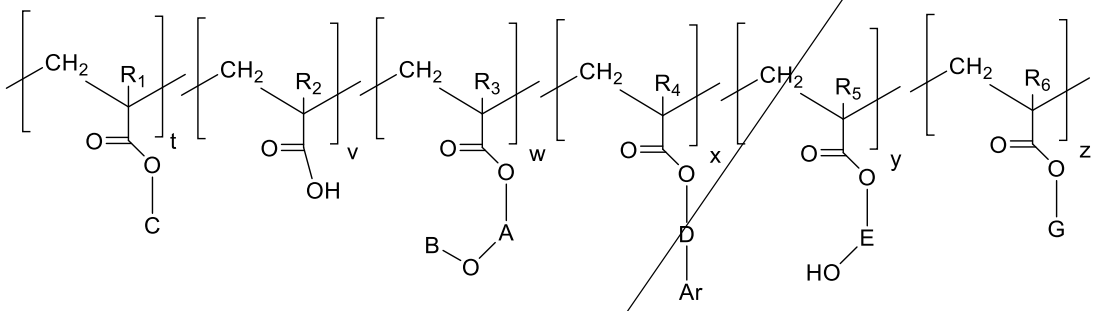
What is claimed is:

1. A positive working photosensitive composition comprising:

a) at least one photoacid generator;

b) at least one Novolak polymer;

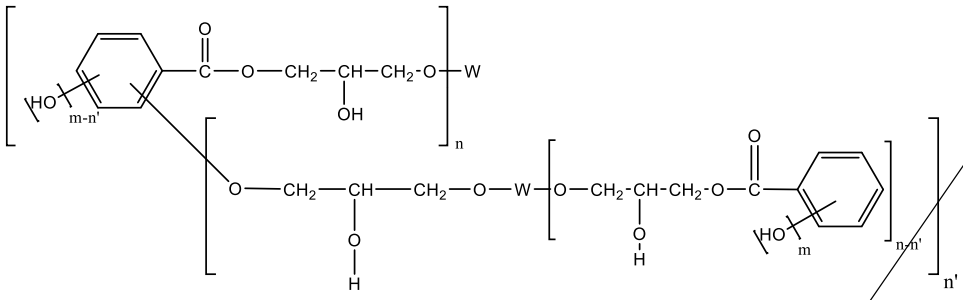
c) at least one acrylate polymer, comprising a component having structure (I),



(I)

wherein R_1 to R_6 are, independently, -H, or $-CH_3$, A is a linear or branched C_2 to C_{10} alkylene group, B is a C_1 to C_{12} primary or secondary unsubstituted linear, branched, cyclic or alicyclic alkyl group, C is a C_1 to C_{12} primary or secondary unsubstituted linear, branched, cyclic or alicyclic alkyl group, D is a linking group that is a direct valence bond, or a linear or branched C_1 to C_{10} alkylene group, Ar is a substituted or unsubstituted aromatic group or heteroaromatic group, E is a linear or branched C_2 to C_{10} alkylene group, G is an acid cleavable group, t is 0 mole% to about 40 mole%, v is 0 mole% to about 15 mole%, w is 0 mole% to about 45 mole%, x is 0 mole% to about 80 mole%, y is about 20 mole% to about 50 mole% and z is about 20 mole% to about 50 mole%, and further wherein the sum of t, v, w, x, y and z equals 100 mole%;

d) at least one glycidyl hydroxy benzoic acid condensate material comprising one or more compounds having structure (II),



(II),

wherein,

W is an organic moiety having a molecular weight of 600 or less, wherein W forms an ether bond with the oxygen to which it is bound,

m is an integer from 1 to 3 and

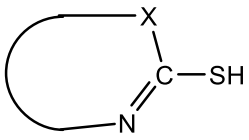
n is an integer from 1 to 4, and further provided that

when m is 1, n is 3 or 4,

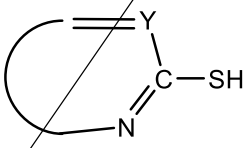
and when m is 2 or 3, n is an integer from 1 to 4,

n' is 0 or 1,

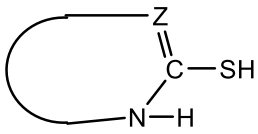
e) at least one heterocyclic thiol compound comprising a ring structure chosen from the general structures (III), (IIIa) or (IIIb), or tautomers thereof; and



(III)



(IIIa)



(IIIb),

wherein,

said ring structure is a single ring structure having from 4 to 8 atoms, or a multi ring structure having from 5 to 20 atoms; and wherein the single ring structure, or the multi ring structure comprises an aromatic, non-aromatic, or heteroaromatic ring, and

in said structure (III), X is selected from the group consisting of $C(Rt_1)(Rt_2)$, O, S, Se, and Te;

in said structure (IIIa), Y is selected from the group consisting of $C(Rt_3)$ and N;

in said structure (IIIb), Z is selected from the group consisting of $C(Rt_3)$ and N; and

Rt_1, Rt_2, and Rt_3 are independently selected from the group consisting of H, a substituted alkyl group having 1 to 8 carbon atoms, an unsubstituted alkyl group having 1 to 8 carbon atoms, a substituted alkenyl group having 2 to 8 carbon atoms, unsubstituted alkenyl group having 2 to 8 carbon atoms, a substituted alkynyl group having 2 to 8 carbon atoms, unsubstituted alkynyl group having 2 to 8 carbon atoms, a substituted aromatic group having 6 to 20 carbon atoms, a substituted heteroaromatic group having 3 to 20 carbon atoms, unsubstituted aromatic group having 6 to 20 carbon atoms and unsubstituted heteroaromatic group having 3 to 20 carbon atoms;

f) at least one solvent.

2. The positive working photosensitive composition of Claim 1, wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aliphatic moiety selected from the group consisting an aliphatic hydrocarbon, an aliphatic alkyl ether, a bis(alkyl) sulfone, and a bis(alkyl)ketone.

3. The positive working photosensitive composition of Claim 1, wherein glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aromatic moiety selected from an arene, a polycyclic arene, an bis(aryl)ether, a biphenyl, a bis(aryl) sulfone, bis(phenyl)alkylene, an (alkyl)(aryl)ketone, a bis(aryl)ketone, a bis(aryl) sulfone, and an (alkyl)(aryl) sulfone.

4. The positive working photosensitive composition of any one of Claims 1 to 3, wherein m is 1.

5. The positive working photosensitive composition of any one of Claims 1 to 3 wherein m is 2.

6. The positive working photosensitive composition of any one of Claims 1 to 3 wherein m is 3.

7. The positive working photosensitive composition of any one of Claims 1 to 3 wherein n is 1.

8. The positive working photosensitive composition of any one of Claims 1 to 3 wherein n is 2.

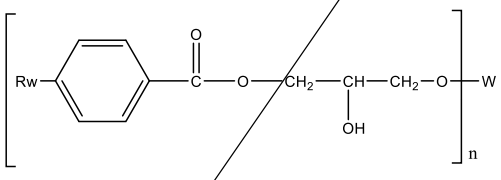
9. The positive working photosensitive composition of any one of Claims 1 to 3 wherein n is 3.

10. The positive working photosensitive composition of any one of Claims 1 to 3 wherein n is 4.

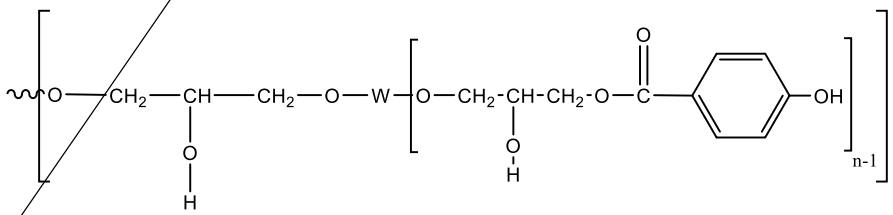
11. The positive working photosensitive composition of any one of Claims 1 to 3 wherein n' is 0.

