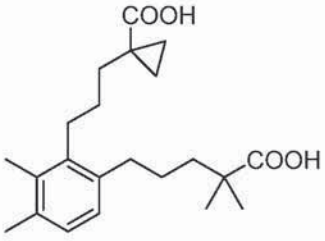

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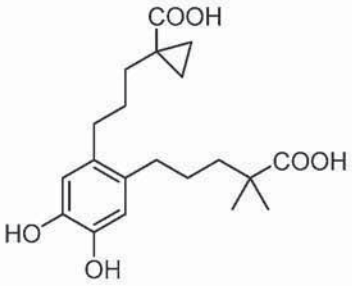
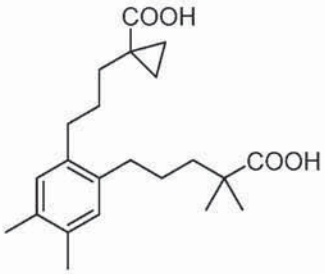
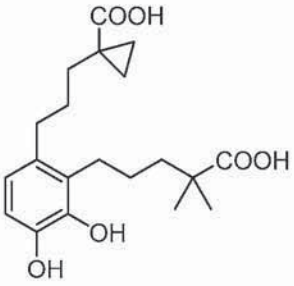
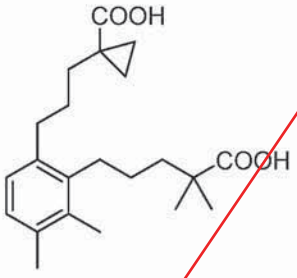
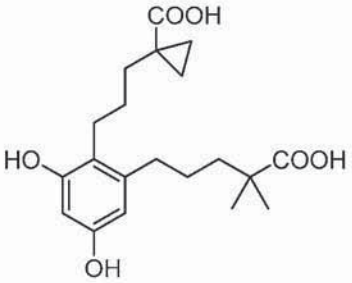
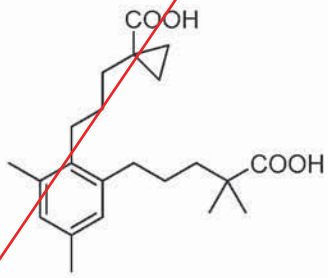
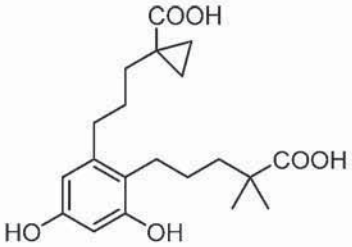
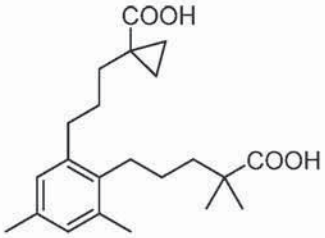
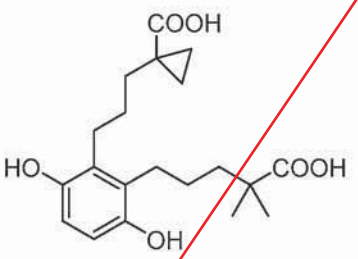
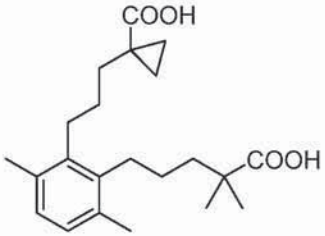
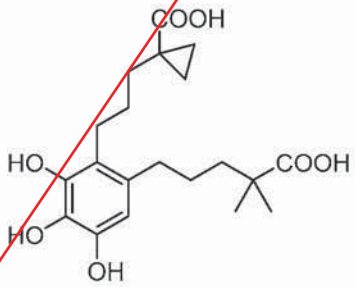
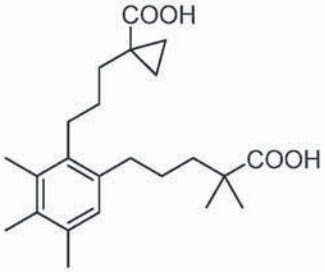

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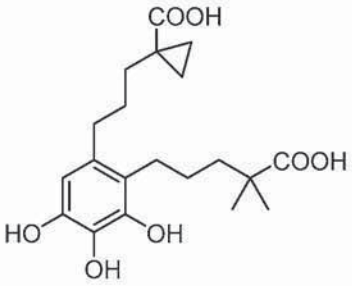

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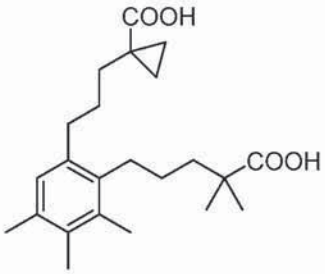

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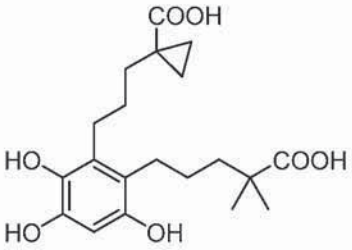

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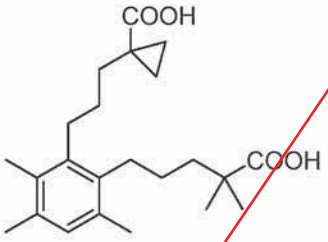

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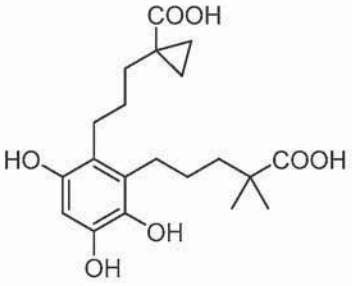













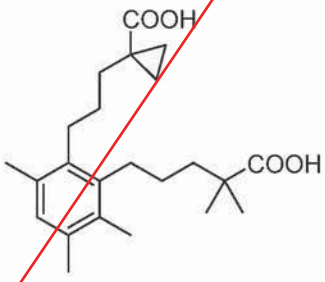

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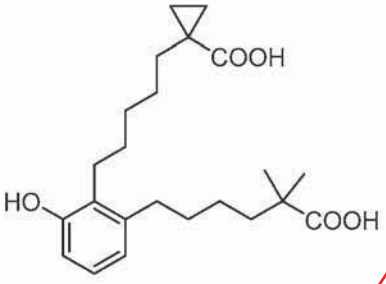

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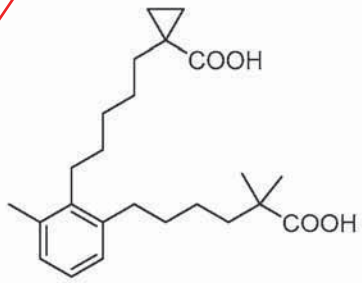

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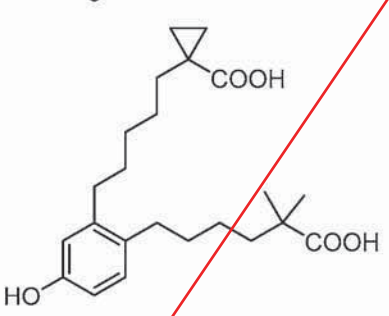

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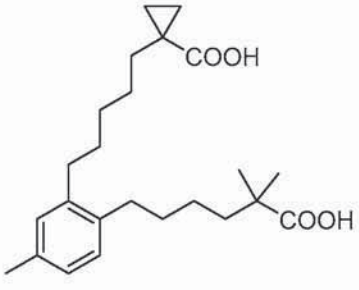

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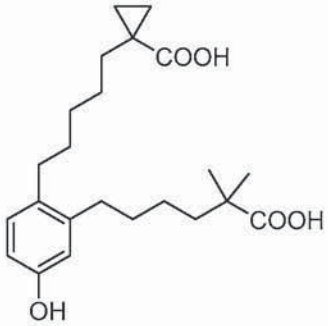

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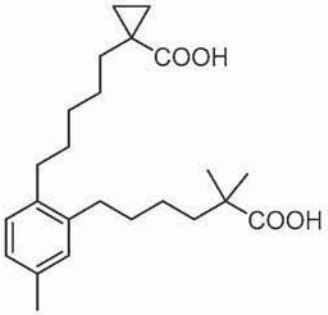

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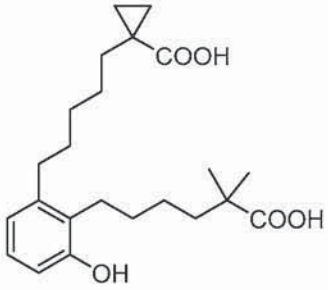

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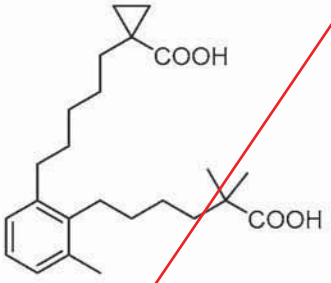

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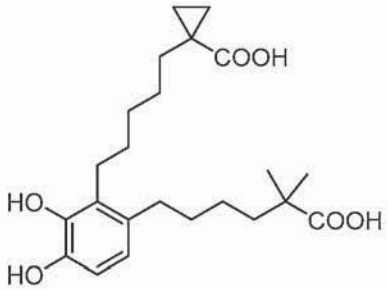

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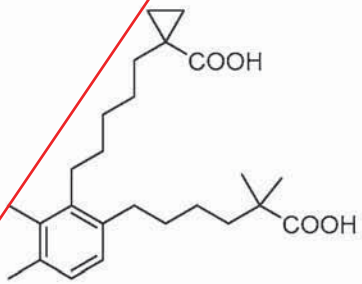

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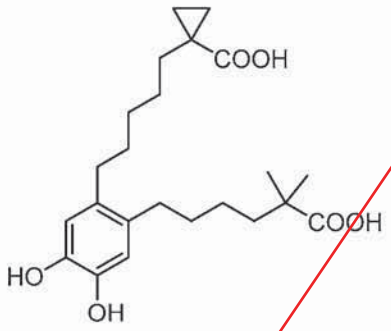

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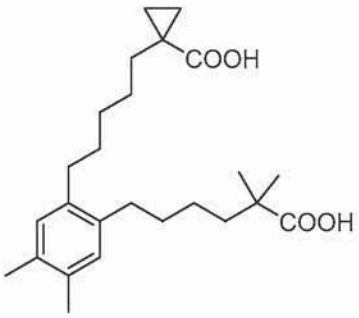

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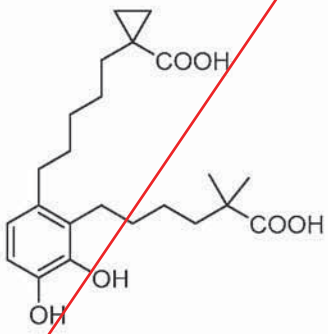

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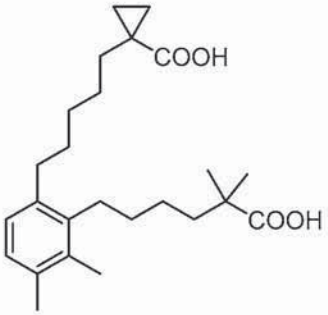

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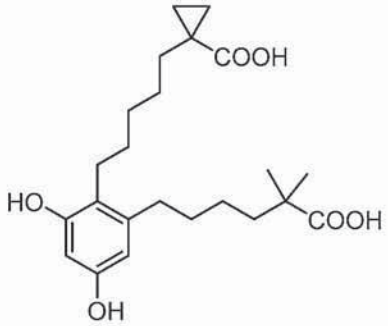

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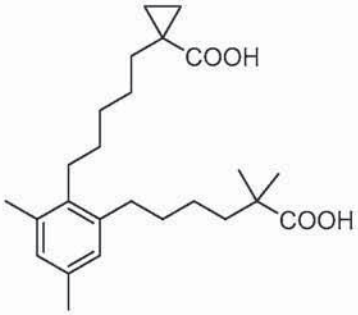

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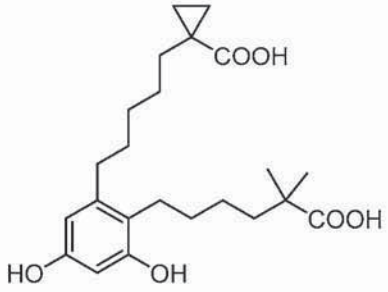

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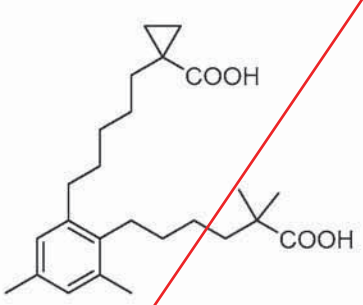

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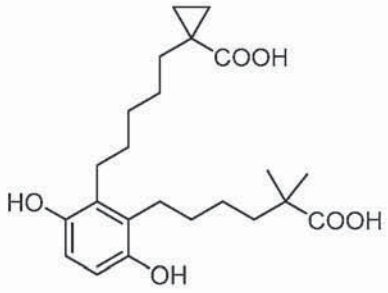

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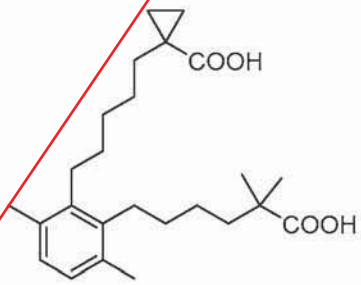

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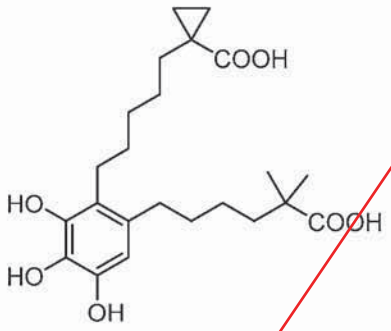

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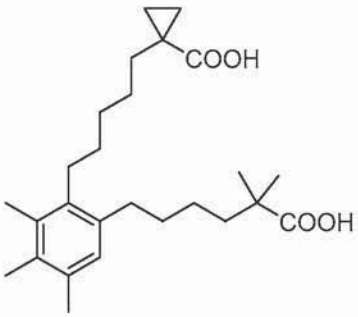

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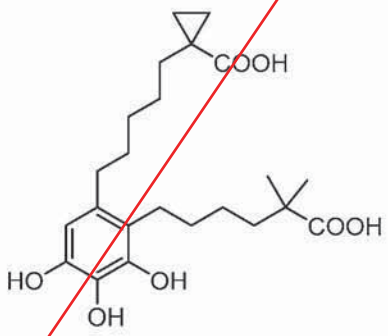

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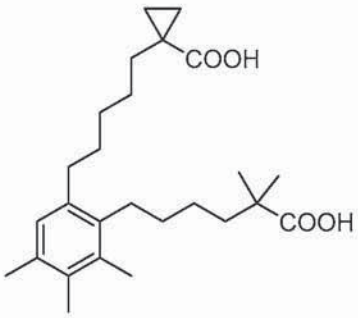

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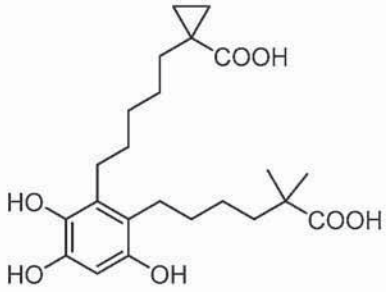

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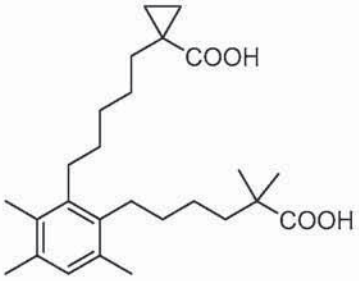

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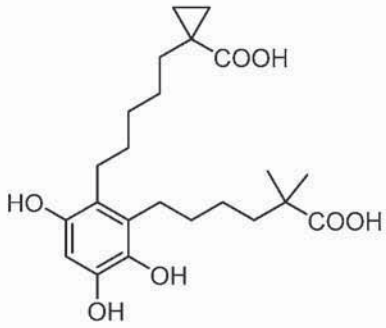

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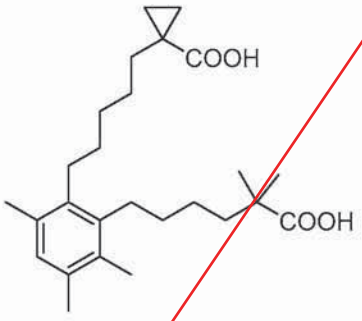

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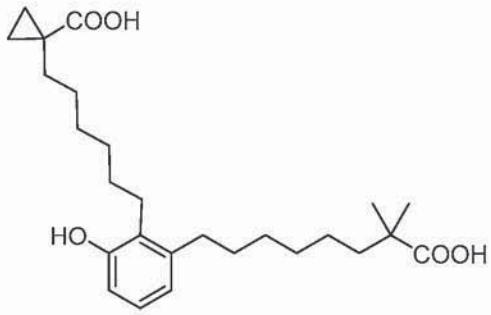

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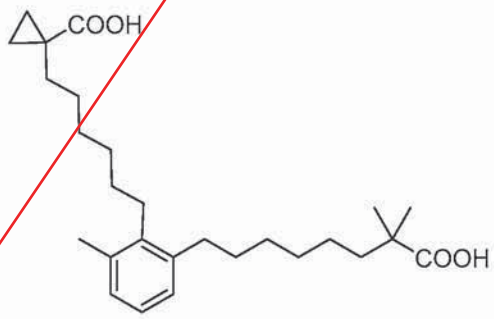

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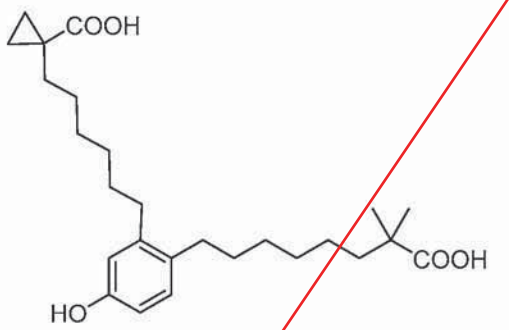