12. The positive working photosensitive composition of any one of Claims 1 to 3 wherein n' is 1.

13. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-1), wherein n is 3 to 4, and Rw is OH or the moiety (IVb-1), wherein ~~ represents the point of attachment in this moiety;

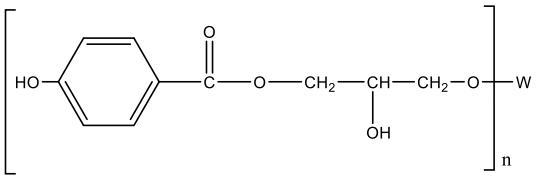


(IVa-1),



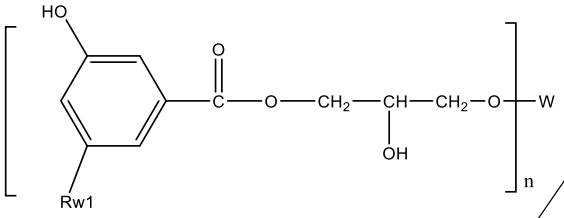
(IVb-1).

14. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IV-1), wherein n is 3 to 4;

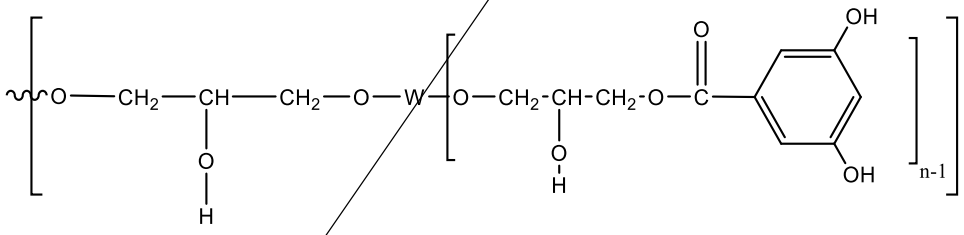


(IV-1).

15. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-2), wherein n is 1 to 4, and Rw1 is OH or the moiety (IVb-2), wherein ∿∿ represents the point of attachment in this moiety;

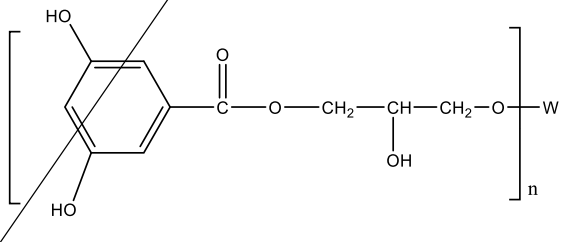


(IVa-2),



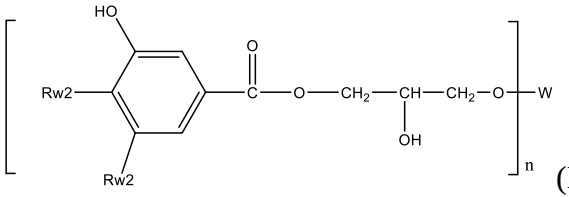
(IVb-2).

16. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IV-2), wherein n is 1 to 4;

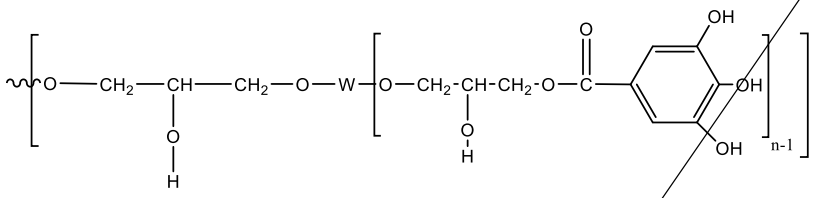


(IV-2).

17. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-3), wherein n is 1 to 4, and Rw2 is OH or the moiety (IVa), provided that no more than one Rw2 is the moiety (IVb-3), wherein ∿∿ represents the point of attachment in this moiety;

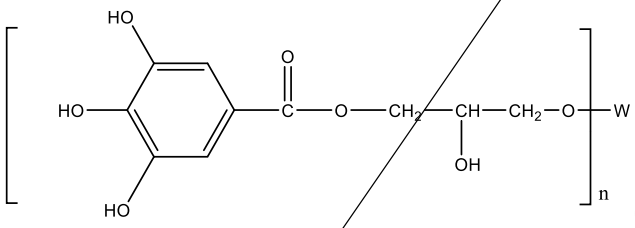


(IVa-3),



(IVb-3).

18. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IV-3), wherein n is 1 to 4;



(IV-3).

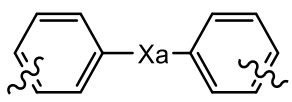
19. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said organic moiety W is selected from the group consisting of moieties of structures (Wa), (Wb), (Wc), (Wd), (We) and (Wf); wherein

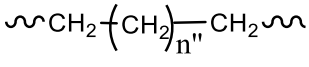
∿∿ represents an attachment point within each of these organic moieties, where it forms an ether bond with the oxygen in said glycidyl hydroxy benzoic acid condensate material of structure (II);

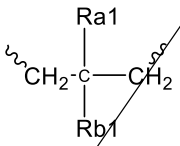
Xa is a moiety selected from the group consisting of a direct valence bond, alkylene, $-SO_2-$, -C(=O)- and -O-;

Ra1, Rb1 and Rc are independently selected from a C_1 to C_5 alkyl or C_2 to C_5 alkyleneoxyalkyl;

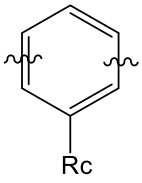
Ra2 is selected from a C_1 to C_5 alkyl an C_2 to C_5 alkyleneoxyalkyl, a C_1 to C_5 alkyloxy, a halide, a C_1 to C_5 alkylsulfonyl a C_1 to C_5 alkylcarbonyl, and a C_1 to C_5 alkylcarbonyloxy, and n'' ranges from 0 to 12;

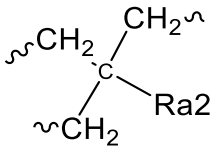


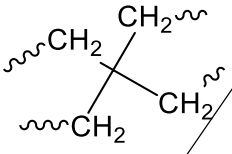
(Wa),


(Wb),


(Wc),

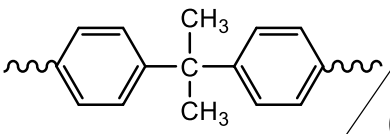
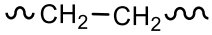
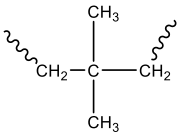
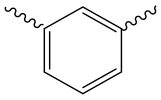
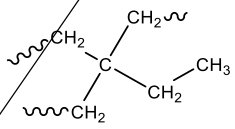


(Wd),


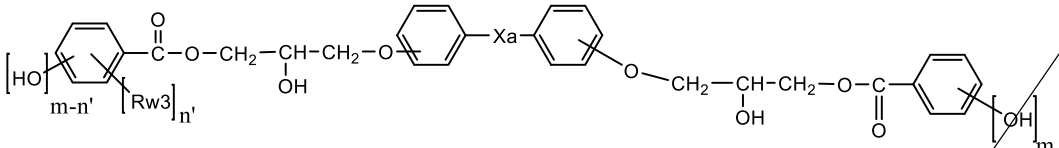
(We),


(Wf).

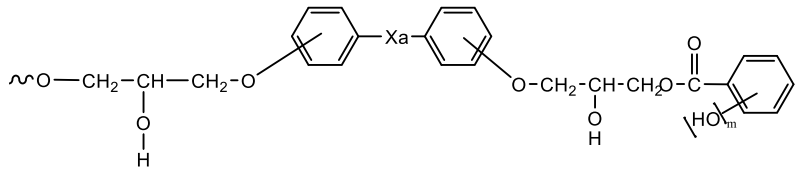
20. The positive working photosensitive composition of any one of Claims 1 to 3 said organic moiety W is selected from the group consisting of moieties of structure (Wa1), (Wb1), (Wc1), (Wd1), and (We1) wherein;

~~~ represents an attachment point within each of these organic moieties, where it forms an ether bond with the oxygen in said glycidyl hydroxy benzoic acid condensate material of structure (II);



(Wa1),


(Wb1),


(Wc1),


(Wd1),


(We1).

21. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-1), wherein Rw3 is OH, or a moiety of structure (Vb-1), wherein ~~~ represents the point of attachment in this moiety, provided

m is 2 to 3,

n' is 1 or 0; and
~~~

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O- ;



(Va-1),

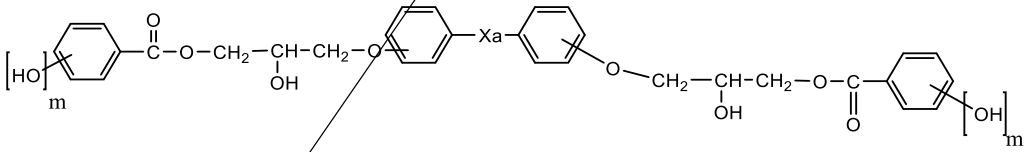


(Vb-1).

22. The positive working photosensitive composition of Claim 21 wherein m is 2.

23. The positive working photosensitive composition of Claim 21 wherein m is 3.

24. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-1), wherein m is 2 to 3, and further wherein,
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-.



(V-1).

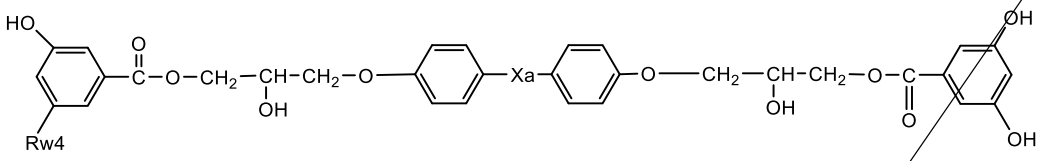
25. The positive working photosensitive composition of Claim 24 wherein m is 2.

26. The positive working photosensitive composition of Claim 24 wherein m is 3.

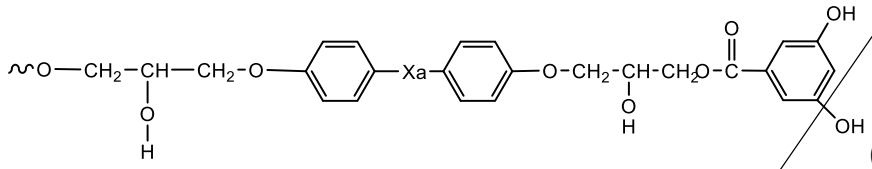
27. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-2), wherein Rw4 is OH or a moiety of structure (Vb-2),

wherein ~~ represents the point of attachment in this moiety, and further wherein,

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-,



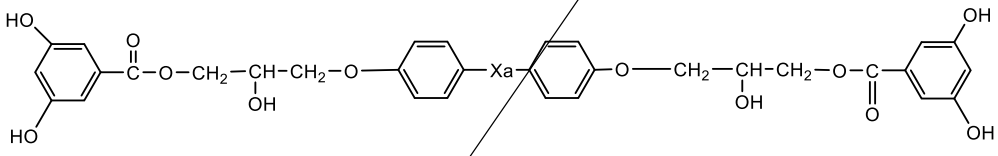
(Va-2),



(Vb-2).

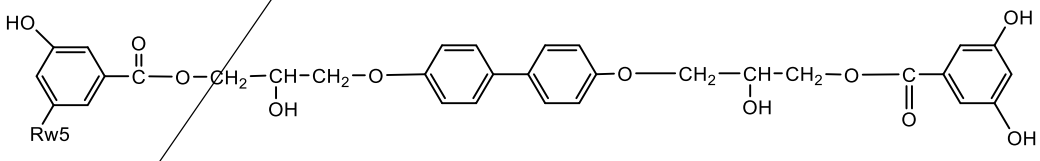
28. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-2), and further wherein,

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-

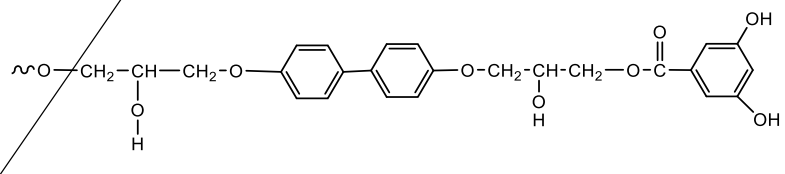


(V-2).

29. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-3), wherein Rw5 is OH or a moiety of structure (Vb-3), wherein ~~ represents the point of attachment in this moiety;

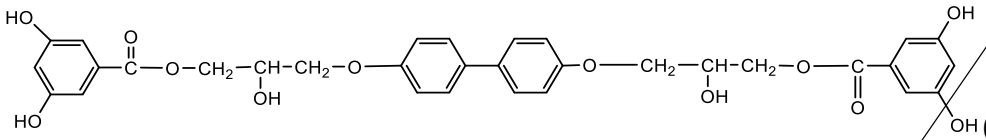


(Va-3),

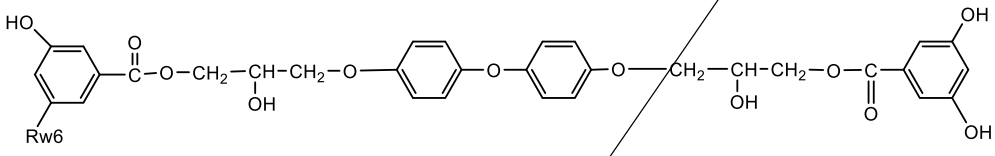


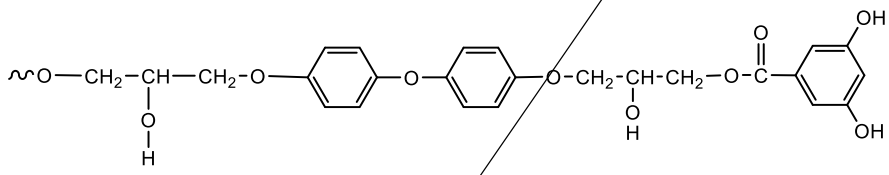
(Vb-3).

30. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material is the compound having structure (V-3),

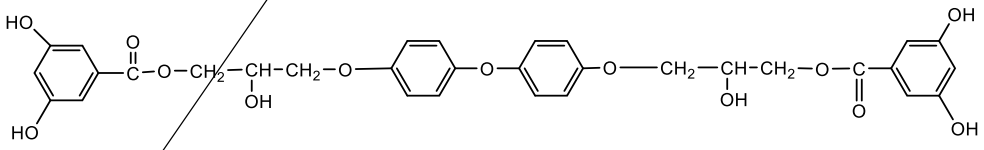

(V-3).

31. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-4), wherein Rw6 is OH or a moiety of structure (Vb-4), wherein ∿∿ represents the point of attachment in this moiety

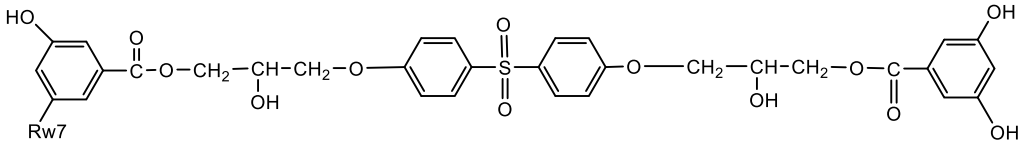

(Va-4),

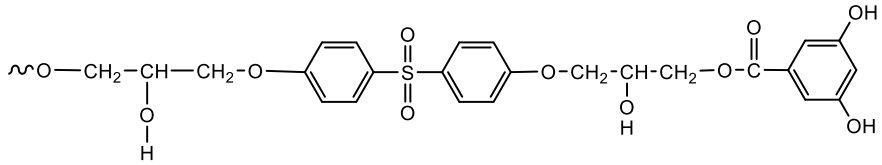

(Vb-4).

32. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate is the compound having structure

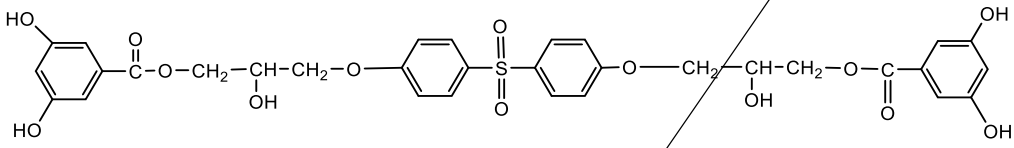

(V-4), (V-4).

33. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-5), wherein Rw7 is OH or a moiety of structure (Vb-5), wherein ∿∿ represents the point of attachment in this moiety,

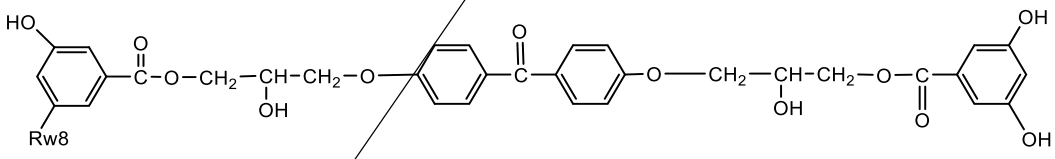

(Va-5),

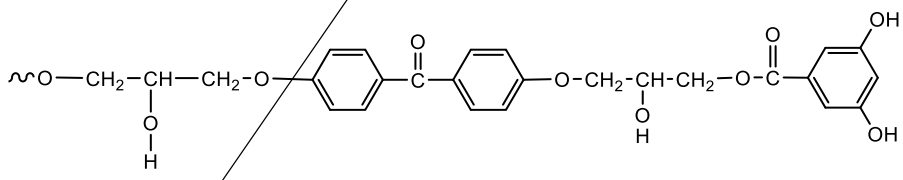

(Vb-5).

34. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material is the compound having structure, (V-5),

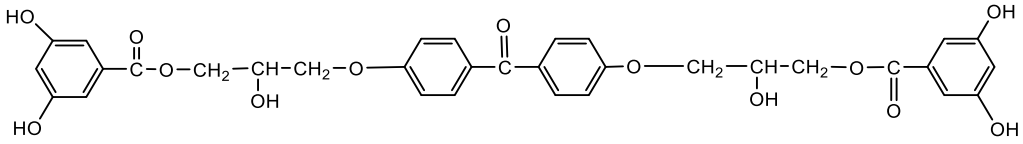

(V-5).

35. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-6), wherein Rw8 is OH or a moiety of structure (Vb-6), wherein ∿∿ represents the point of attachment in this moiety,

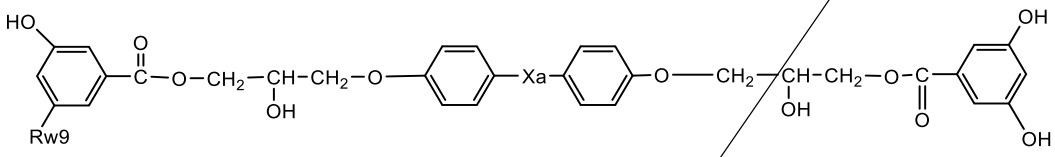

(Va-6),

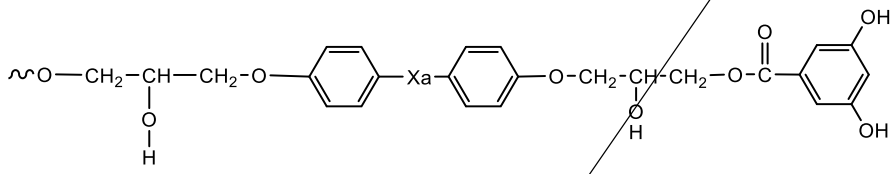

(Vb-6).

36. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-6),

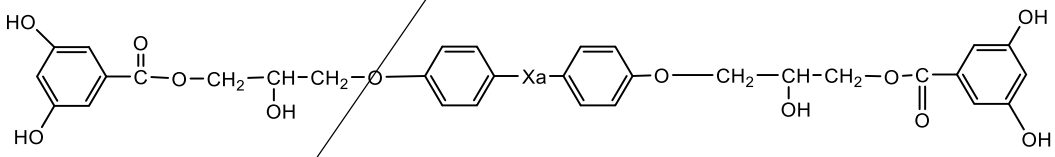

(V-6).

37. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-7), wherein Rw9 is OH or a moiety of structure (Vb-7), wherein ∿∿ represents the point of attachment in this moiety, and further wherein Xa is an alkylene moiety,

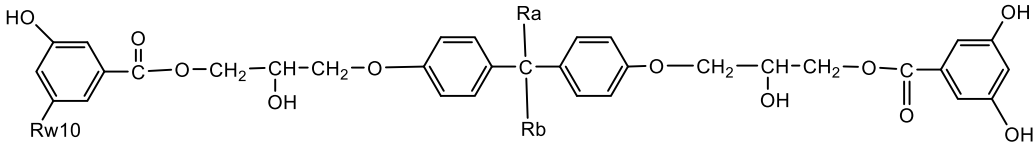

(Va-7),

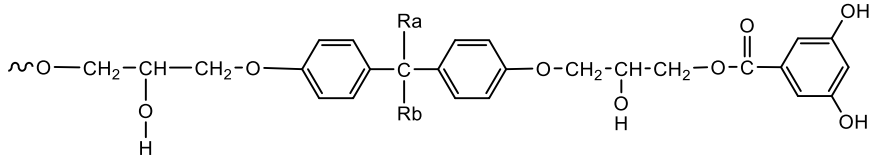

(Vb-7).

38. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-7), wherein Xa is an alkylene moiety,

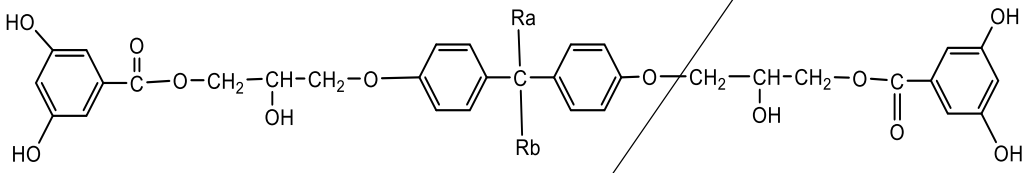

(V-7).

39. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-8), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety, and Rw10 is OH or a moiety of structure (Vb-8), wherein ∿∿ represents the point of attachment in this moiety,

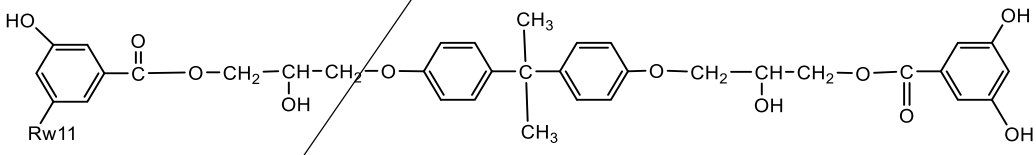

(Va-8),

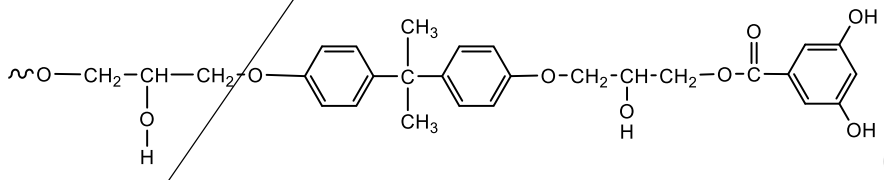

(Vb-8).

40. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-8), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety,

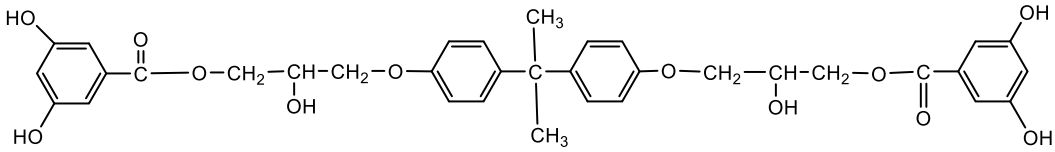

(V-8).

41. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-9), wherein Rw11 is OH or a moiety of structure (Vb-9), wherein ∿∿ represents the point of attachment in this moiety


(Va-9),

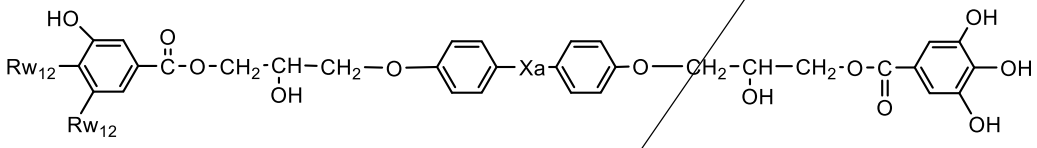

(Vb-9).

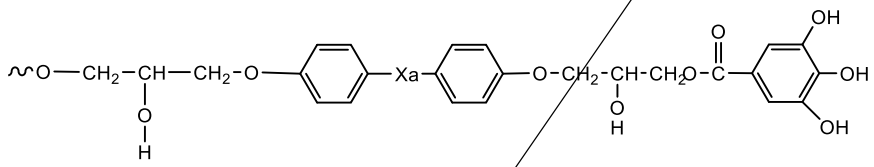
42. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material is a compound having structure (V-9),


(V-9).

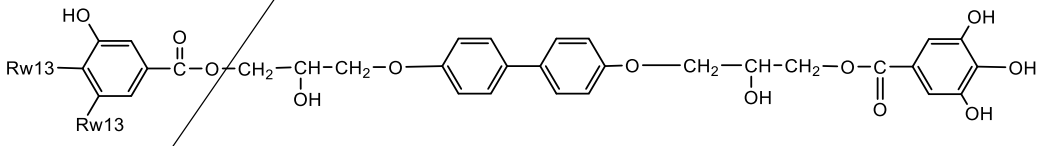
43. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-10), wherein Rw12 is OH or the moiety (Vb-10), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw12 is the moiety (Vb-10), and further wherein,

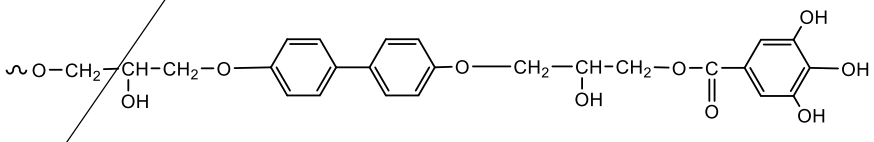
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-;


(Va-10),


(Vb-10).

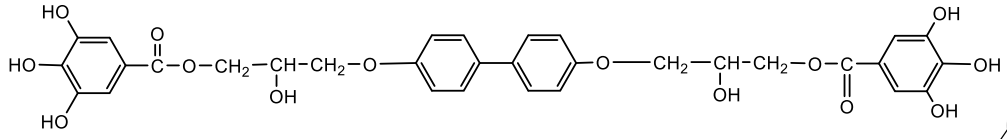
44. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-11), wherein Rw13 is OH or the moiety (Vb-11), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw13 is (Vb-11),


(Va-11),


(Vb-11).

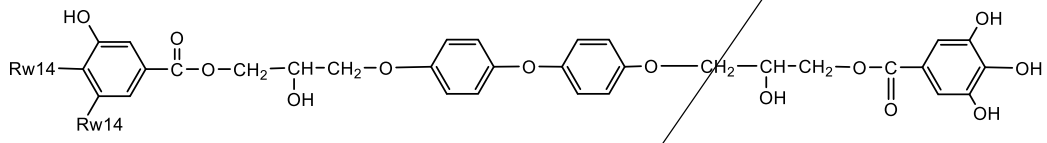
45. The positive working photosensitive composition of any one of Claims 1 to 3

wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-11),

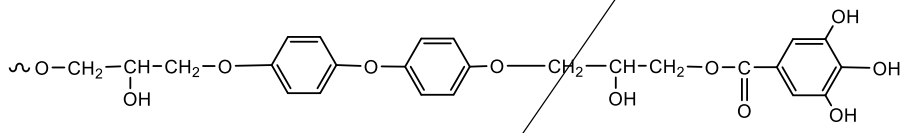


(V-11).

46. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-12), wherein Rw14 is OH or the moiety (Vb-12), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw14 is the moiety (Vb-12),

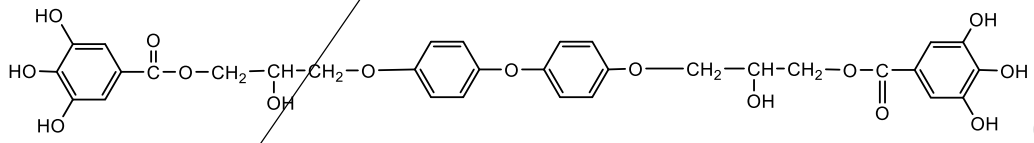


(Va-12),



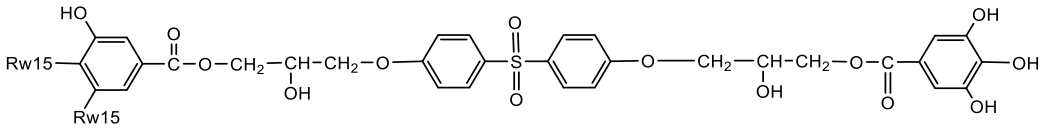
Vb-12.

47. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-12),

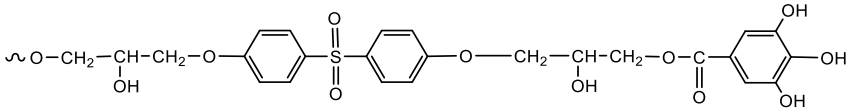


(V-12).

48. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-13), wherein Rw15 is OH or the moiety (Vb-13), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw15 is the moiety (Vb-13),

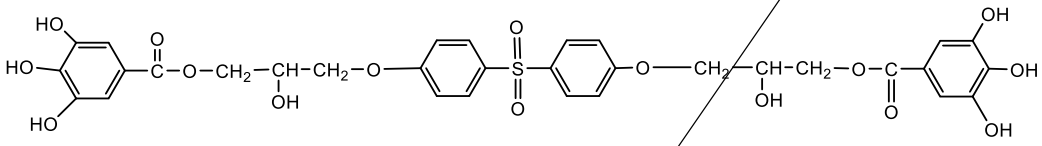


(Va-13),



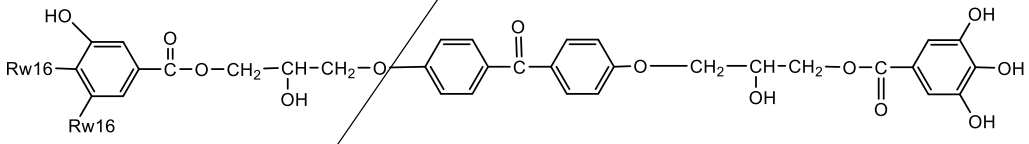
(Vb-13).

49. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-13),

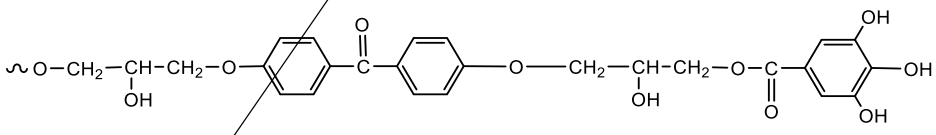


(V-13).

50. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-14), wherein Rw16 is OH or the moiety (Vb-14), wherein ∿∿ represents the point of attachment in this moieties, provided that no more than one Rw16 is the moiety (Vb-14),

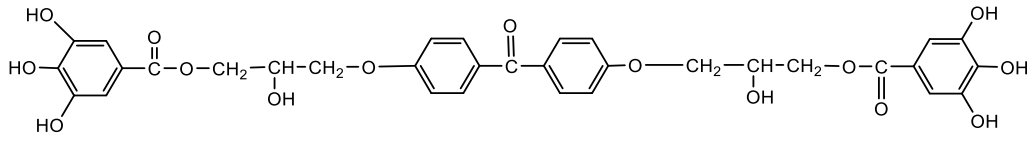


(Va-14),



(Vb-14).