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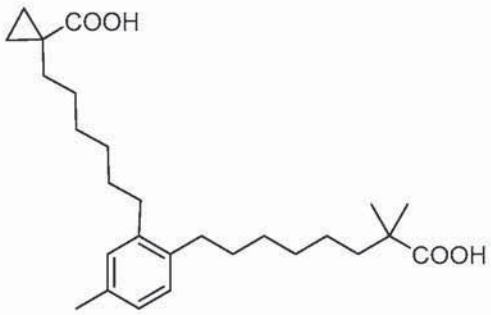

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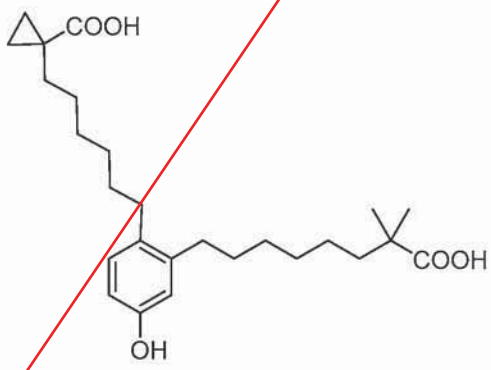

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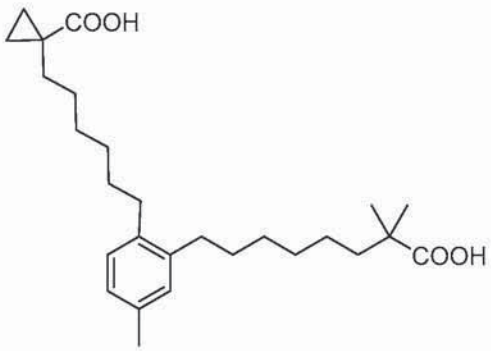

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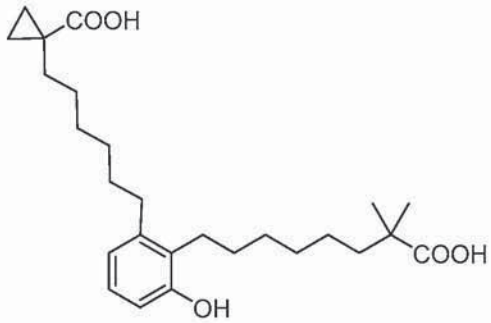

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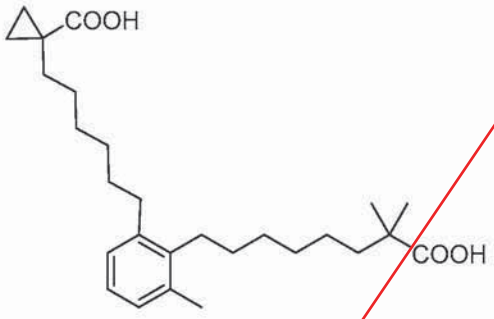

COOH
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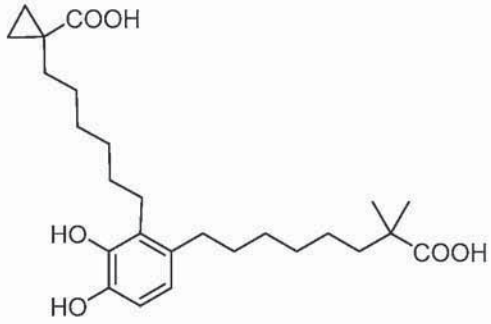

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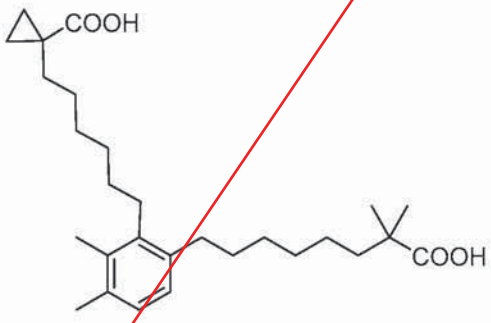

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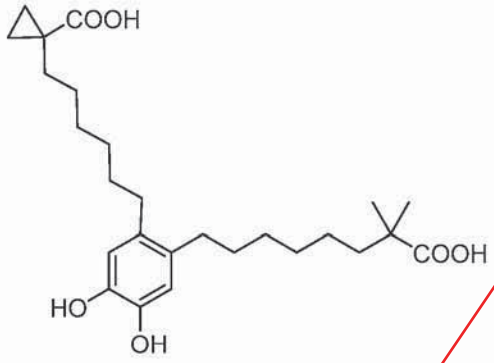

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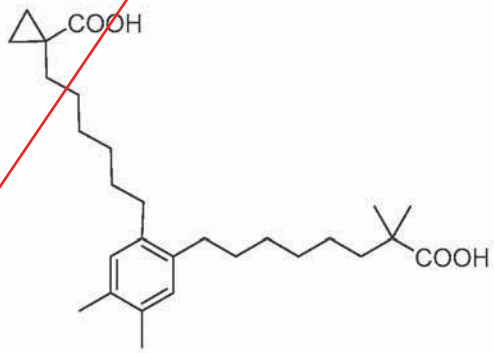

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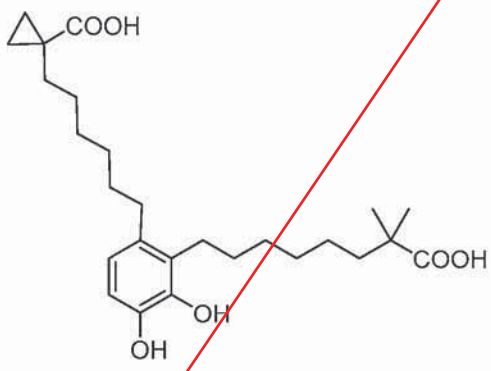

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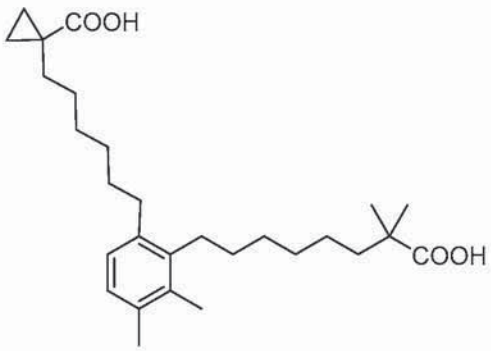

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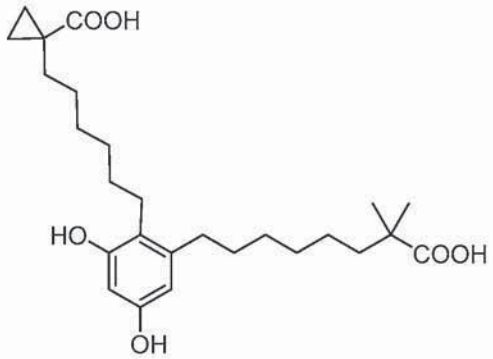

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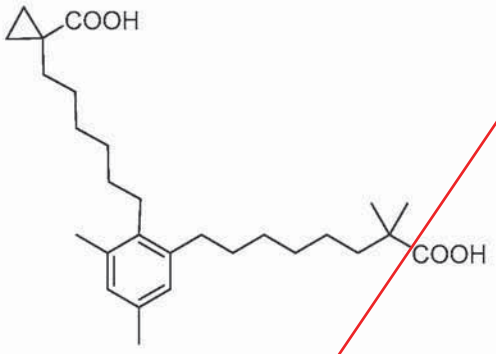

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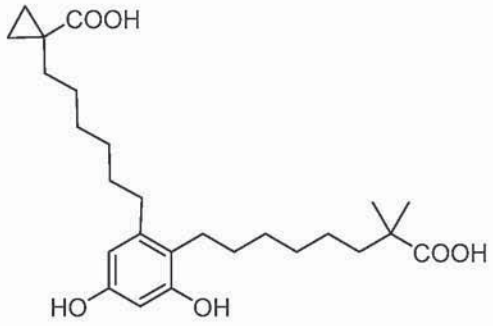

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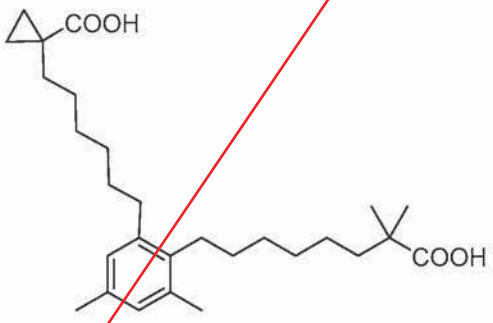

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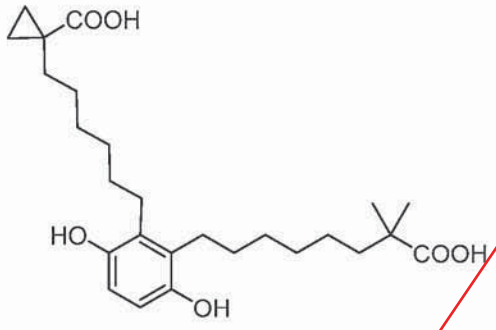

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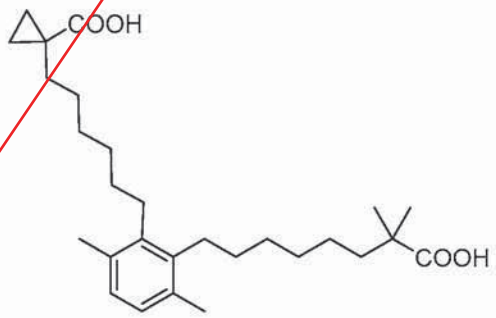

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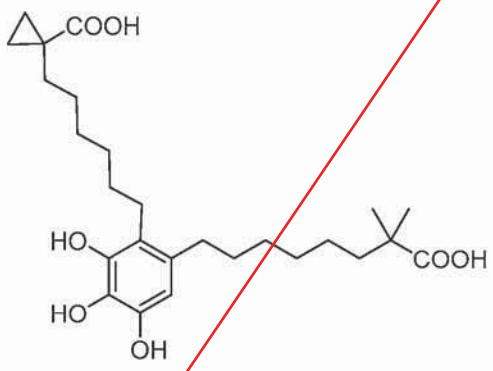

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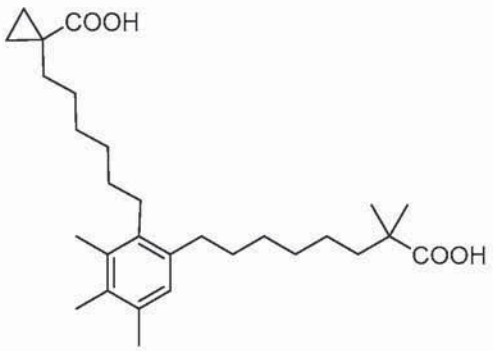

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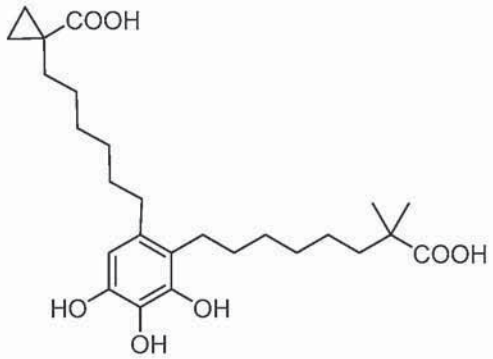

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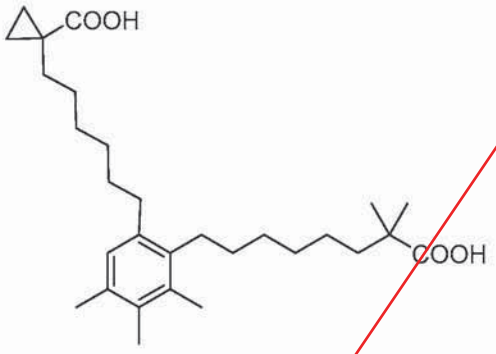

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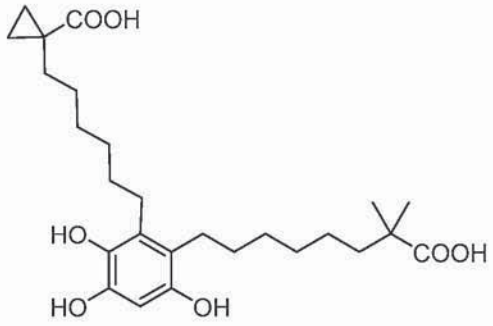

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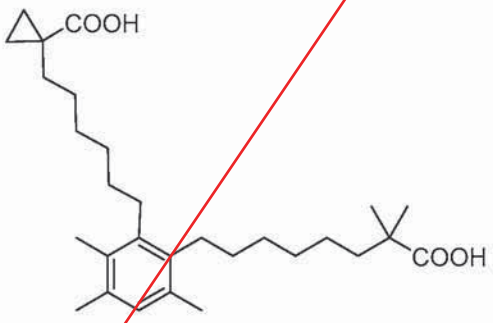

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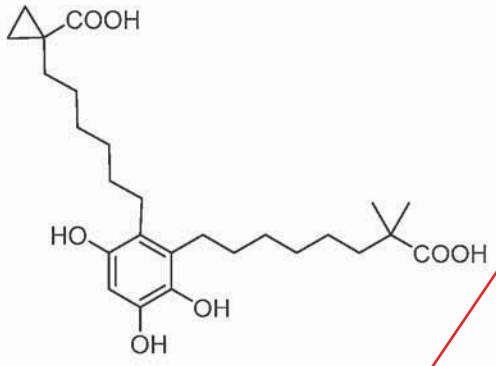

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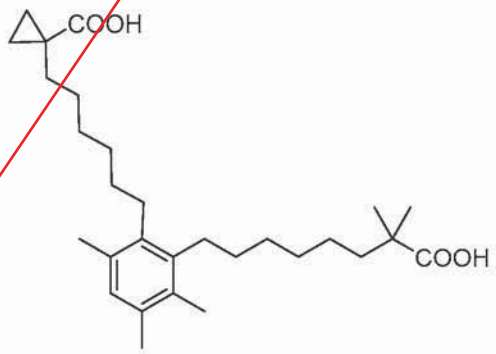

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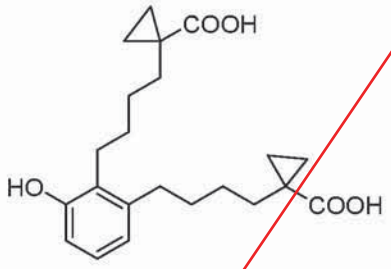

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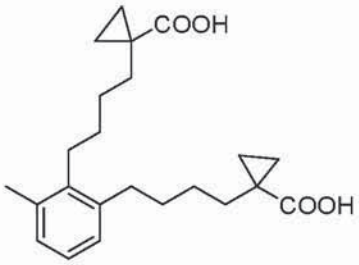

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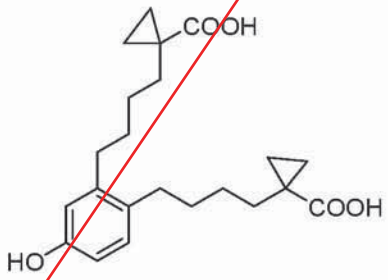

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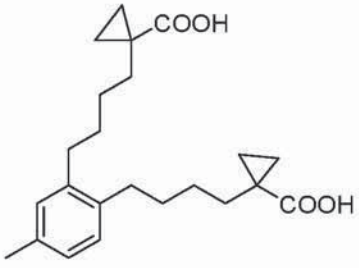

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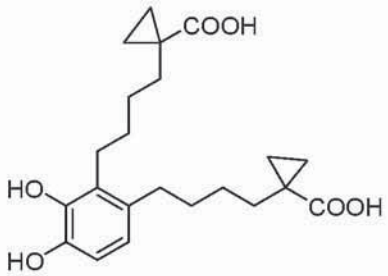

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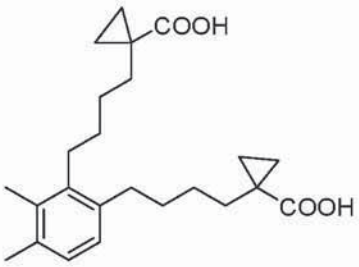

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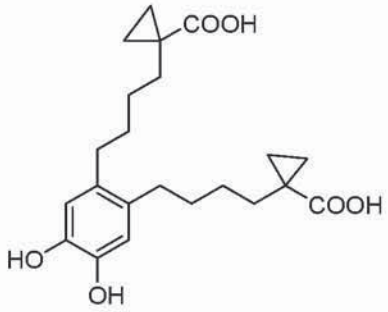

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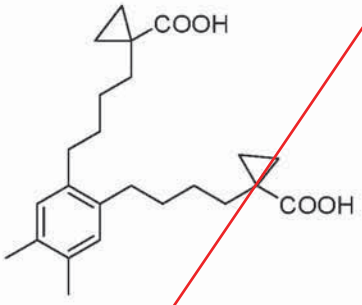

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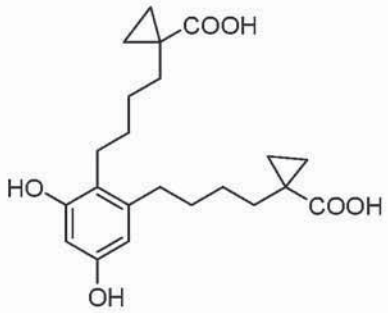

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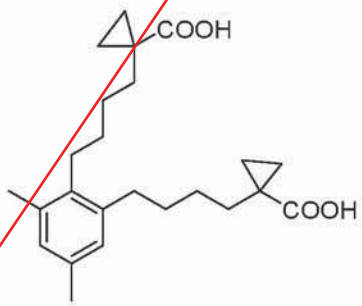

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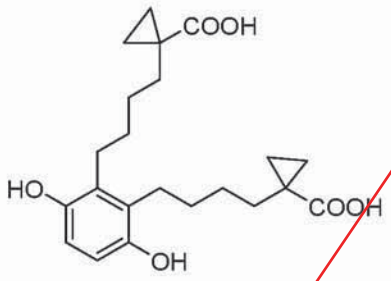

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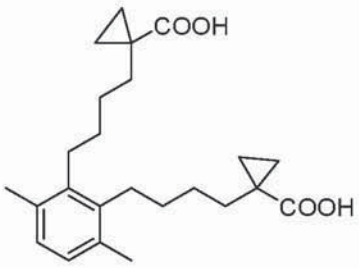

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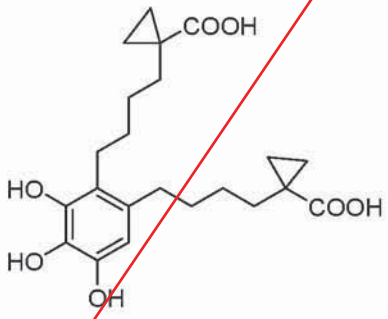

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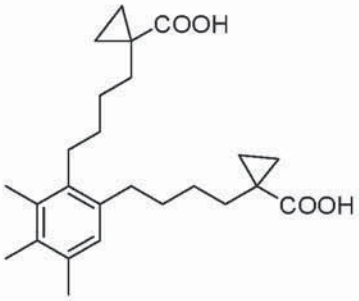

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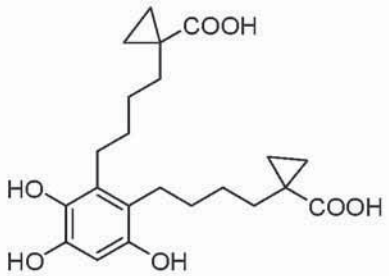

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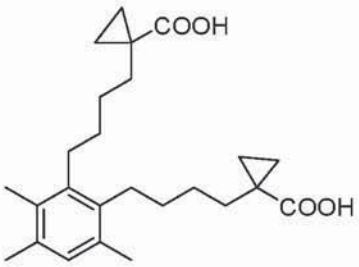

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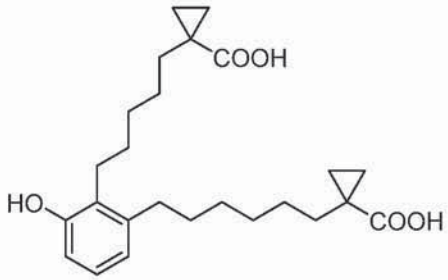

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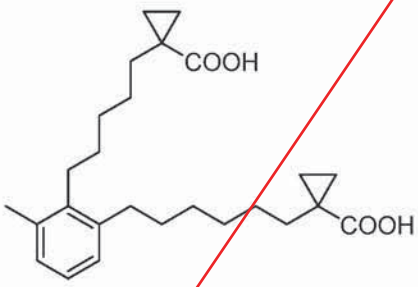

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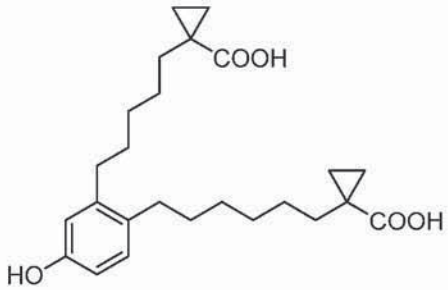

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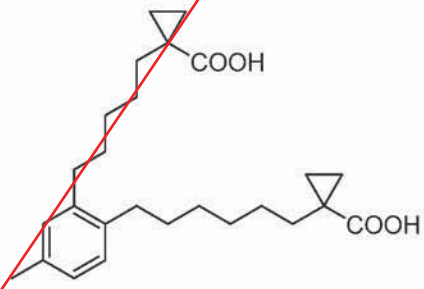

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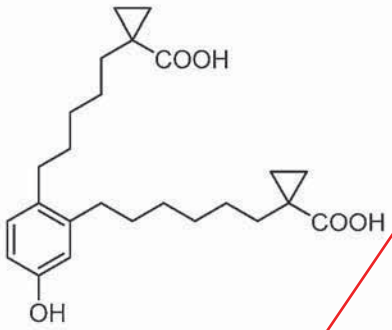

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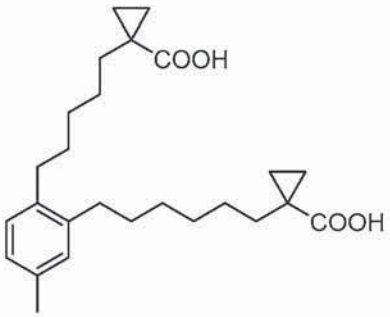

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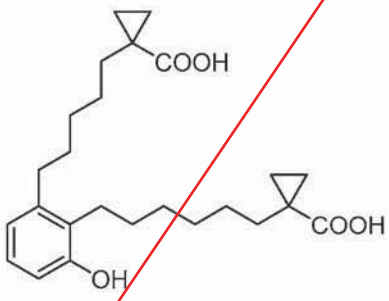

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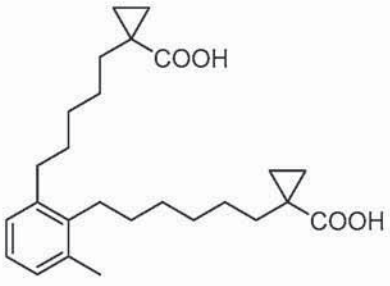

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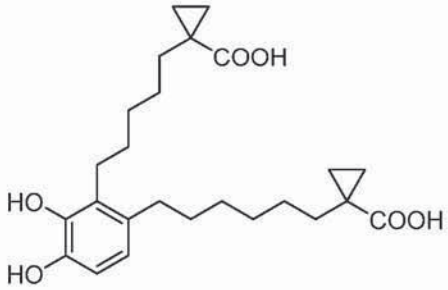

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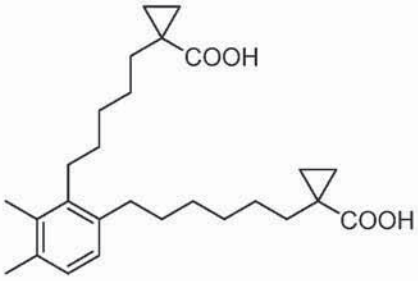

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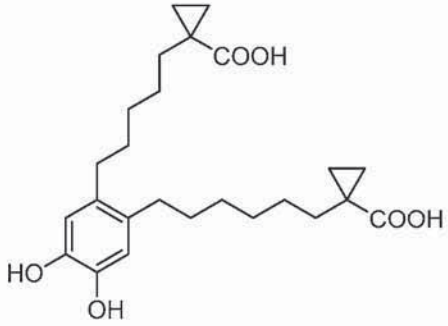

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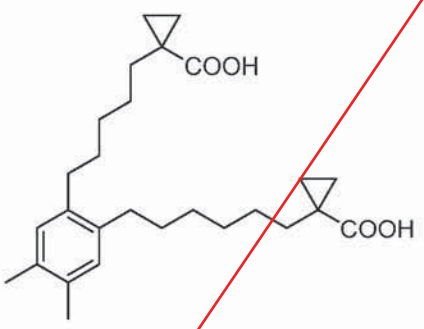

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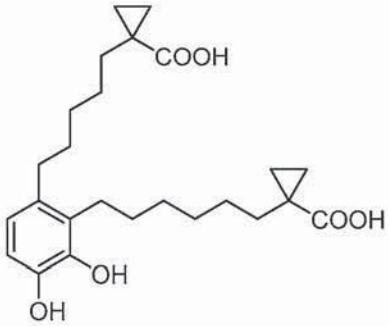

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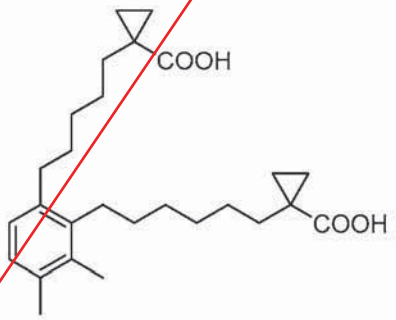

COOH
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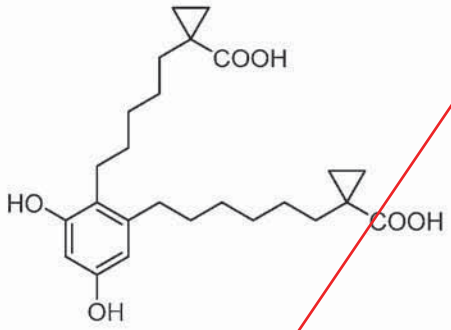

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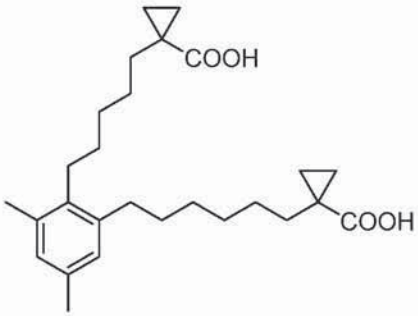

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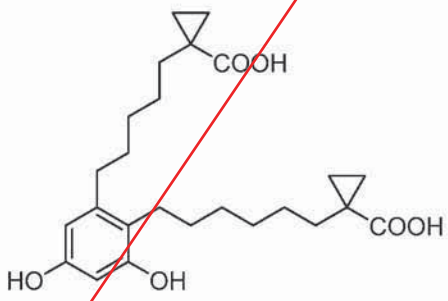

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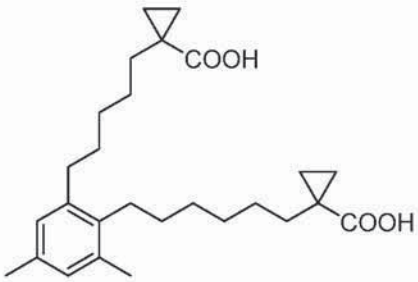

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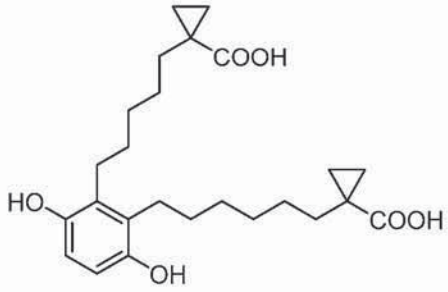

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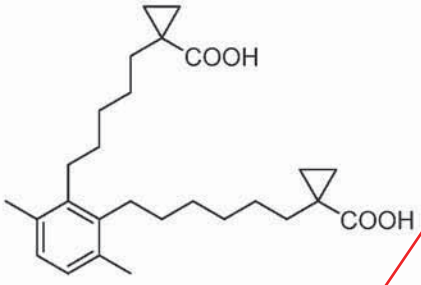

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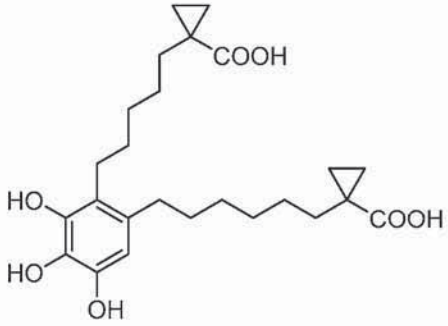

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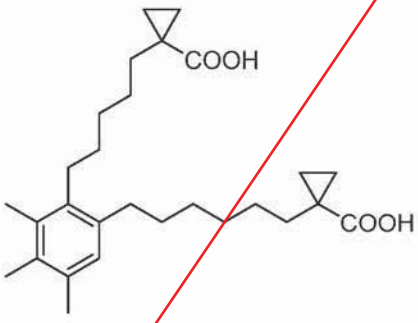

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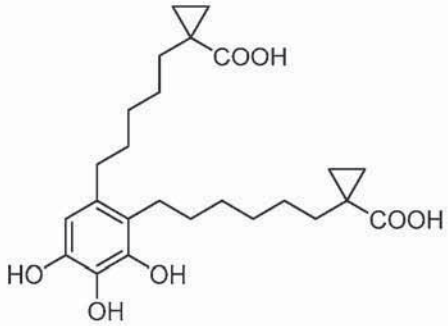

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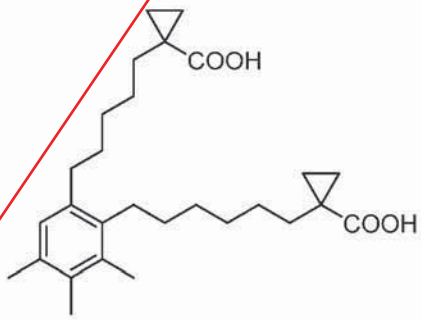

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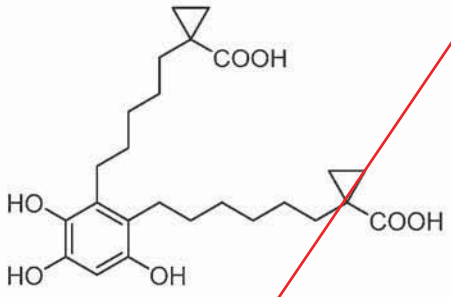

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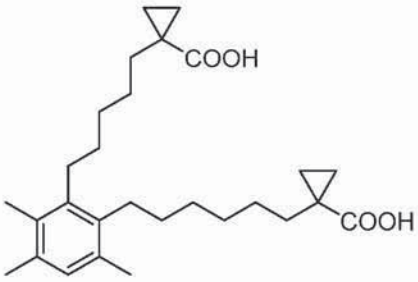

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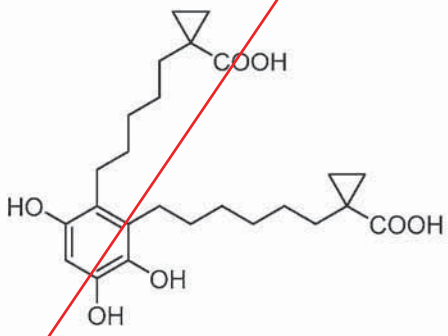

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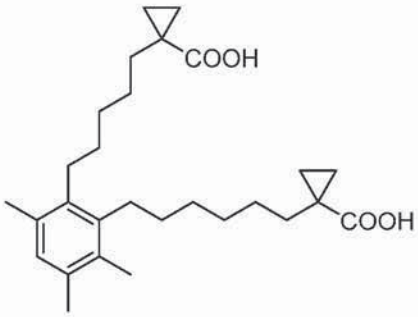

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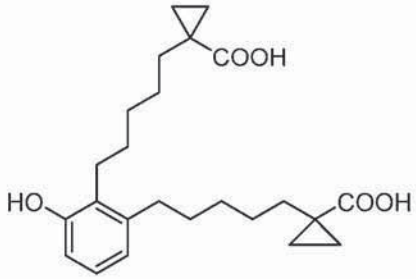

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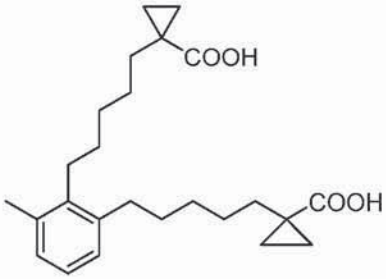

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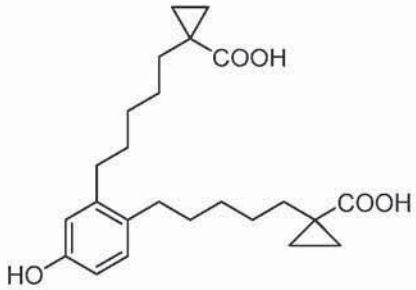

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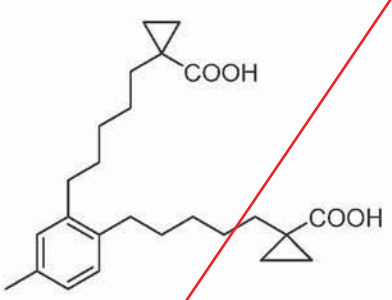

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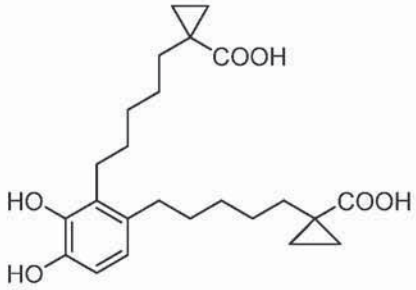

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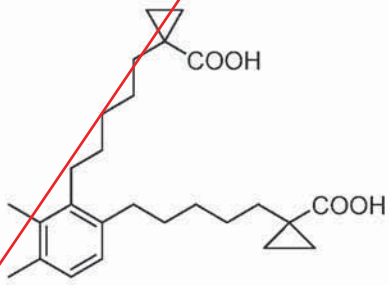

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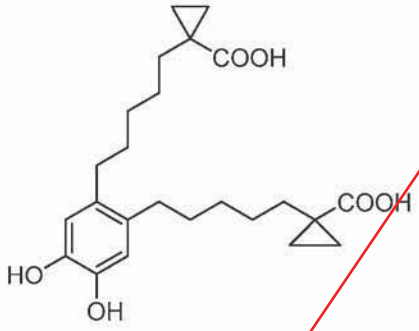

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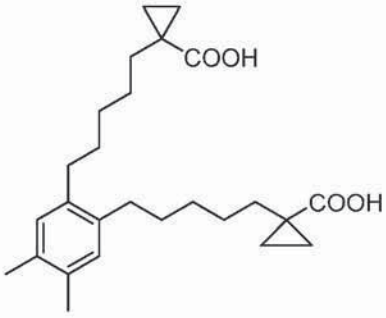