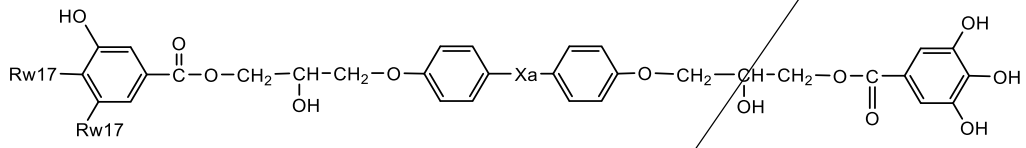
51. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-14),



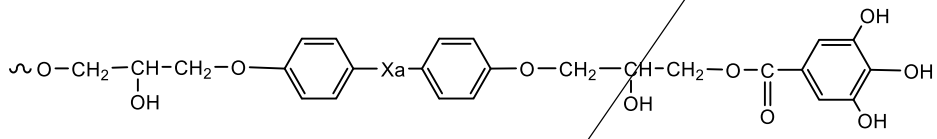
(V-14).

52. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-15), wherein Rw17 is OH or the moiety (Vb-15), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw17 is the moiety (Vb-15), and further wherein

Xa is an alkylene moiety,

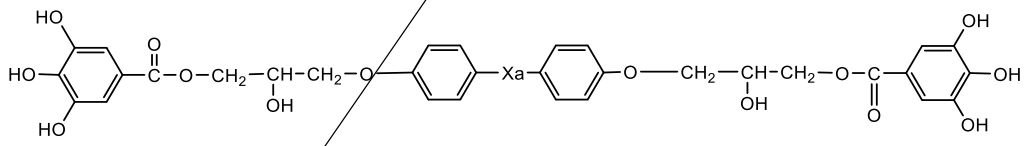


(Va-15),



(Vb-15).

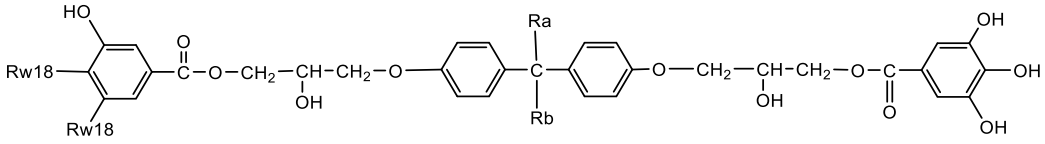
53. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-15), wherein Xa is an alkylene moiety,

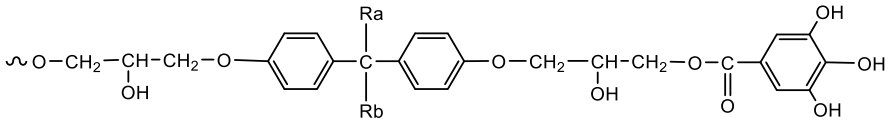


(V-15).

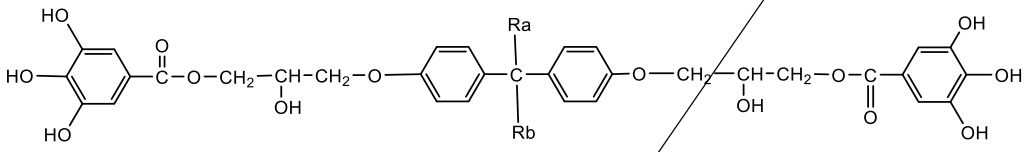
54. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-16), wherein Rw18 is OH or the moiety (Vb-16), wherein ∿∿ represents the point of attachment in these moieties, provided that no more than one Rw18 is the moiety (Vb-16), and further wherein,

Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety,

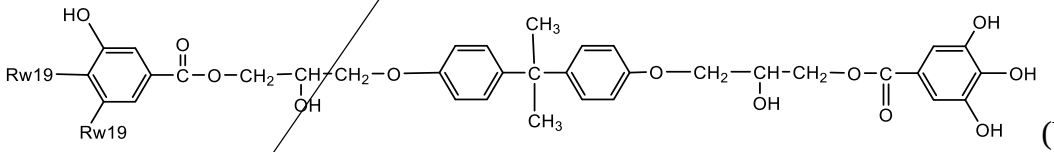

(Va-16)

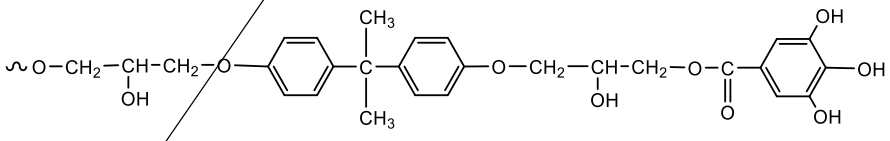

(Vb-16).

55. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-16), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety,

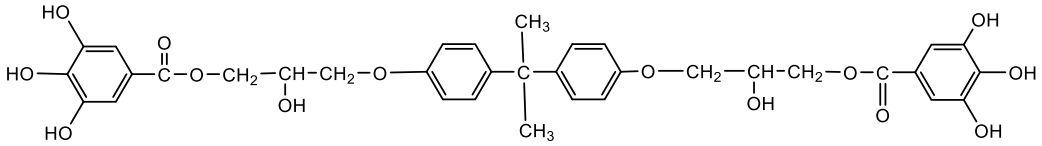

(V-16).

56. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-17), wherein Rw19 is OH or the moiety (Vb-17), wherein ∿∿ represents the point of attachment in these moieties, provided that no more than one Rw19 is the moiety (Vb-17), and further wherein,


(Va-17),


(Vb-17).

57. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-17),



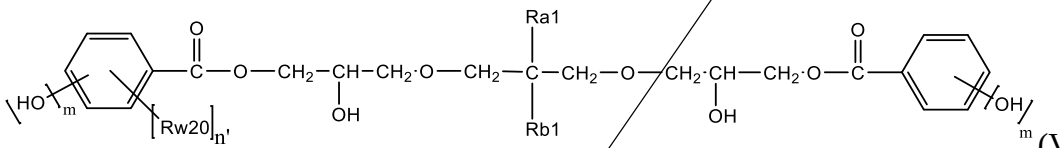
(V-17).

58. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VIa-1), wherein Rw20 is OH, or a moiety of structure (VIb-1), wherein ~~ represents the point of attachment in this moiety, provided that

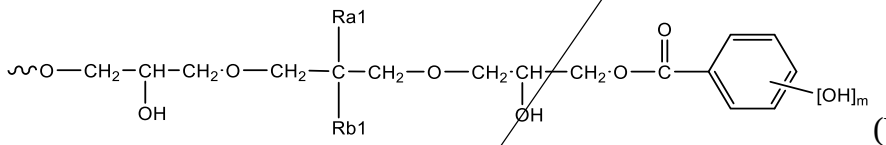
m is 2 to 3,

n' is 0 or 1, and further wherein,

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

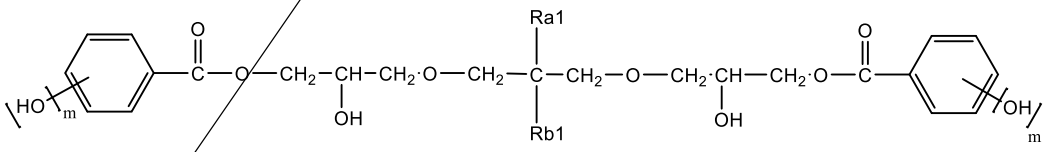


(VIa-1),



(VIb-1).

59. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VI-1), wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety, and m is 2 or 3

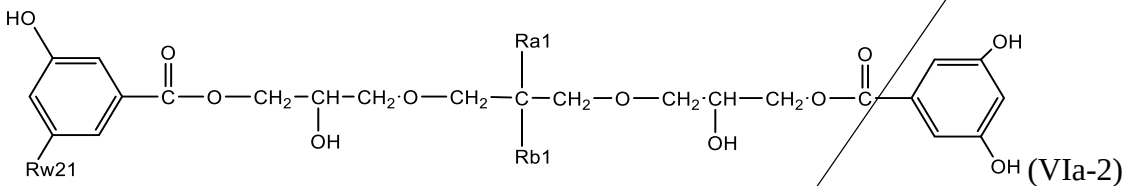


(VI-1).