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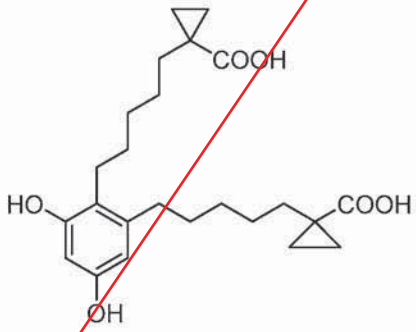

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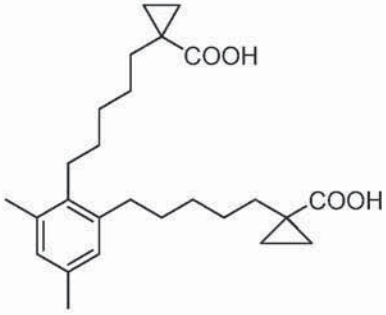

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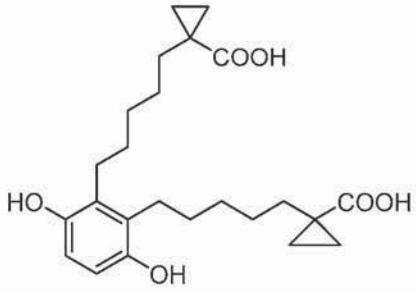

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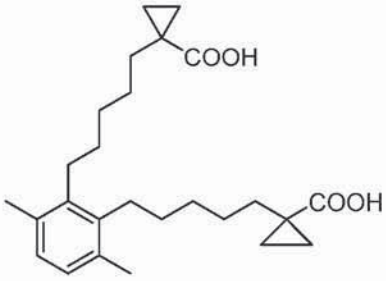

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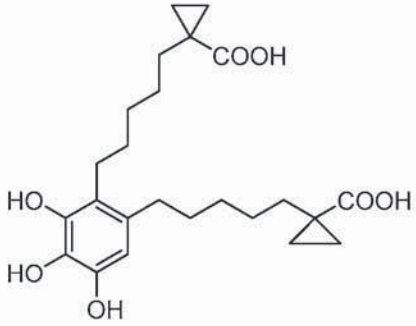

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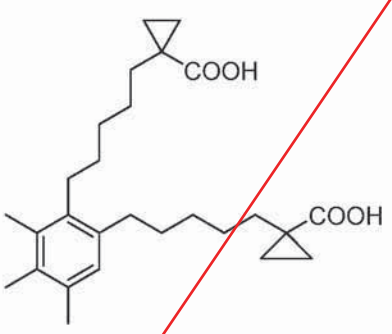

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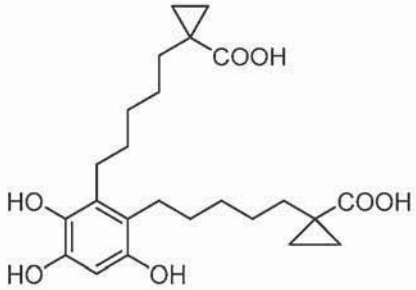

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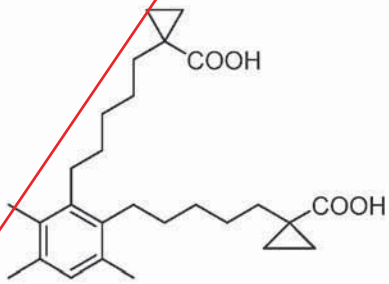

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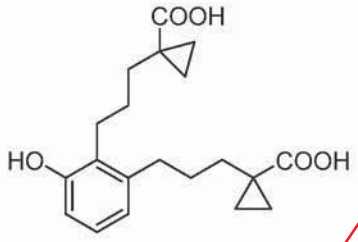

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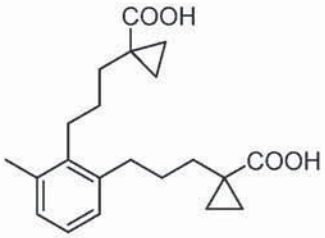

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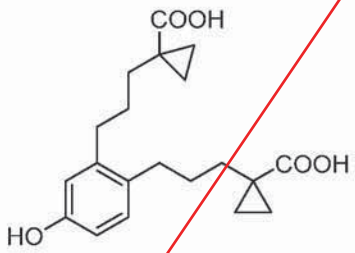

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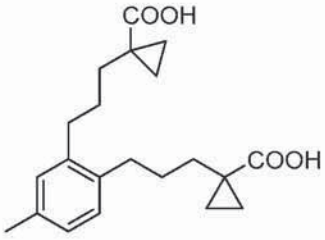

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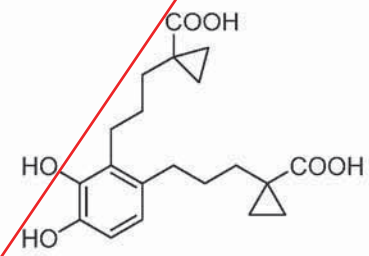

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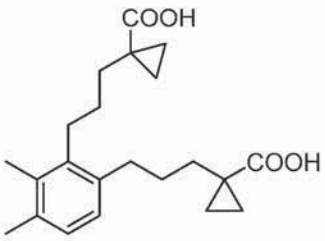

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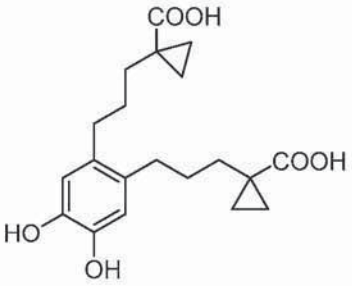
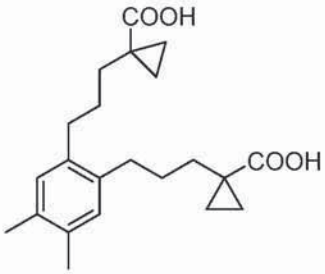
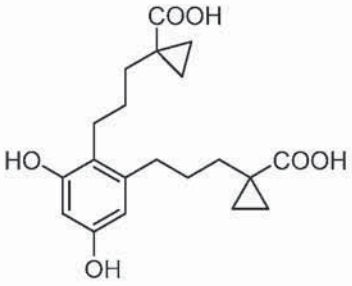
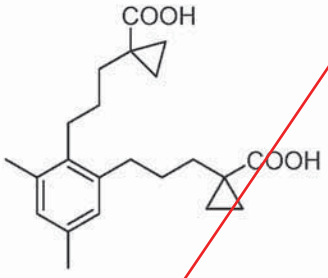
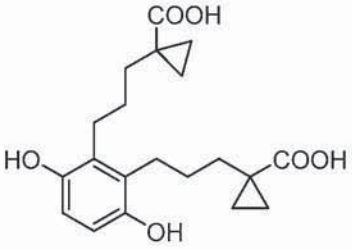
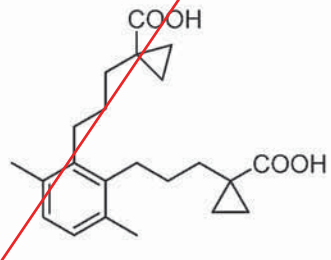
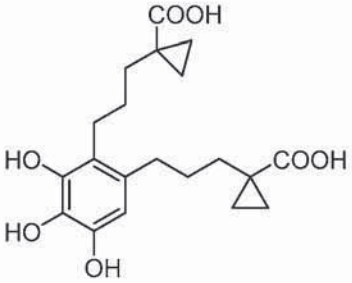
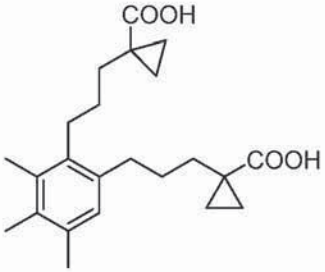
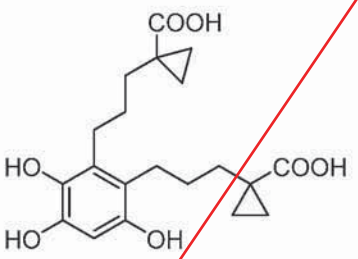
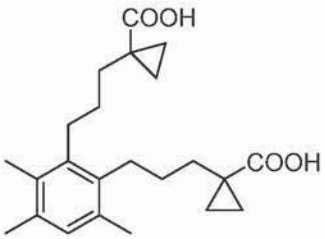
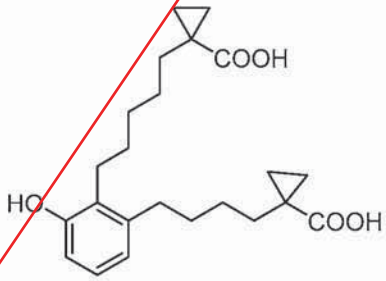
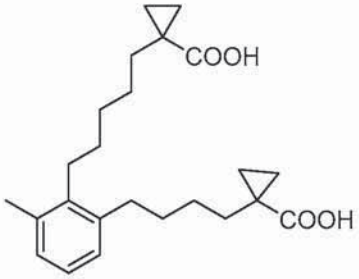

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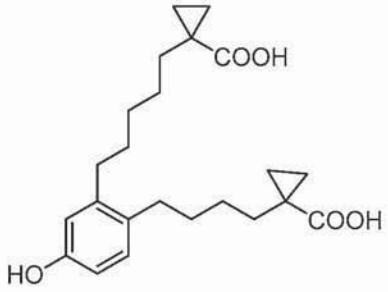

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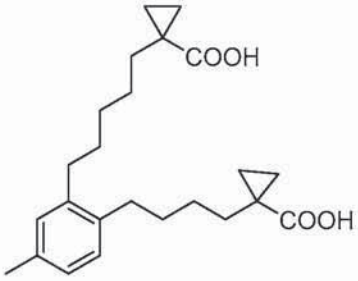

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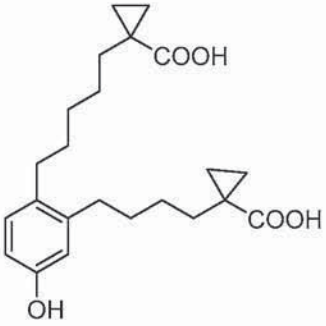

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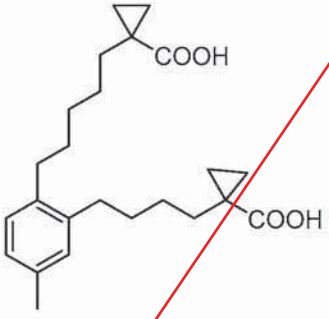

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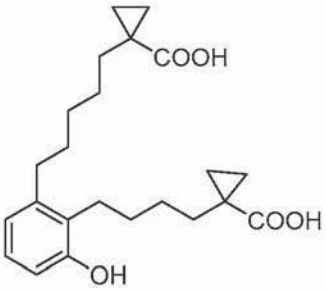













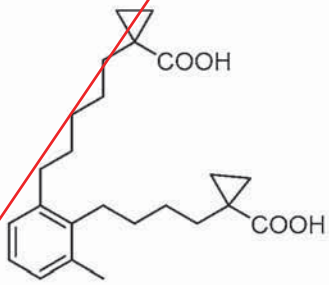

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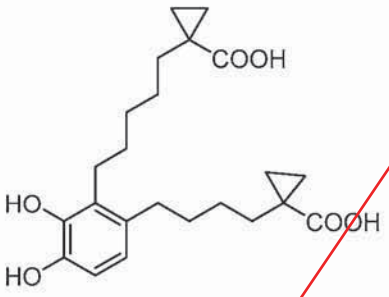

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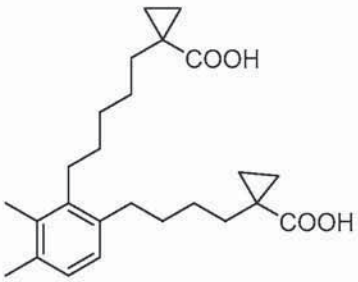

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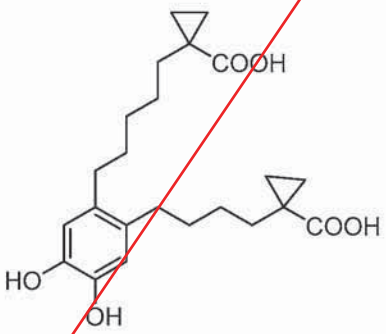

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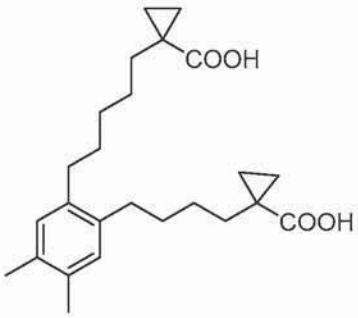

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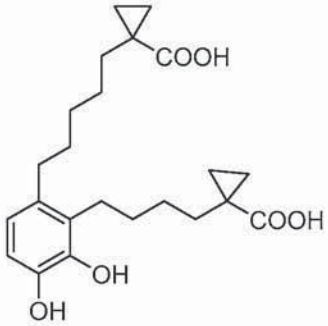

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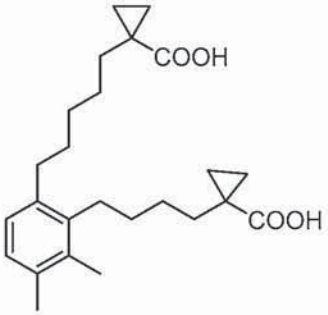

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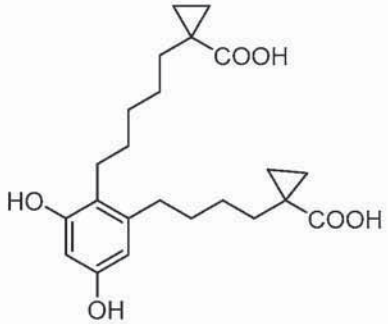

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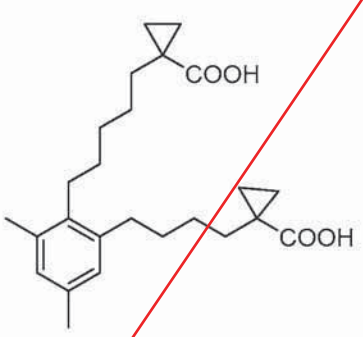

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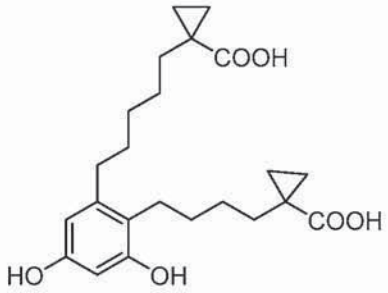

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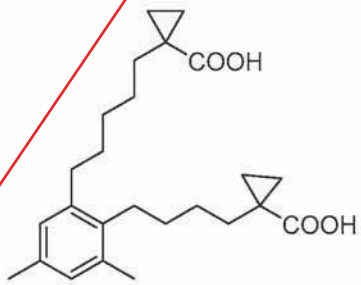

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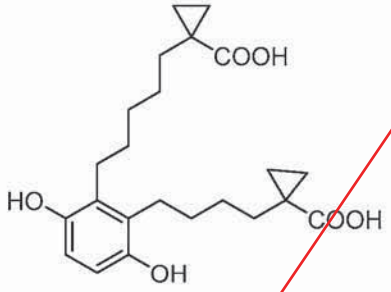

COOH
COOH

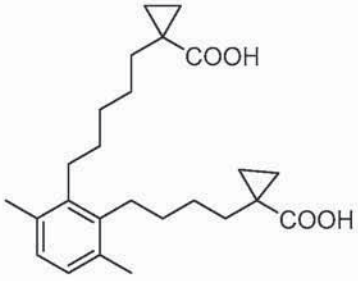

COOH
HO
COOH
OH

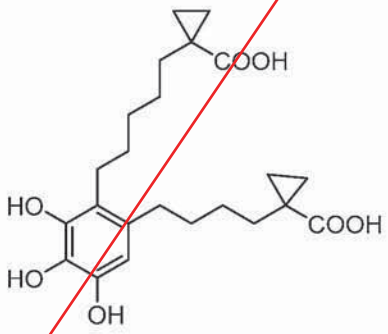

COOH
COOH

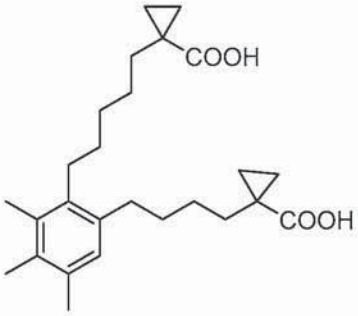

COOH
COOH
HO
OH

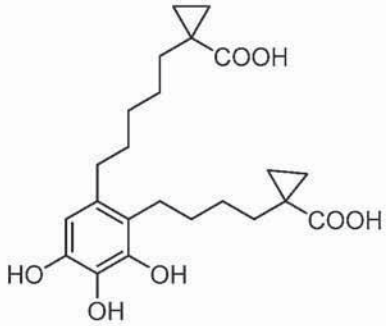

COOH
COOH

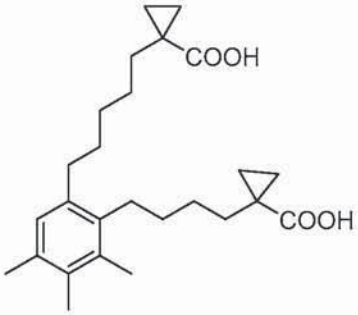

COOH
HO
COOH
OH

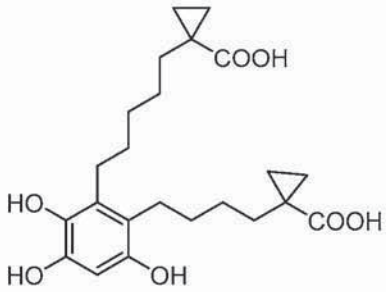

COOH
COOH

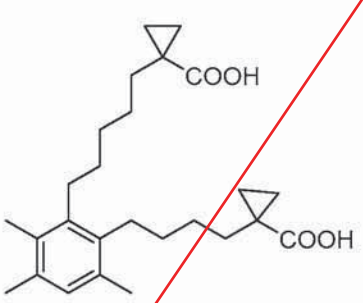

COOH
HO
COOH
HO
OH

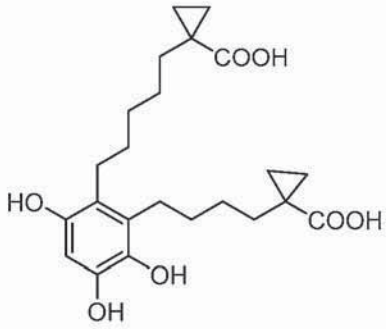

COOH
COOH

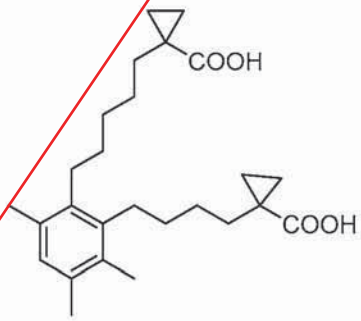

COOH
COOH
HO
OH
OH

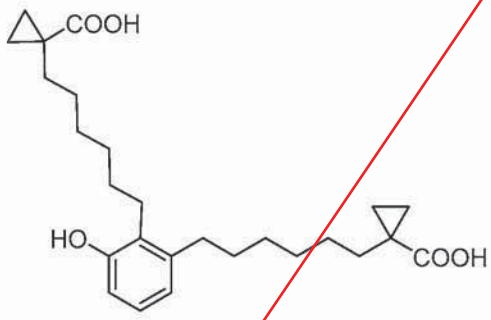

COOH
COOH

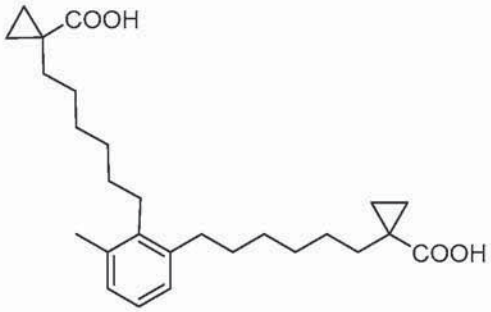

COOH
COOH
HO
HO
OH

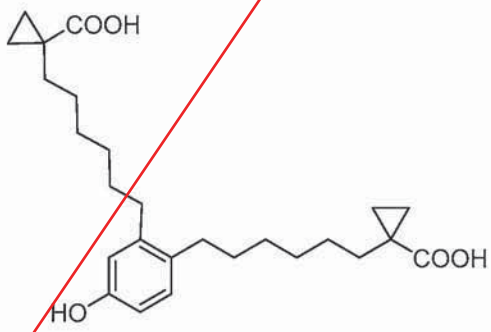

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COOH

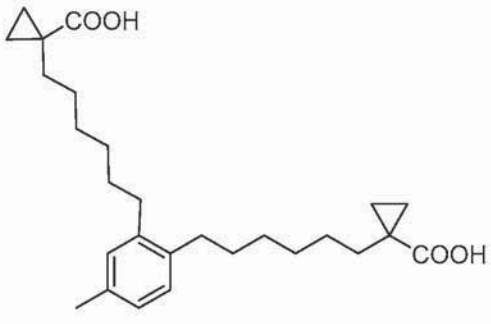

COOH
COOH
HO
OH
OH

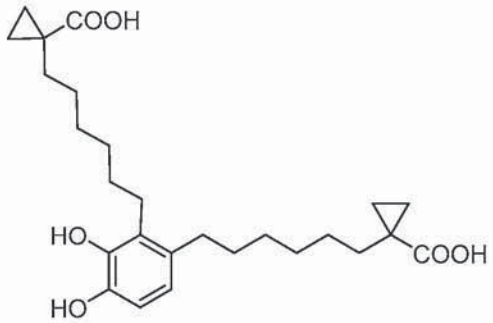

COOH
COOH

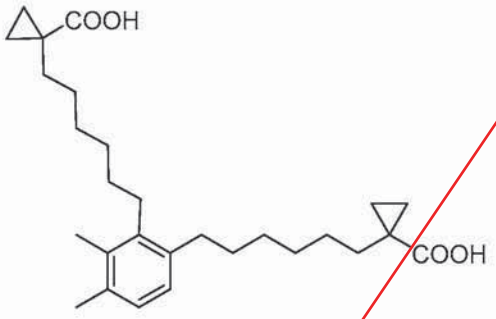

COOH
HO
COOH

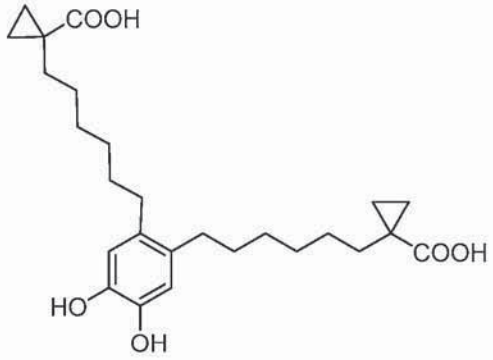

COOH
COOH

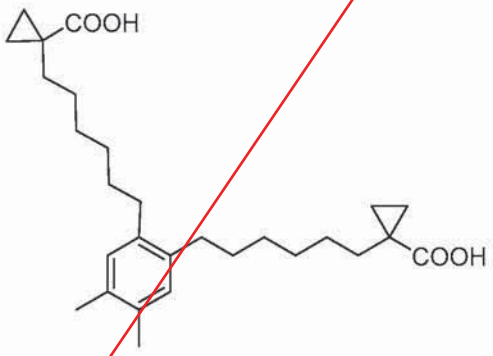

COOH
COOH
HO

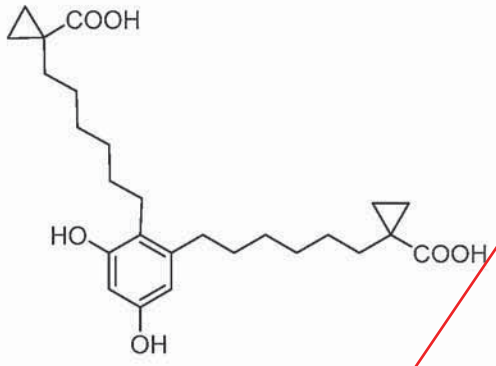

COOH
COOH

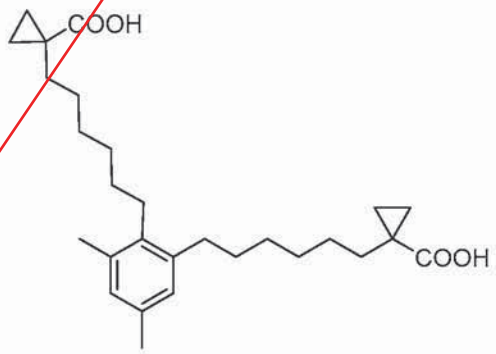

COOH
HO
HO
COOH

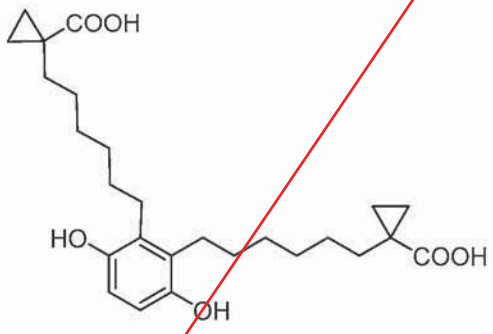

COOH
COOH

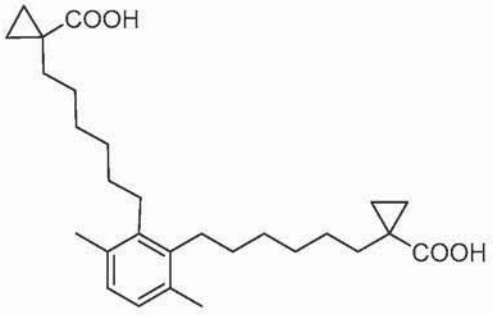

COOH
HO
OH
COOH

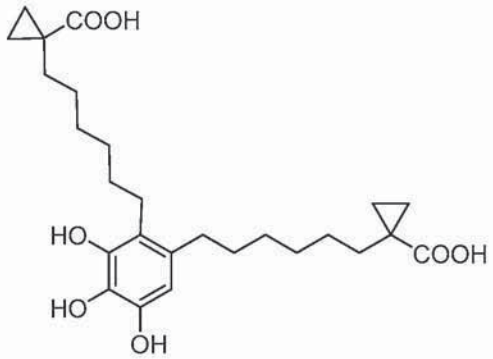
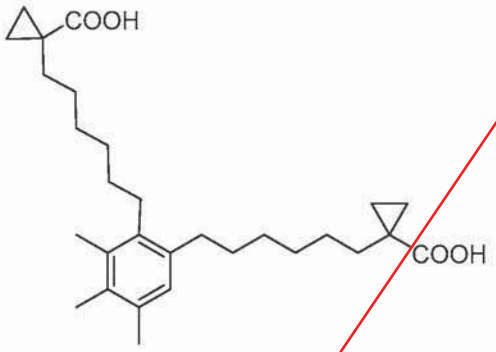
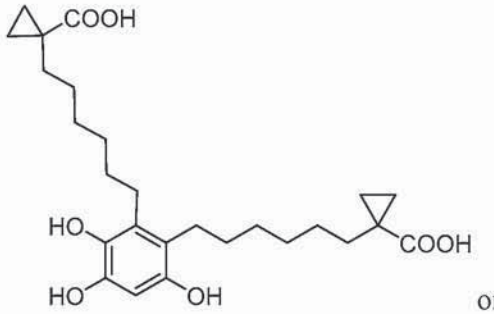
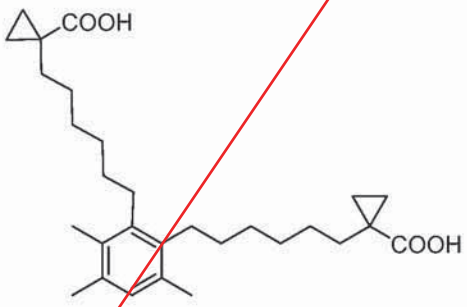

COOH
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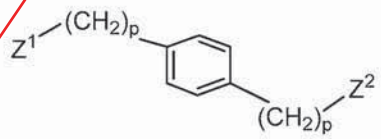
or

or a pharmaceutically acceptable salt of solvate thereof.

37. A composition comprising an effective amount of a compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36 and a pharmaceutically acceptable carrier or vehicle.

38. A composition comprising:

(i) an effective amount of a compound of Formula (IA):



(IA)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each p is independently 1, 2, 3, 4, 5, 6, or 7;

Z^1 and Z^2 is independently $–C(R^1)(R^2)–(CH_2)_c–COOH$ or $–C(R^1)(R^2)–(CH_2)_c–COOR^5$;

each c is independently 0, 1, 2, or 3;

each R^1 and R^2 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^1 and R^2 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group; and

each R^5 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1-C_6 alkyl), or phenyl groups; and

(ii) a pharmaceutically acceptable carrier or vehicle.

39. The composition of claim 38, wherein each R^1 and R^2 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl.

40. The composition of claim 38, wherein each R^1 and R^2 is independently -C_1-C_3 alkyl, -C_2-C_3 alkenyl, or -C_2-C_3 alkynyl.

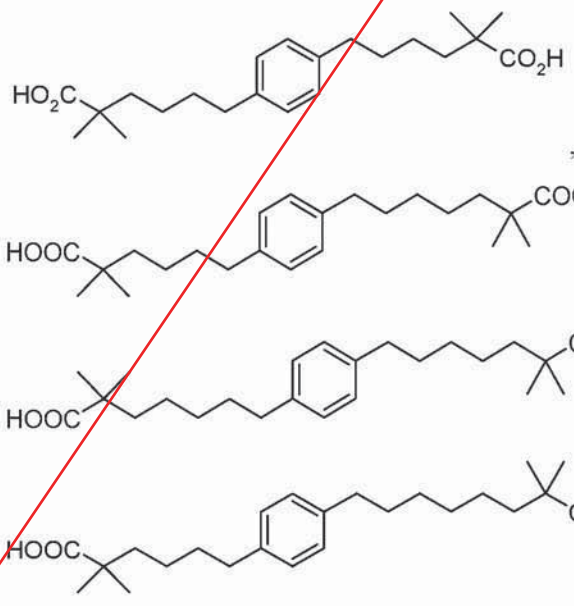
41. The composition of any one of claims 38-40, wherein R^1 and R^2 are methyl.

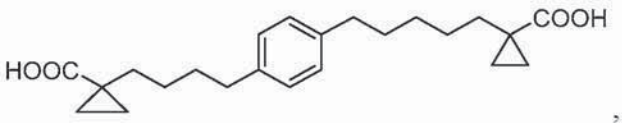
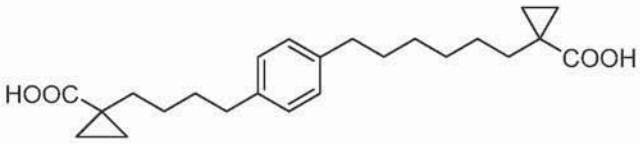
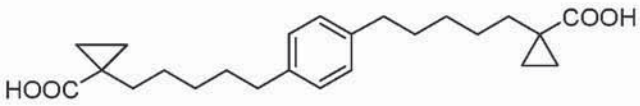
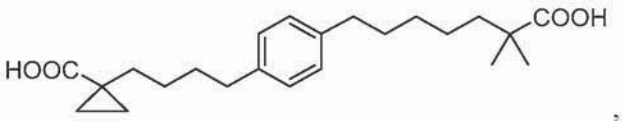
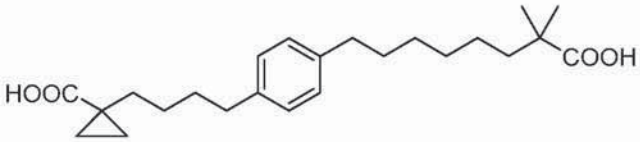
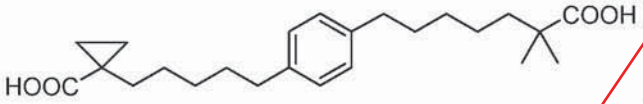
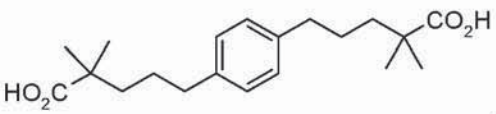
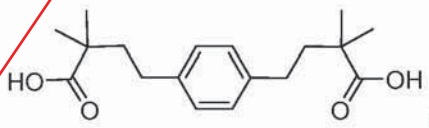
42. The composition of any one of claims 38-41, wherein c is 0 or 1.

43. The composition of any one of claims 38-42, wherein R^5 is -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl.

44. The composition of any one of claims 38-43, wherein R^5 is -C_1-C_3 alkyl, -C_2-C_3 alkenyl, or -C_2-C_3 alkynyl.

45. The composition of claim 38, wherein the compound has the structure




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,

,

,

, or

; or a pharmaceutically acceptable salt or solvate thereof.

46. A compound of Formula (II):



(II)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

each R^1 and R^2 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or each carbon atom together with the R^1 and R^2 attached to the carbon atom independently form a -C_3-C_7 cycloalkyl group;

each n is independently 0, 1, 2, or 3;

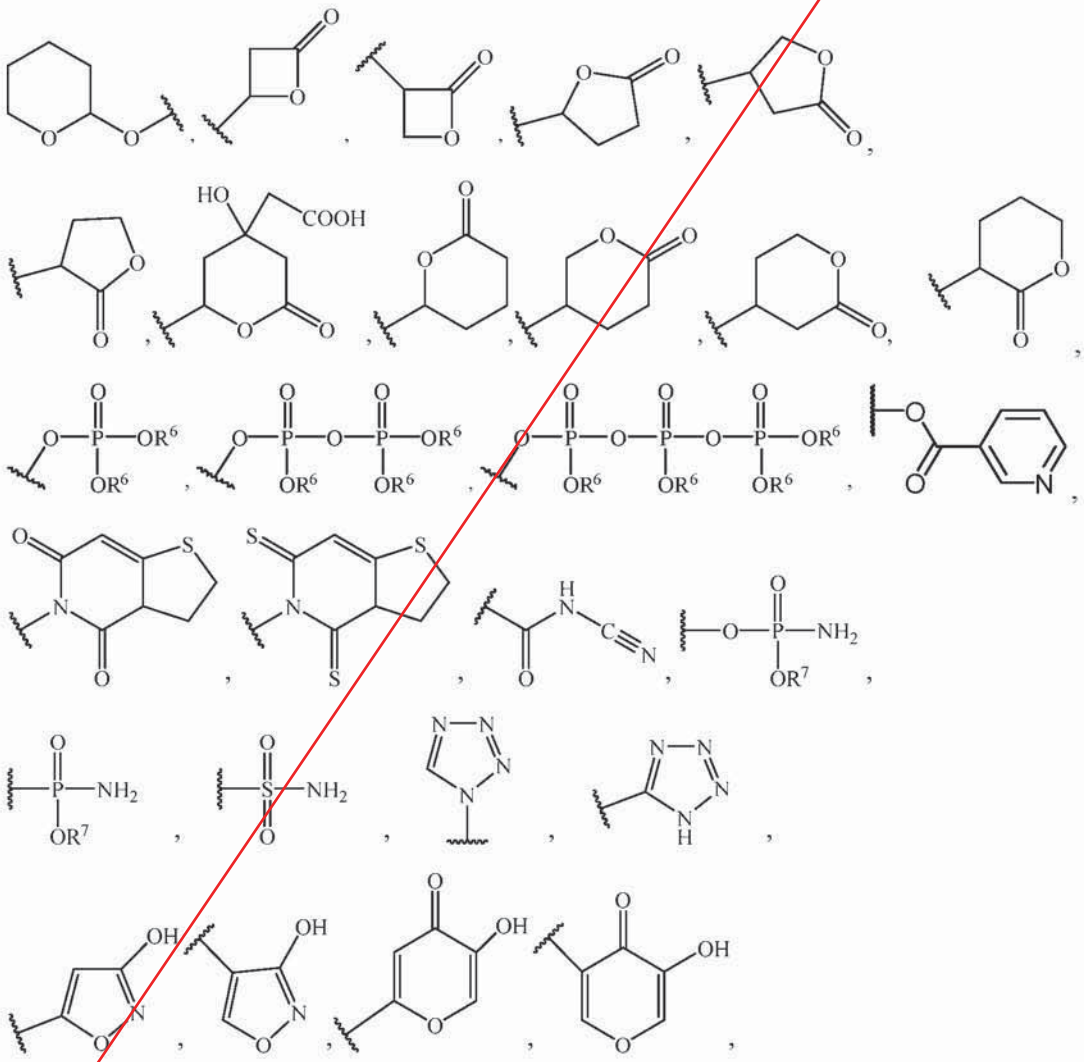
each m is independently 1, 2, 3, 4, 5, 6, 7, 8 or 9;