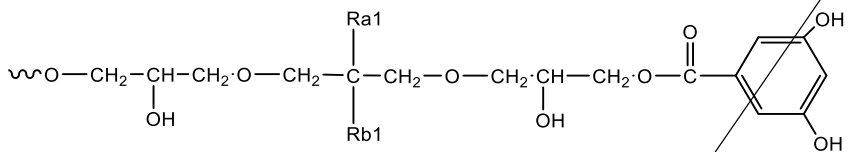
60. The positive working photosensitive composition of Claim 59 wherein m is 3.

61. The positive working photosensitive composition of Claim 59 wherein m is 2.

62. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VIa-2), wherein Rw21 is OH or a moiety of structure (VIb-2), wherein ∿∿ represents the point of attachment in this moiety, and further wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

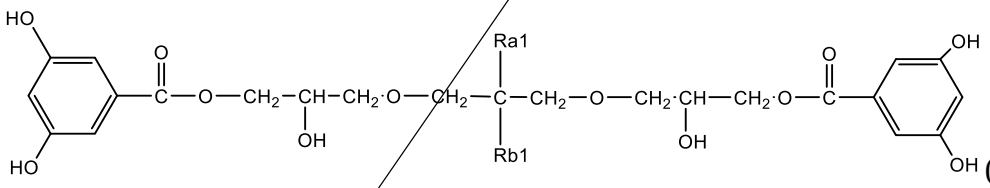


(VIa-2)



(VIb-2).

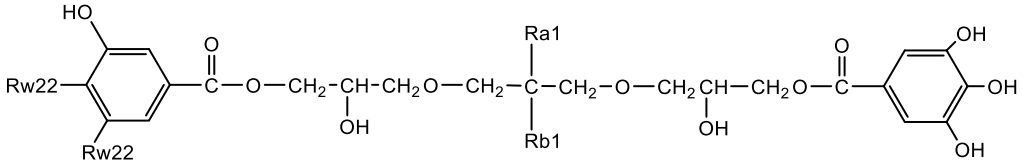
63. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VI-2), wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,



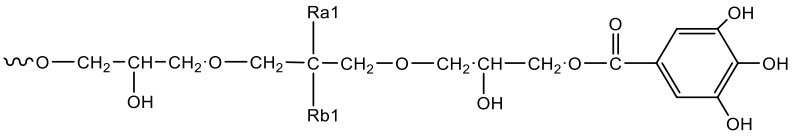
(VI-2).

64. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIa-3), wherein Rw22 is OH or the moiety (VIb-3), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw22 is the moiety (VIb-3), and further wherein,

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

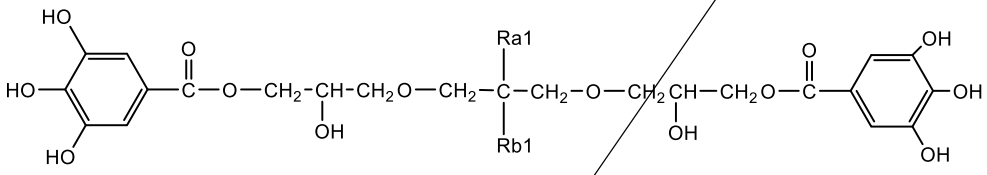


(VIa-3),



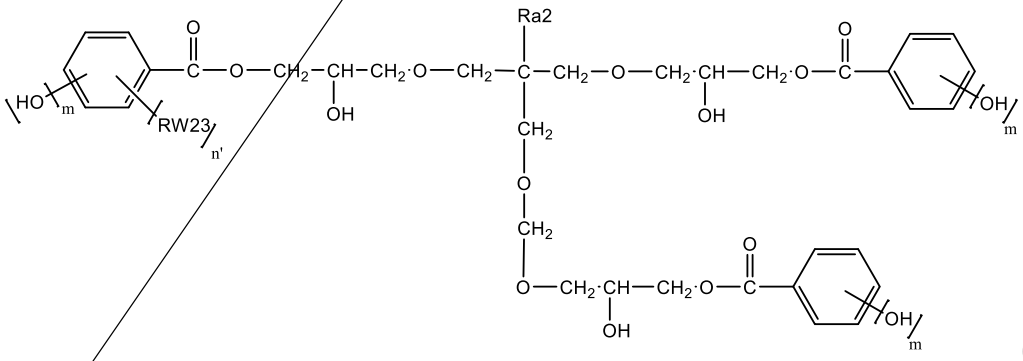
(VIb-3).

65. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VI-3), wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

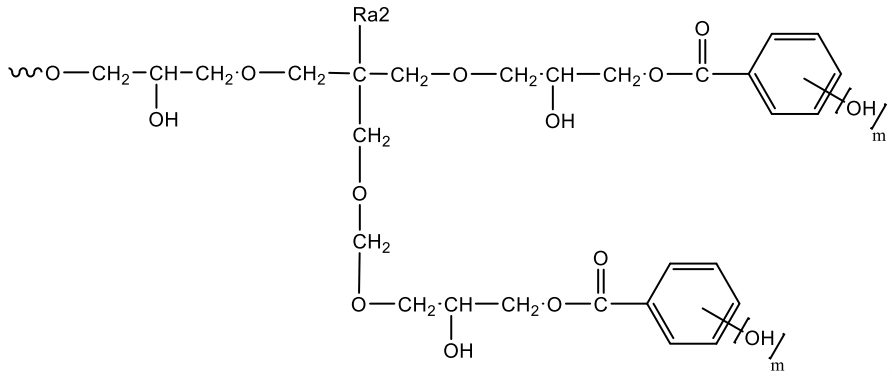


(VI-3).

66. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-1), wherein Rw23 is OH, or a moiety of structure (VIIb-1), wherein ~~ represents the point of attachment in this moiety, provided
m is 1, 2 or 3, and n' is 0 or 1, and further wherein,
Ra2 is selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety;



(VIIa-1),



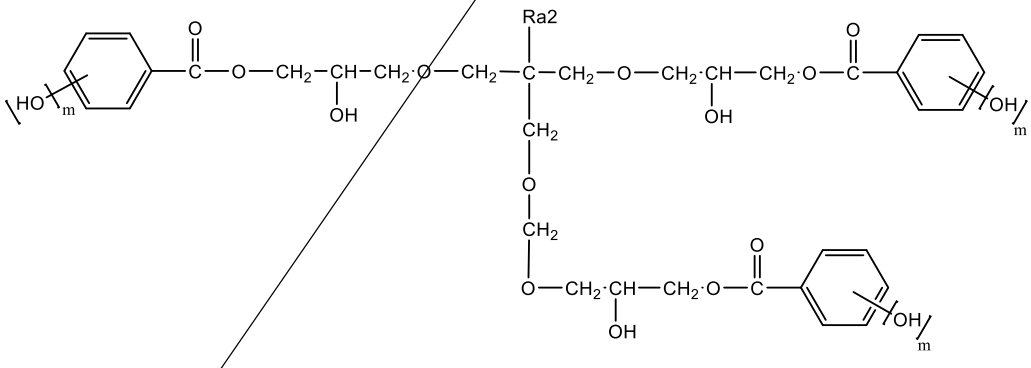
(VIIb-1).

67. The positive working photosensitive composition of Claim 66 wherein m is 3.

68. The positive working photosensitive composition of Claim 66 wherein m is 2.

69. The positive working photosensitive composition of Claim 66 wherein m is 1.

70. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VII-1), wherein Ra2 is selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety, and m is 1, 2 or 3,



(VII-1).

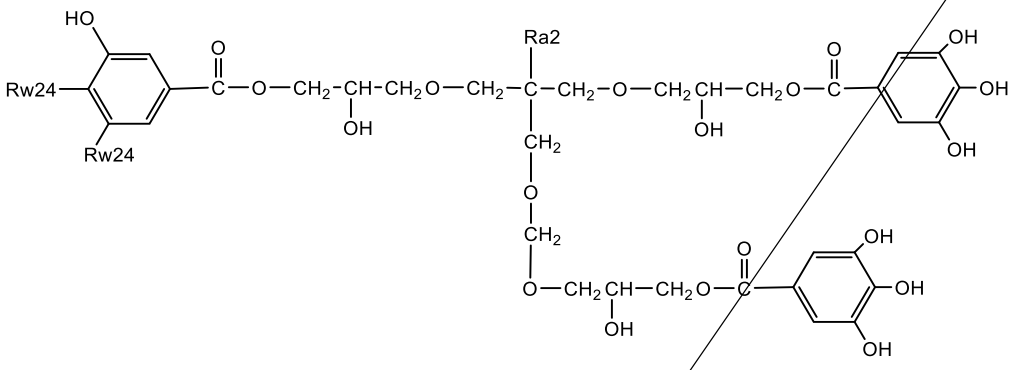
71. The positive working photosensitive composition of Claim 70 wherein m is 3.