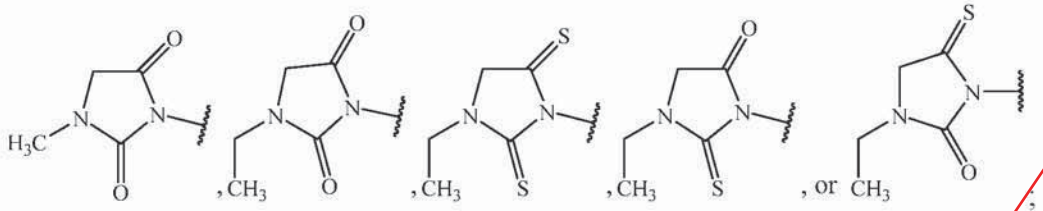
X is -C(=O)-, -CHR^3-, -CH-CH$_2$(OR^3)-, -O-, -S-, -S(=O)-, -S(O)$_2$-, -NR^3-, -N(OH)-, -N(→O)-, or -Se-;

R^3 is H, -OH, -O(C$_1$-C$_6$ alkyl), -C$_1$-C$_6$ alkyl, -C$_2$-C$_6$ alkenyl, -C$_2$-C$_6$ alkynyl, -C$_3$-C$_7$ cycloalkyl, C$_4$-C$_7$ cycloalkenyl, C$_5$-C$_8$ cycloalkynyl, phenyl, or benzyl, each -C$_1$-C$_6$ alkyl, -C$_2$-C$_6$ alkenyl, -C$_2$-C$_6$ alkynyl, -C$_3$-C$_7$ cycloalkyl, C$_4$-C$_7$ cycloalkenyl, C$_5$-C$_8$ cycloalkynyl, phenyl and benzyl being unsubstituted or substituted with one or more halogen, -CN, -NO$_2$, or -CF$_3$ groups;

each Y is independently -O-, -NH-, -N(OH)-, -N(→O)-, -S-, -S(=O)-, -S(O)$_2$-, or –Se-;

each Z is independently -OH, -COOH, -COOR^5, -SO$_3$H, -SO$_3$R^5,





each R^5 is independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1-C_6 alkyl), or phenyl groups;

each R^6 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl, wherein the -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1-C_6 alkyl), or phenyl groups; and

each R^7 is independently H, -C_1-C_6 alkyl, -C_2-C_6 alkenyl, or -C_2-C_6 alkynyl.

47. The compound or pharmaceutically acceptable salt or solvate of claim 46, wherein X is -C(=O)-, -CHR^3-, -O-, -S-, -S(=O)-, or Se.

48. The compound or pharmaceutically acceptable salt or solvate of claim 46 or 47, wherein R^3 is H, -OH, -O(C_1-C_3 alkyl), or -C_1-C_3 alkyl.

49. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-48, wherein each Y is independently -O- or -S-.

50. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-49, wherein each R^1 and R^2 is independently H, -C_1-C_3 alkyl, -C_2-C_3 alkenyl, or -C_2-C_3 alkynyl.

51. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-50, wherein each R^1 and R^2 is independently H or methyl.

52. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-51, wherein each Z is independently –COOH or -COOR^5.

53. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-52, wherein each R^5 is independently -C_1-C_3 alkyl, -C_2-C_3 alkenyl, or -C_2-C_3 alkynyl.

54. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-51, wherein Z is –COOH.

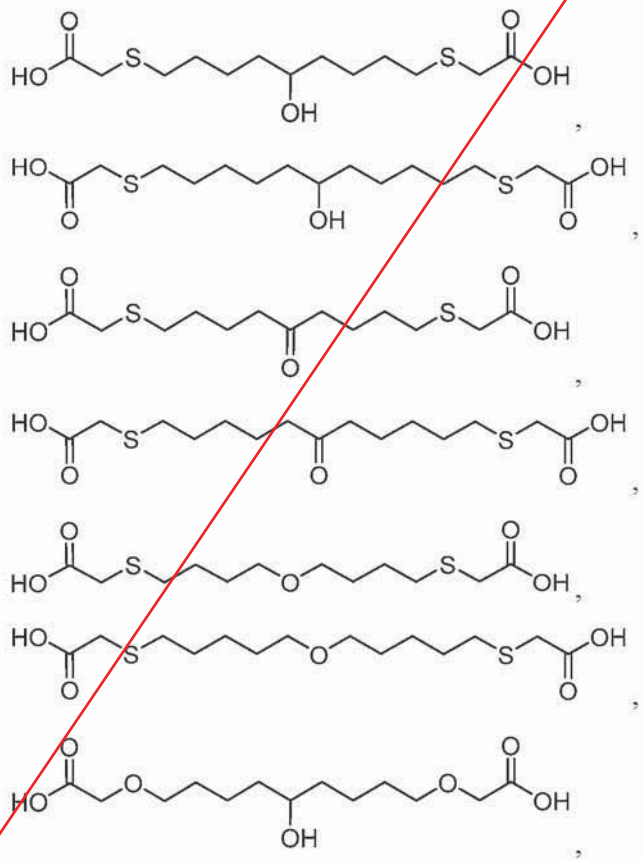
55. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-54, wherein each n is independently 0, 1, or 2.

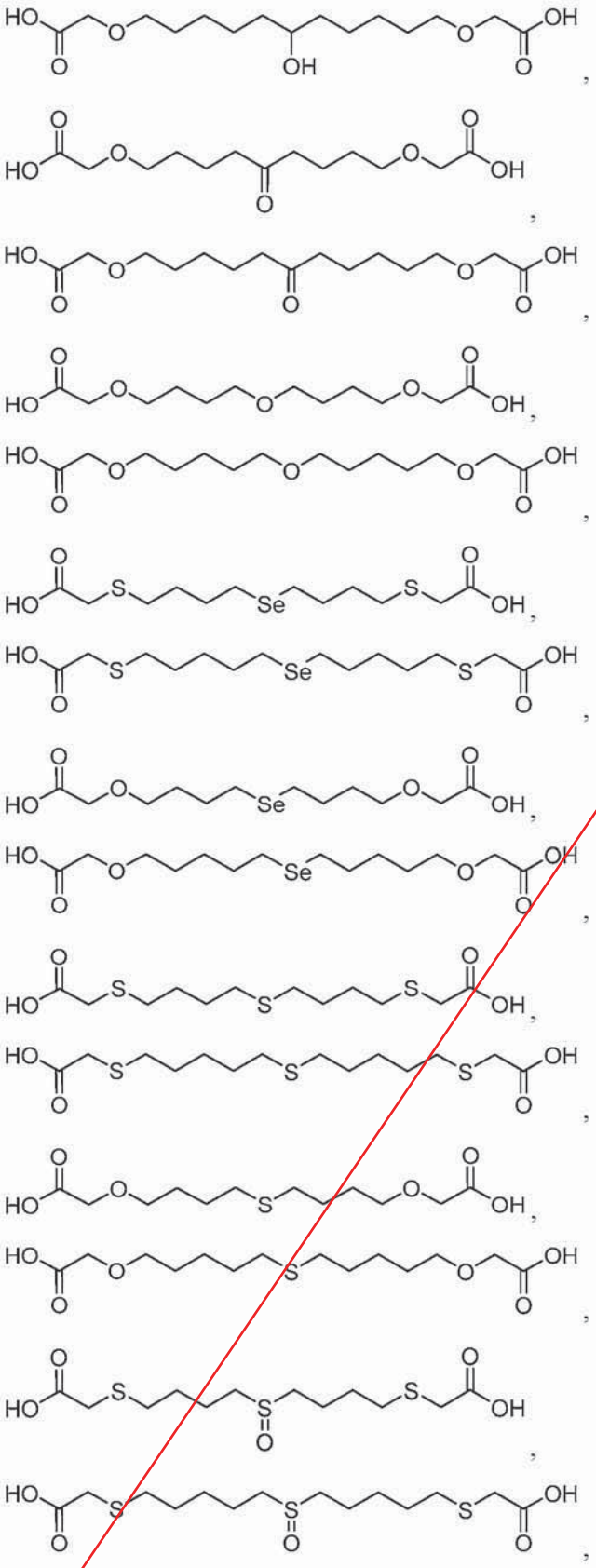
56. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-55, wherein n is 1.

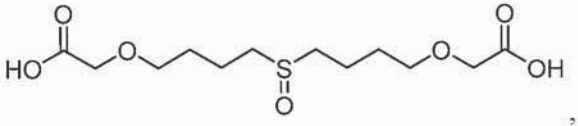
57. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-56, wherein each m is independently 3, 4, 5, or 6.

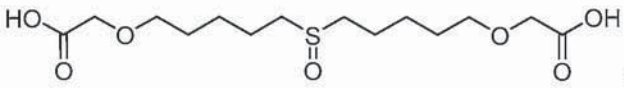
58. The compound or pharmaceutically acceptable salt or solvate of any one of claims 46-57, wherein each m is independently 4 or 5.

59. The compound of claim 46, having the structure:



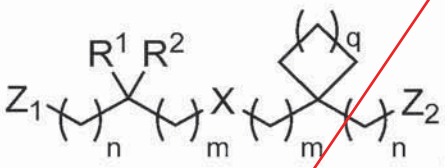



, or


; or a pharmaceutically acceptable salt or solvate thereof.

60. A composition comprising an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 46-59 and a pharmaceutically acceptable carrier or vehicle.

61. A compound of Formula (IIIA):


(IIIA)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

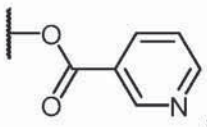
R^1 and R^2 are independently -C_1-C_6 alkyl, -C_2-C_6 alkenyl, -C_2-C_6 alkynyl, phenyl or benzyl, or R^1 and R^2 together with the attached carbon atom form a -C_3-C_7 cycloalkyl group;

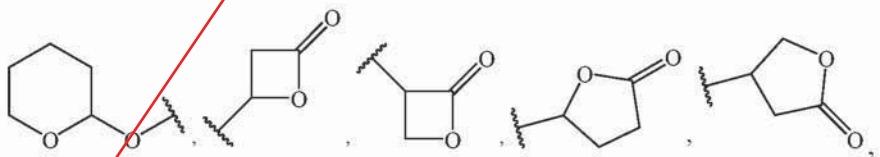
each m is independently 2, 3, 4, 5, 6, or 7;

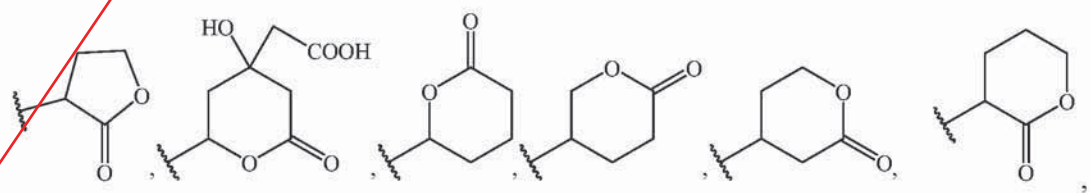
each n is independently 0, 1, 2, 3, 4, or 5;

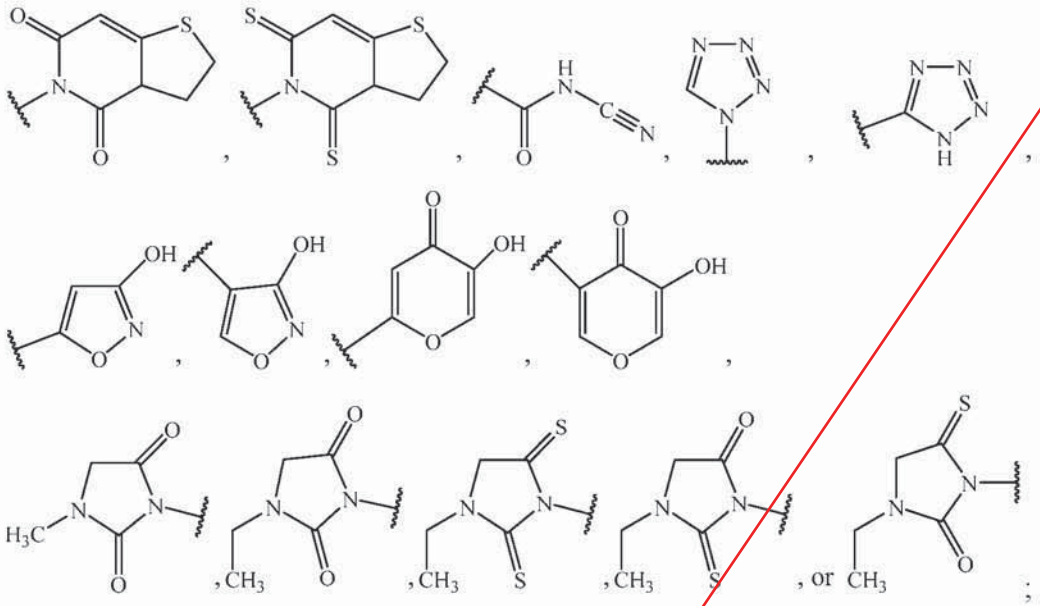
each q is 0, 1, 2, 3, or 4;

X is -O-, -S-, -S(=O)-, -$S(O)_2$-, -NH-, -N(OH)-, -N(→O)-, N(alkyl)-, or –N(aryl)-;

Z_1 and Z_2 are -C_1-C_6 alkyl, -COOH, -$COOR^5$, -SO_3R^5, 
,


,


,



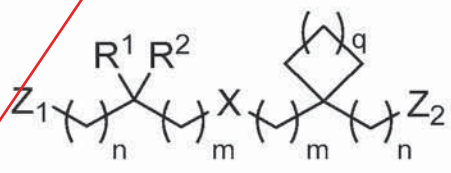
wherein Z_1 and Z_2 are the same;

each R^5 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups;

each R^6 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl, wherein the -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups; and

each R^7 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl.

62. A compound of Formula (IIIB):



(IIIB)

or a pharmaceutically acceptable salt or solvate thereof, wherein:

R^1 and R^2 are independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl or benzyl, or R^1 and R^2 together with the attached carbon atom form a -C_3-C_7 cycloalkyl group;

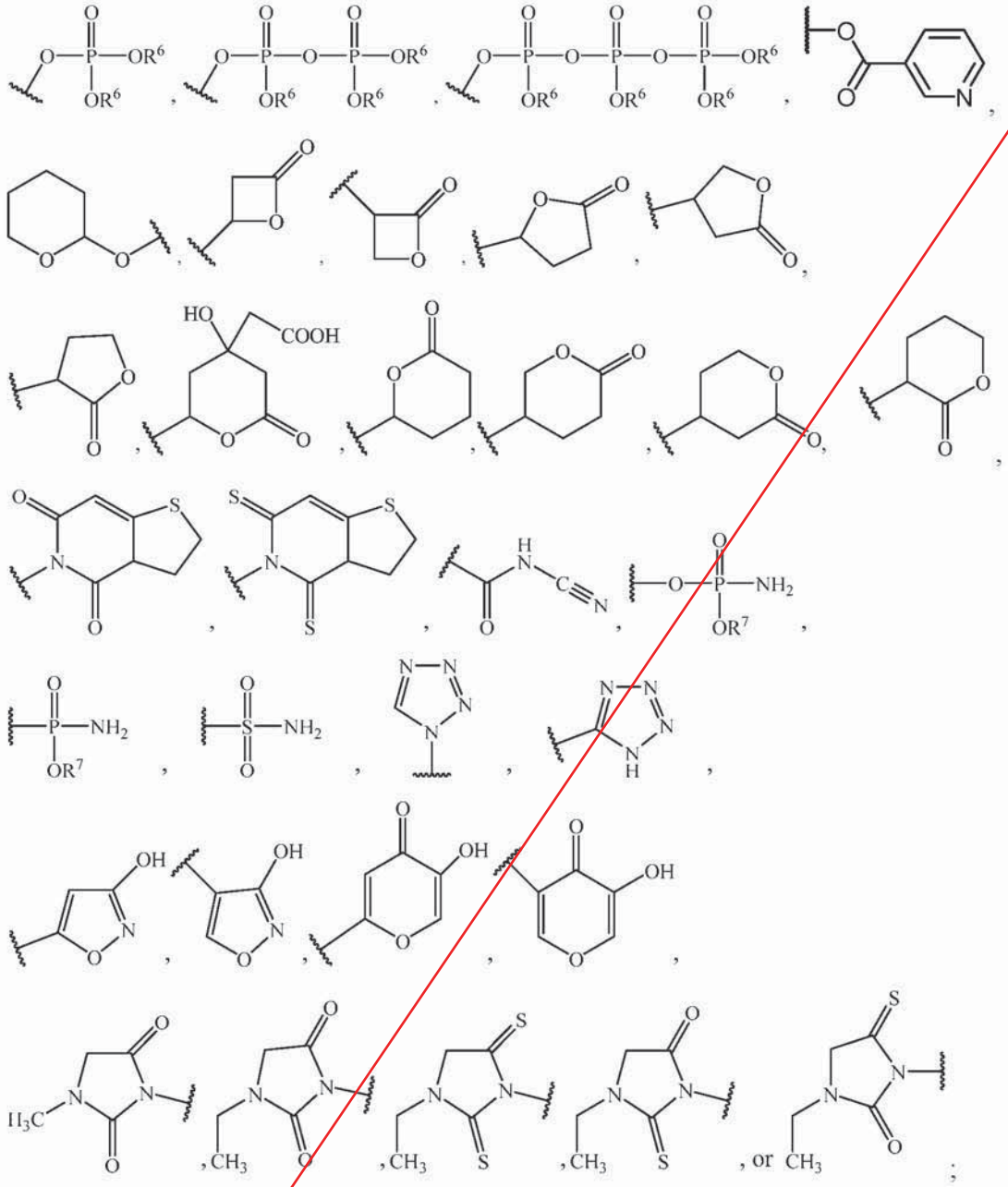
each m is independently 2, 3, 4, 5, 6, or 7;

each n is independently 0, 1, 2, 3, 4, or 5;

each q is 0, 1, 2, 3, or 4;

X is -S-, -S(=O)-, -S(O)$_2$-, -NH-, -N(OH)-, -N(→O)-, N(alkyl)-, or –N(aryl)-;

Z_1 and Z_2 are independently -C_1–C_6 alkyl, -OH, -COOH, -$COOR^5$, -SO_3H, -SO_3R^5,



each R^5 is independently -C_1–C_6 alkyl, -C_2–C_6 alkenyl, -C_2–C_6 alkynyl, phenyl, or benzyl, each being unsubstituted or substituted with one or more halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups;

each R^6 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl, wherein the -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl is unsubstituted or substituted with one or two halogen, -OH, -O(C_1–C_6 alkyl), or phenyl groups; and

each R^7 is independently H, -C_1–C_6 alkyl, -C_2–C_6 alkenyl, or -C_2–C_6 alkynyl.

63. The compound or pharmaceutically acceptable salt or solvate of claim 61 or 62, wherein each Z^1 and Z^2 is independently -OH, -COOH, or -$COOR^5$.

64. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-63, wherein each n is independently 0 or 1.

65. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-63, wherein n is 0.

66. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-63, wherein n is 1.

67. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-66, wherein each m is independently 4, 5, or 6.

68. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-66, wherein m is 4.

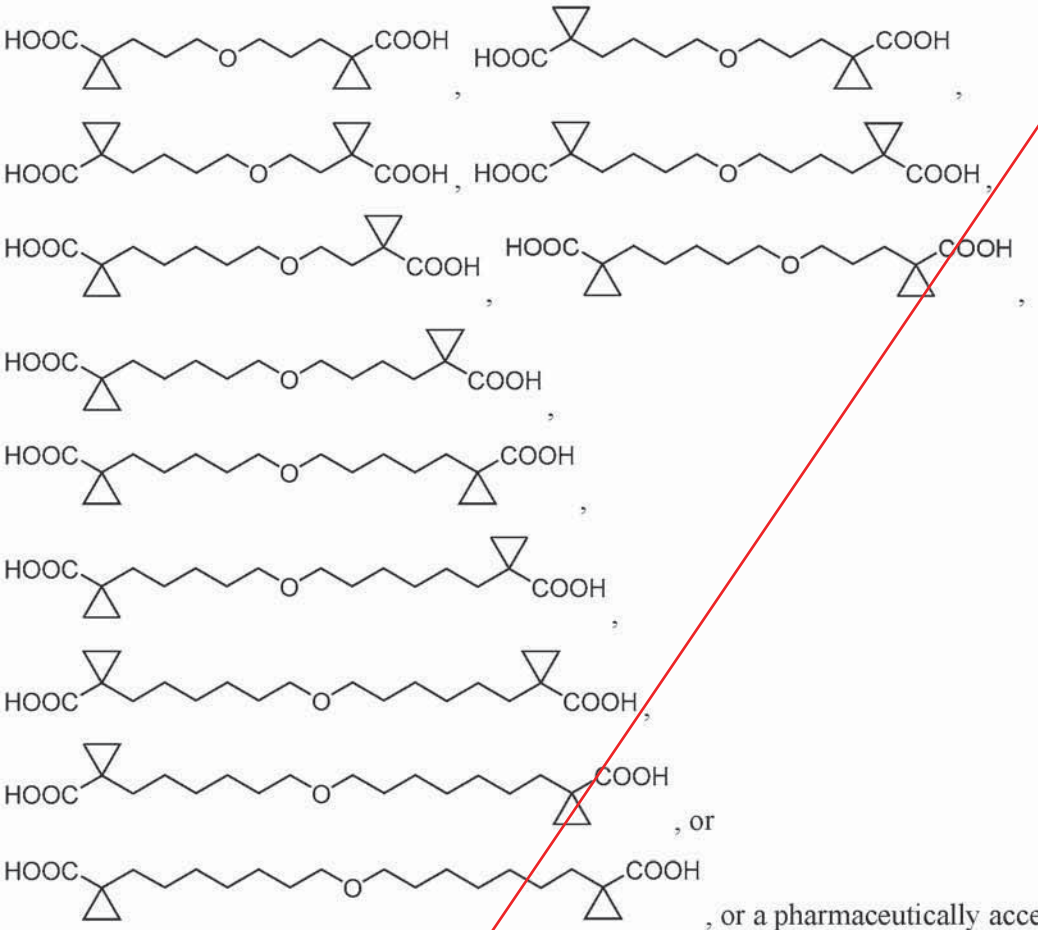
69. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-66, wherein m is 5.

70. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-66, wherein m is 6.

71. The compound or pharmaceutically acceptable salt or solvate of any one of claim 61-70, wherein each Z^1 and Z^2 is independently -C_1-C_6 alkyl.

72. The compound or pharmaceutically acceptable salt or solvate of any one of claims 61-71, wherein R^1 and R^2 together with the attached carbon atom form a -C_3-C_7 cycloalkyl group.

73. The compound of claim 61, having the structure:



, or a pharmaceutically acceptable salt or solvate thereof.

74. A composition comprising an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 61-73, and a pharmaceutically acceptable carrier or vehicle.

75. The composition of any one of claims 37-45, 60 and 74, further comprising another pharmaceutically active agent.

76. The composition of claim 75, wherein the other pharmaceutically active agent is a statin, a thiazolidinedione or fibrate, a bile-acid-binding-resin, a niacin, an anti-obesity drug, a hormone, a tyrophostine, a sulfonylurea-based drug, a biguanide, an α-glucosidase inhibitor, an apolipoprotein A-I agonist, apolipoprotein E agonist, a phosphodiesterase type-5 inhibitor, a cardiovascular drug, an HDL-raising drug, an HDL enhancer, an agonist of the

apolipoprotein A-I gene or protein, an agonist of the apolipoprotein A-IV gene or protein, an agonist of an apolipoprotein gene, an ATP citrate lyase modulator, an ATP citrate lyase allosteric inhibitor, an acetyl-CoA carboxylase modulator, or an acetyl-CoA carboxylase allosteric inhibitor.

77. The composition of claim 75, wherein the other pharmaceutically active agent is a statin, and the statin is lovastatin.

78. The composition of claim 75, wherein the other pharmaceutically active agent is sorafenib, taxol, cenicriviroc, elafibranor, eicosapentaenoic acid, galunisertib, LY2109761, LDE225, nivolumub, firsocostat, apararenone, metformin, leucine-metformin-sildenafil combination, IMM-124E, RG-125, vitamin E, cysteamine, selonsertib, losartan, RO5093151, pradigastat, Sitagliptin, vildagliptin, NGM282, pegbelfermin, PF-05231023, obeticholic acid, cilofexor, tropifexor, EDP-305, INT-767, galactoarabino-rhamnogalacturonate, liraglutide, semaglutide, exenatide, ND-L02-s0201/BMS-986263, volixibat, amlexanox, PF-06835919, leptin, metreleptin, simtuzumab, tipelukast, oltipraz, MSDC-0602K, ASP9831, roflumilast, elafibranor, pioglitazone, rosiglitazone, fenofibrate, saroglitazar, lanifibranor, aramchol, ipragliflozin, dapagliflozin, empagliflozin, BI 1467335, rosuvastatin, atorvastatin, pitavastatin, VK2809, MGL-3196, nalmafene, pentamidine, berberine, L-carnitine, EYP001a, silymarin, miricorilant, ursodeoxycholic acid, metadoxine, ezetimibe, cystadane, L-alanine, saroglitazar magnesium, volixibat, solithromycin, 99m technetium-mebrofenin, tropifexor, S-adenosylmethionine, pentoxifylline, olesoxime, AKR-001, or seladelpar.

79. The composition of claim 75, wherein the other pharmaceutically active agent is an anti-cancer agent, immunotherapeutic agent, oncologic virus, or vaccine.

80. The composition of claim 79, wherein the anti-cancer agent is sorafenib, taxol, lenvatinib, tazemetostat, TBI-302, namodenoson, MM-310, cenicriviroc, elafibranor, eicosapentaenoic acid, galunisertib, LY2109761, LDE225, firsocostat, apararenone, metformin, Leucine-Metformin-Sildenafil Combination, Vitamin E, cysteamine, selonsertib, losartan, RO5093151 pradigastat, Sitagliptin, vildagliptin, NGM282, pegbelfermin, PF-05231023, obeticholic acid, cilofexor, tropifexor, EDP-305, INT-767, galactoarabino-rhamnogalacturonate, liraglutide, semaglutide, exenatide, volixibat, amlexanox, PF-06835919, leptin, metreleptin, simtuzumab, tipelukast, oltipraz, MSDC-0602K, ASP9831,

roflumilast, elafibranor, pioglitazone, rosiglitazone, fenofibrate, saroglitazar, lanifibranor, aramchol, ipragliflozin, dapagliflozin, empagliflozin, BI 1467335, Rosuvastatin, atorvastatin, pitavastatin, VK2809, MGL-3196, nalmafene, pentamidine, Berberine, L-Carnitine, EYP001a, silymarin, miricorilant, ursodeoxycholic acid, metadoxine, ezetimibe, cystadane, L-alanine, saroglitazar magnesium, volixibat, elafibranor, nalmefene, solithromycin, 99mTechnetium-Mebrofenin, S-adenosylmethionine, pentoxifylline, Olesoxime, AKR-001, Seladelpar, fisogatinib, doxorubicin, cabozantinib, deferoxamine, itacitinib, chiauranib, SF1126, anlotinib, P1101, varlitinib, SHR-1210, SHR6390, capmatinib, dabrafenib, trametinib, sapanisertib, meclizine, enzalutamide, H3B-6527, OBI-3424, brivanib, tepotinib, temsirolimus, epacadostat, RO7119929, guadecitabine, linrodostat, copanlisib, MIV-818, vorolanib, RO7070179, axitinib, sunitinib, or zotiraciclib citrate.

81. The composition of claim 79, wherein the immunotherapeutic agent is pembrolizumab, avelumab, durvalumab, nivolumab, cemiplimab, ABX196, sintilimab, camrelizumab, spartalizumab, toripalimab, bispecific antibody XmAb20717, mapatumumab, tremelimumab, carotuximab, tocilizumab, ipilimumab, atezolizumab, bevacizumab, ramucirumab, IBI305, ascrinvacumab, LioCyx, sitravatinib, cytokine-based biologic agent IRX-2, bempegaldesleukin, DKN-01, PTX-9908, AK104, PT-112, SRF388, ET1402L1-CART, Glypican 3-specific Chimeric Antigen Receptor Expressing T Cells (CAR-T cells), CD147-targeted CAR-T cells, NKG2D-based CAR T-cells, or neoantigen reactive T cells.

82. The composition of claim 79, wherein the oncologic virus is Pexastimogene Devacirepvec or Talimogene Laherparepvec.

83. The composition of claim 79, wherein the vaccine is GNOS-PV02, INO-9012, ABBV-176, NCI-4650, DNAJB1-PRKACA fusion kinase peptide vaccine, or IMA970A.

84. The composition of claim 75, wherein the other pharmaceutically active agent is novantrone, prednisone, pixantrone, losoxantrone, Cytidine-phosphate-guanosine (CpG) DNA, paclitaxel, oraxol, MTL-CEBPA, ribavirin, elbasvir, grazoprevir, lipotecan, ZSP1241, U3-1784, avadomide, INCAGN01949, or CMP-001.

85. A method for treating or preventing a disease, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or

solvate of the compound of any one of claims 1-36, 46-59, and 61-73, wherein the disease is liver disease or an abnormal liver condition; cancer; a malignant or benign tumor of the lung, liver, gall bladder, bile duct or digestive tract; an intra- or extra-hepatic bile duct disease; a disorder of lipoprotein; a lipid-and-metabolic disorder; cirrhosis; fibrosis; a disorder of glucose metabolism; a cardiovascular or related vascular disorder; a disease resulting from steatosis, fibrosis, or cirrhosis; a disease associated with increased inflammation, hepatocyte ballooning; a peroxisome proliferator activated receptor-associated disorder; an ATP citrate lyase disorder; an acetyl-coenzyme A carboxylase disorder; obesity; pancreatitis; or renal disease.

86. The method of claim 85, wherein the disease is cancer, and the cancer is hepatocellular carcinoma (HCC), HCC with cirrhosis, HCC without cirrhosis, cholangiocarcinoma, colorectal cancer, biliary cancer, or pulmonary cancer.

87. The method of claim 85, wherein the disease is cancer, and the cancer is fibrosarcoma, myxosarcoma, liposarcoma, chondrosarcoma, osteogenic sarcoma, chordoma, angiosarcoma, endotheliosarcoma, lymphangiosarcoma, lymphangioendotheliosarcoma, synovioma, mesothelioma, Ewing's tumor, leiomyosarcoma, rhabdomyosarcoma, colon cancer, colorectal cancer, kidney cancer, pancreatic cancer, bone cancer, breast cancer, ovarian cancer, prostate cancer, esophogeal cancer, stomach cancer, oral cancer, nasal cancer, throat cancer, squamous cell carcinoma, basal cell carcinoma adenocarcinoma, sweat gland carcinoma, sebaceous gland carcinoma, papillary carcinoma, papillary adenocarcinomas, cystadenocarcinoma, medullary carcinoma, bronchogenic carcinoma, renal cell carcinoma, hepatoma, bile duct carcinoma, choriocarcinoma, seminoma, embryonal carcinoma, Wilms' tumor, cervical cancer, uterine cancer, testicular cancer, small cell lung carcinoma, bladder carcinoma, lung cancer, epithelial carcinoma, glioma, glioblastoma, multiforme, astrocytoma, medulloblastoma, craniopharyngioma, ependymoma, pinealoma, hemangioblastoma, acoustic neuroma, oligodendroglioma, meningioma, skin cancer, melanoma, neuroblastoma, retinoblastoma, acute lymphoblastic B-cell leukemia, acute lymphoblastic T-cell leukemia, acute myeloblastic leukemia (AML), acute promyelocytic leukemia (APL), acute monoblastic leukemia, acute erythroleukemic leukemia, acute megakaryoblastic leukemia, acute myelomonocytic leukemia, acute nonlymphocyctic leukemia, acute undifferentiated leukemia, chronic myelocytic leukemia (CML), chronic lymphocytic leukemia (CLL), hairy cell leukemia, multiple myeloma, lymphoblastic leukemia, myelogenous leukemia,

lymphocytic leukemia, myelocytic leukemias, Hodgkin's disease, non-Hodgkin's lymphoma, multiple myeloma, Waldenström's macroglobulinemia, heavy chain disease, gastrointestinal cancer, head-and-neck cancer, hematopoietic cancer, or polycythemia vera.

88. The method of claim 85, wherein the disease is a lipid-and-metabolic disorder, and the lipid-and-metabolic disorder is characterized by high C-reactive protein (CRP), high serum amyloid A (SAA), high alanine aminotransferase (ALT), high aspartate aminotransferase (AST), high alkaline phosphatase (ALP), high gamma-glutamyl transferase (GGT), high low-density lipoprotein (LDL), high very-low-density lipoprotein (VLDL), high apolipoprotein B (ApoB) and ApoB/Lp(a) (lipoprotein(a)) ratio, high total cholesterol, low high-density lipoprotein (HDL), or high non-HDL-cholesterol in the subject's plasma or blood serum; or by high glucose and insulin resistance in a subject with diabetes.

89. The method of claim 85, wherein the disease is a lipid-and-metabolic disorder, and the lipid-and-metabolic disorder is non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), or alcoholic steatohepatitis (ASH).

90. The method of claim 85, wherein the disease is a disorder of glucose metabolism, and the disorder of glucose metabolism is type I diabetes or type II diabetes.

91. A method for reducing a concentration in a subject's blood plasma or blood serum the subject's C-reactive protein (CRP) concentration, serum amyloid A (SAA) concentration, alanine aminotransferase (ALT) concentration, aspartate aminotransferase (AST) concentration, alkaline phosphatase (ALP) concentration, gamma-glutamyl transferase (GGT) concentration, serum creatinine concentration, 7α-hydroxy-4-cholesten-3-one (C4) concentration, protein:creatinine ratio, creatine kinase concentration, angiopoietin-like protein 3 concentration, angiopoietin-like protein 4 concentration, angiopoietin-like protein 8 concentration, fibrinogen concentration, total cholesterol concentration, low-density lipoprotein cholesterol concentration, low-density lipoprotein concentration, very low-density lipoprotein cholesterol concentration, very low-density lipoprotein concentration, non-HDL cholesterol concentration, non-HDL concentration, apolipoprotein B concentration, lipoprotein(a) concentration, or serum triglyceride concentration, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

92. A method for reducing triglyceride concentration in a subject's liver, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

93. A method for elevating in a subject's blood plasma or blood serum a concentration of high-density lipoprotein cholesterol or high-density lipoprotein, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

94. A method for treating a disease, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73, wherein the disease is gastrointestinal disease, irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), or autoimmune disease.

95. The method of claim 94, wherein the disease is inflammatory bowel disease, and the inflammatory bowel disease is Crohn's Disease or ulcerative colitis.

96. The method of claim 94, wherein the disease is autoimmune disease, and the autoimmune disease is systemic lupus erythematosus.

97. A method for regressing, reducing the rate of progression or inhibiting progression of fibrosis, hepatocyte ballooning or hepatic inflammation, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

98. A method for inhibiting, reducing, or delaying advancement of a subject's lipid synthesis, liver steatosis, hepatocyte ballooning and inflammation, liver fibrosis, lung fibrosis, or cirrhosis, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

99. A method for elevating HDL concentration in the subject's blood serum or plasma, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

100. A method for inhibiting NF-kB or stellate cell activation, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

101. A method for activating PPAR (peroxisome proliferator-activated receptor) in a subject, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

102. A method for modulating, directly inhibiting or allosterically inhibiting ATP citrate lyase in a subject, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

103. A method for modulating, directly inhibiting or allosterically inhibiting acetyl-CoA carboxylase 1 or acetyl-CoA carboxylase 2 in a subject, comprising administering to a subject in need thereof an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

104. A method of reducing the fat or cholesterol content of livestock meat or poultry eggs, comprising administering to the livestock or poultry an effective amount of the compound, pharmaceutically acceptable salt or solvate of the compound of any one of claims 1-36, 46-59, and 61-73.

105. A method for treating or preventing a disease, comprising administering to a subject in need thereof an effective amount of the composition of any one of claims 37-45, 60 and 74, wherein the disease is cancer, a lipid-and-metabolic disorder, a liver disorder, cirrhosis, fibrosis, a disorder of glucose metabolism, a peroxisome proliferator activated receptor-associated disorder, a malignant or benign tumor of the lung, liver, bile and digestive tract, an

ATP citrate lyase disorder, an acetyl-coenzyme A carboxylase disorder, obesity, pancreatitis, renal disease, hepatic inflammation, or pulmonary inflammation.

106. The method of any one of claims 85-105, further comprising administering an effective amount of another pharmaceutically active agent.

107. The method of claim 106, wherein the other pharmaceutically active agent is a statin, a thiazolidinedione or fibrate, a bile-acid-binding-resin, a niacin, an anti-obesity drug, a hormone, a tyrophostine, a sulfonylurea-based drug, a biguanide, an α-glucosidase inhibitor, an apolipoprotein A-I agonist, apolipoprotein E agonist; a phosphodiesterase type-5 inhibitor, a cardiovascular drug, an HDL-raising drug, an HDL enhancer, a regulator of the apolipoprotein A-I gene, a regulator of the apolipoprotein A-IV gene, a regulator of the apolipoprotein gene, an ATP citrate lyase modulator, an ATP citrate lyase allosteric inhibitor, an acetyl-CoA carboxylase modulator, or an acetyl-CoA carboxylase allosteric inhibitor.

108. The method of claim 106, wherein the other pharmaceutically active agent is a statin, and the statin is lovastatin.

109. The method of claim 106, wherein the other pharmaceutically active agent is sorafenib, taxol, carotuximab, pembrolizumab, lenvatinib, avelumab, durvalumab, tremelimumab, nivolumab, tazemetostat, cemiplimab, ABX196, T-cell receptor (TCR) immune cell therapy agent, TBI-302, namodenoson, MM-310, tumor-injected oncolytic viruses or gene-modified oncolytic viruses, or immunomodulating gene-therapy agents.

110. The method of claim 106, wherein the other pharmaceutically active agent is cenicriviroc, elafibranor, eicosapentaenoic acid, galunisertib, LY2109761, LDE225, nivolumub, firsocostat, apararenone, metformin, leucine-metformin-sildenafil combination, IMM-124E, RG-125, vitamin E, cysteamine, selonsertib, losartan, RO5093151, pradigastat, Sitagliptin, vildagliptin, NGM282, pegbelfermin, PF-05231023, obeticholic acid, cilofexor, tropifexor, EDP-305, INT-767, galactoarabino-rhamnogalacturonate, liraglutide, semaglutide, exenatide, ND-L02-s0201/BMS-986263, volixibat, amlexanox, PF-06835919, leptin, metreleptin, simtuzumab, tipelukast, oltipraz, MSDC-0602K, ASP9831, roflumilast, elafibranor, pioglitazone, rosiglitazone, fenofibrate, saroglitazar, lanifibranor, aramchol, ipragliflozin, dapagliflozin, empagliflozin, BI 1467335, rosuvastatin, atorvastatin,

pitavastatin, VK2809, MGL-3196, nalmafene, pentamidine, berberine, L-carnitine, EYP001a, silymarin, miricorilant, ursodeoxycholic acid, metadoxine, ezetimibe, cystadane, L-alanine, saroglitazar magnesium, volixibat, solithromycin, 99m technetium-mebrofenin, tropifexor, S-adenosylmethionine, pentoxifylline, olesoxime, AKR-001, or seladelpar.

111. The method of claim 106, wherein the other pharmaceutically active agent is an anti-cancer agent, immunotherapeutic agent, oncologic virus, or vaccine.

112. The method of claim 106, wherein the anti-cancer agent is sorafenib, taxol, lenvatinib, tazemetostat, TBI-302, namodenoson, MM-310, cenicriviroc, elafibranor, eicosapentaenoic acid, galunisertib, LY2109761, LDE225, firsocostat, apararenone, metformin, Leucine-Metformin-Sildenafil Combination, Vitamin E, cysteamine, selonsertib, losartan, RO5093151 pradigastat, Sitagliptin, vildagliptin, NGM282, pegbelfermin, PF-05231023, obeticholic acid, cilofexor, tropifexor, EDP-305, INT-767, galactoarabino-rhamnogalacturonate, liraglutide, semaglutide, exenatide, volixibat, amlexanox, PF-06835919, leptin, metreleptin, simtuzumab, tipelukast, oltipraz, MSDC-0602K, ASP9831, roflumilast, elafibranor, pioglitazone, rosiglitazone, fenofibrate, saroglitazar, lanifibranor, aramchol, ipragliflozin, dapagliflozin, empagliflozin, BI 1467335, Rosuvastatin, atorvastatin, pitavastatin, VK2809, MGL-3196, nalmafene, pentamidine, Berberine, L-Carnitine, EYP001a, silymarin, miricorilant, ursodeoxycholic acid, metadoxine, ezetimibe, cystadane, L-alanine, saroglitazar magnesium, volixibat, elafibranor, nalmefene, solithromycin, 99mTechnetium-Mebrofenin, S-adenosylmethionine, pentoxifylline, Olesoxime, AKR-001, Seladelpar, fisogatinib, doxorubicin, cabozantinib, deferoxamine, itacitinib, chiauranib, SF1126, anlotinib, P1101, varlitinib, SHR-1210, SHR6390, capmatinib, dabrafenib, trametinib, sapanisertib, meclizine, enzalutamide, H3B-6527, OBI-3424, brivanib, tepotinib, temsirolimus, epacadostat, RO7119929, guadecitabine, linrodostat, copanlisib, MIV-818, vorolanib, RO7070179, axitinib, sunitinib, or zotiraciclib citrate.

113. The method of claim 106, wherein the immunotherapeutic agent is pembrolizumab, avelumab, durvalumab, nivolumab, cemiplimab, ABX196, sintilimab, camrelizumab, spartalizumab, toripalimab, bispecific antibody XmAb20717, mapatumumab, tremelimumab, carotuximab, tocilizumab, ipilimumab, atezolizumab, bevacizumab, ramucirumab, IBI305, ascrinvacumab, LioCyx, sitravatinib, cytokine-based biologic agent IRX-2, bempegaldesleukin, DKN-01, PTX-9908, AK104, PT-112, SRF388, ET1402L1-CART,

Glypican 3-specific Chimeric Antigen Receptor Expressing T Cells (CAR-T cells), CD147-targeted CAR-T cells, NKG2D-based CAR T-cells, or neoantigen reactive T cells.

114. The method of claim 106, wherein the oncologic virus is Pexastimogene Devacirepvec or Talimogene Laherparepvec.

115. The method of claim 106, wherein the vaccine is GNOS-PV02, INO-9012, ABBV-176, NCI-4650, DNAJB1-PRKACA fusion kinase peptide vaccine, or IMA970A.

116. The method of claim 106, wherein the other pharmaceutically active agent is novantrone, prednisone, pixantrone, losoxantrone, Cytidine-phosphate-guanosine (CpG) DNA, paclitaxel, oraxol, MTL-CEBPA, ribavirin, elbasvir, grazoprevir, lipotecan, ZSP1241, U3-1784, avadomide, INCAGN01949, or CMP-001.

117. The method of any one of claims 85-116, further comprising administering radiation therapy to the subject.

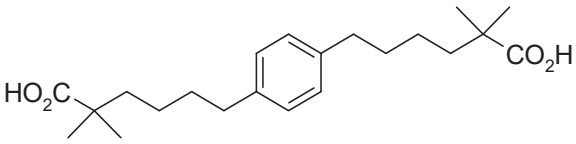
118. The method of claim 117, wherein the radiation therapy is gamma ray radiation therapy or x-ray radiation therapy.

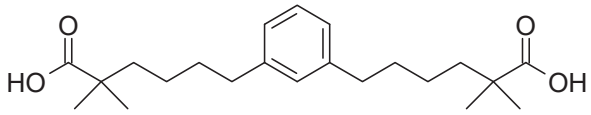
119. The method of claim 117 or 118, wherein the radiation therapy is administered via a radiation therapy apparatus.

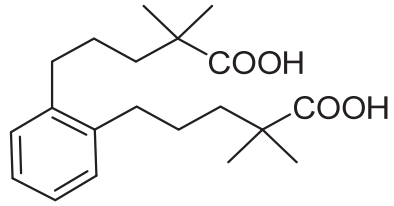
120. The method of any one of claims 117-119, wherein the radiation therapy is administered concurrently with, prior to or subsequent to the administration of the compound, pharmaceutically acceptable salt or solvate.

Claims for Examination

1. A compound having the structure:

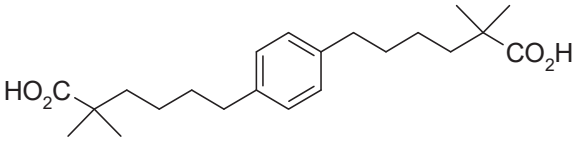


,




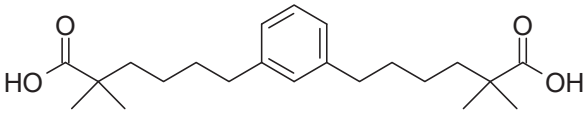
or , or a pharmaceutically acceptable salt or solvate thereof.

2. The compound of claim 1, wherein the compound has the structure



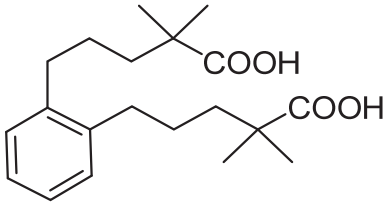
or a pharmaceutically acceptable salt or solvate thereof.

3. The compound of claim 1, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

4. The compound of claim 1, wherein the compound has the structure



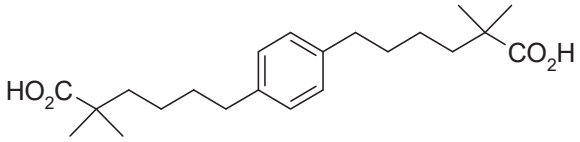
or a pharmaceutically acceptable salt or solvate thereof.

5. A composition comprising:

(i) an effective amount of the compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof; and

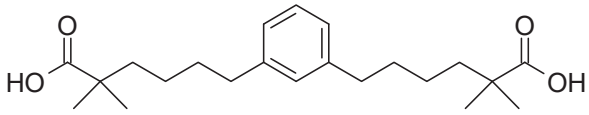
(ii) a pharmaceutically acceptable carrier or vehicle.

6. The composition of claim 5, wherein the compound has the structure



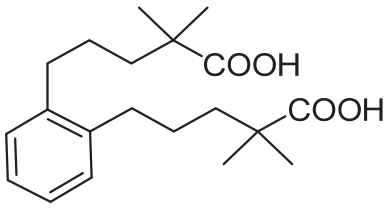
or a pharmaceutically acceptable salt or solvate thereof.

7. The composition of claim 5, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

8. The composition of claim 5, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

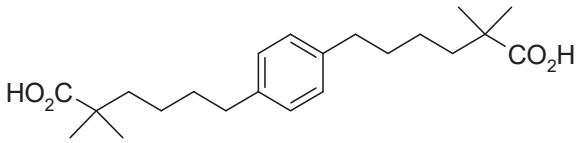
9. The composition of any one of claims 5-8, further comprising sorafenib or lenvatinib.

10. The compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof for use in therapy.

11. The compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof for use in the treatment or prevention of hepatocellular carcinoma in a subject, wherein the compound or a pharmaceutically acceptable salt or solvate thereof is to be administered to the subject.

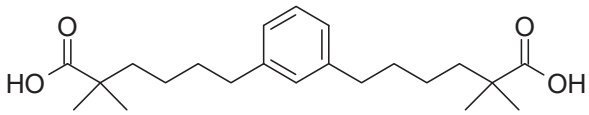
12. Use of the compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof in the manufacture of a medicament for the treatment or prevention of hepatocellular carcinoma in a subject, wherein the compound, or a pharmaceutically acceptable salt or solvate thereof is to be administered to the subject.

13. The compound for use of claim 11 or the use of claim 12, wherein the compound has the structure



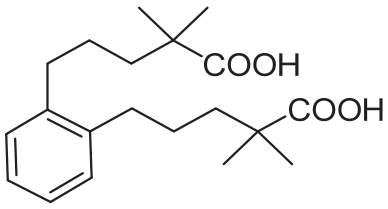
or a pharmaceutically acceptable salt or solvate thereof.

14. The compound for use of claim 11 or the use of claim 12, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

15. The compound for use of claim 11 or the use of claim 12, wherein the compound has the structure



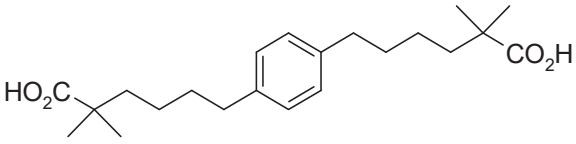
or a pharmaceutically acceptable salt or solvate thereof.

16. The compound for use of any one of claims 11-15 or the use of any one of claims 12-15, wherein sorafenib or lenvatinib is to be further administered to the subject.

17. The compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof for use in the treatment or prevention of renal cell carcinoma in a subject, wherein the compound or a pharmaceutically acceptable salt or solvate thereof is to be administered to the subject.

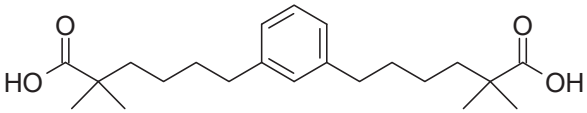
18. Use of the compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof in the manufacture of a medicament for the treatment or prevention of renal cell carcinoma in a subject, wherein the compound or the pharmaceutically acceptable salt or solvate thereof is to be administered to the subject.

19. The compound for use of claim 17 or the use of claim 18, wherein the compound has the structure



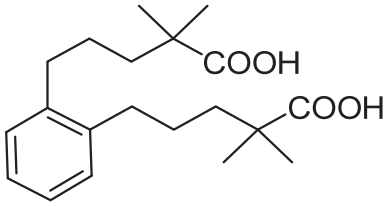
or a pharmaceutically acceptable salt or solvate thereof.

20. The compound for use of claim 17 or the use of claim 18, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

21. The compound for use of claim 17 or the use of claim 18, wherein the compound has the structure



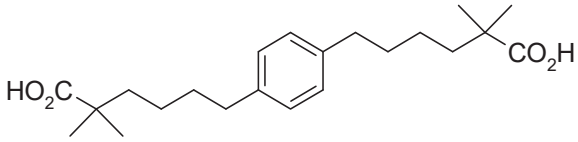
or a pharmaceutically acceptable salt or solvate thereof.

22. The compound for use of any one of claims 17-21 or the use of any one of claims 18-21, wherein sorafenib or lenvatinib is to be further administered to the subject.

23. The compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof for use in the treatment or prevention of colorectal cancer in a subject, wherein the compound or the pharmaceutically acceptable salt or solvate thereof is to be administered to the subject.

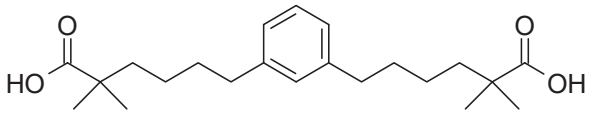
24. Use of the compound of claim 1, or a pharmaceutically acceptable salt or solvate thereof in the manufacture of a medicament for the treatment or prevention of colorectal cancer in a subject, wherein the compound or the pharmaceutically acceptable salt or solvate thereof is to be administered to the subject.

25. The compound for use of claim 23 or the use of claim 24, wherein the compound has the structure



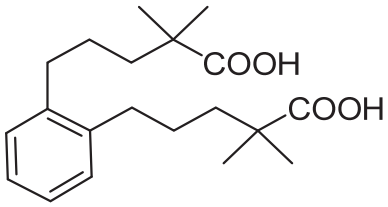
or a pharmaceutically acceptable salt or solvate thereof.

26. The compound for use of claim 23 or the use of claim 24, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

27. The compound for use of claim 23 or the use of claim 24, wherein the compound has the structure



or a pharmaceutically acceptable salt or solvate thereof.

28. The compound for use of any one of claims 23-27 or the use of any one of claims 24-27, wherein sorafenib or lenvatinib is to be further administered to the subject.