72. The positive working photosensitive composition of Claim 70 wherein m is 2.

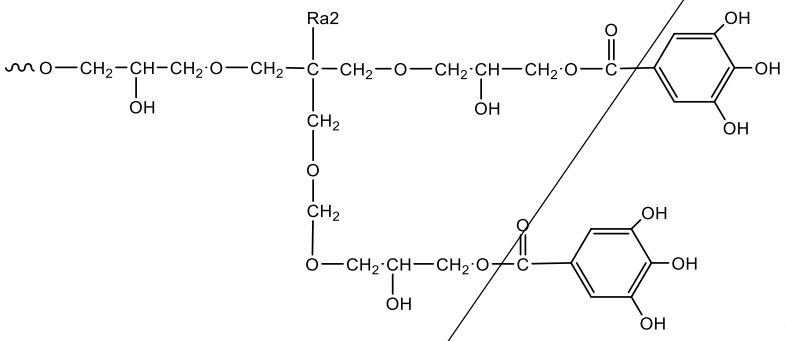
73. The positive working photosensitive composition of Claim 70 wherein m is 1.

74. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-2), wherein Rw24 is OH or the moiety (VIIb-2), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw24 is the moiety (VIIb-2), and further wherein,

Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

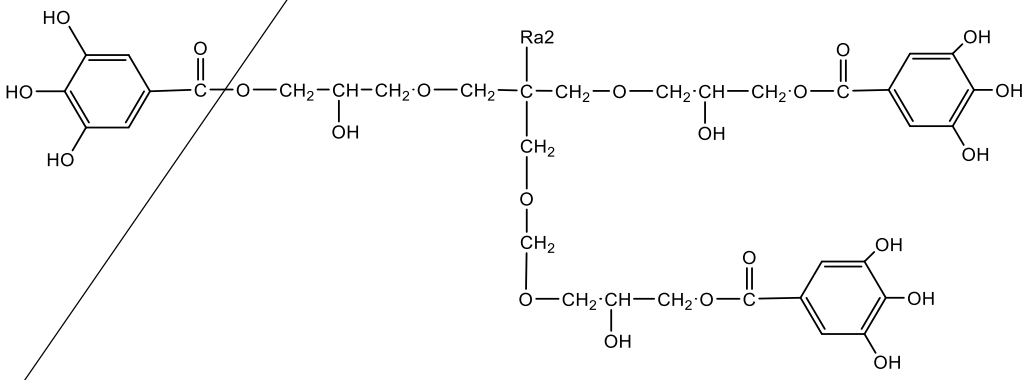


(VIIa-2),



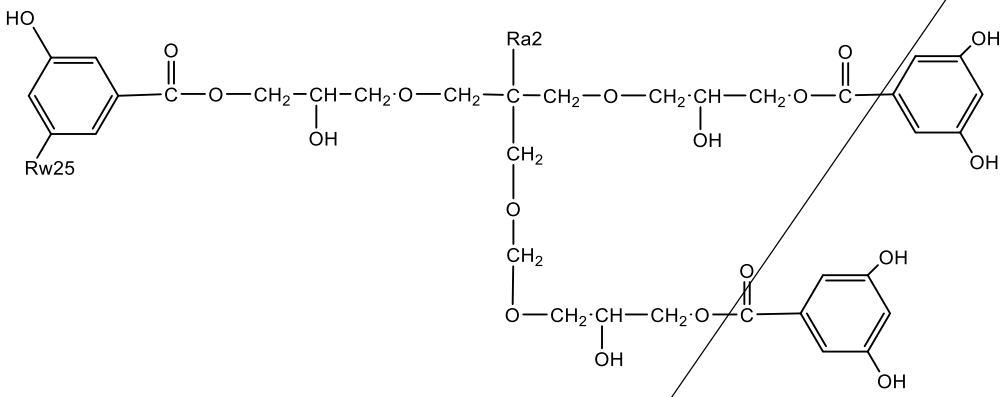
(VIIb-2).

75. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material has structure (VII-2), wherein Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

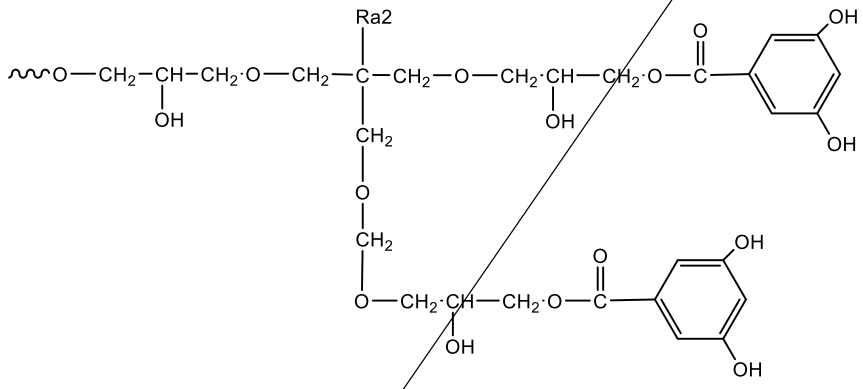


(VII-2).

76. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-3), wherein Rw25 is OH or the moiety (VIIb-3), wherein ~~ represents the point of attachment in this moiety, provided that no more than one Rw25 is the moiety (VIIb-3), and further wherein, Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

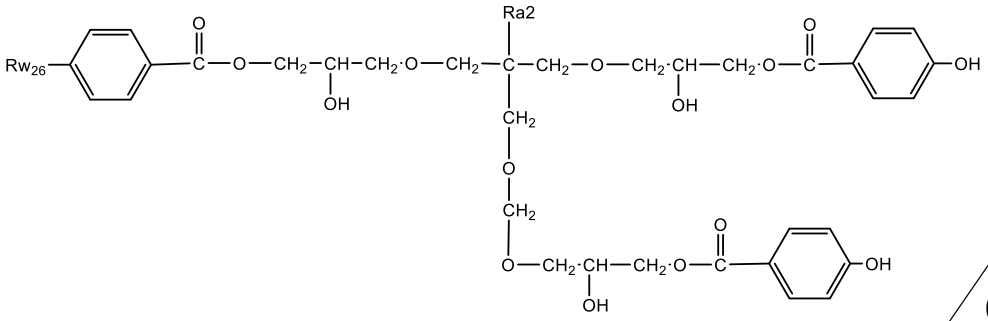


(VIIa-3),

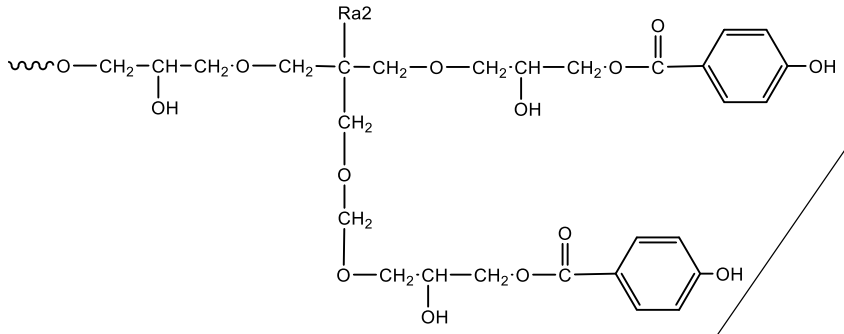


(VIIb-3).

77. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-4), wherein Rw26 is OH or the moiety (VIIb-4), wherein ~~ represents the point of attachment in this moiety, provided that no more than one Rw26 is the moiety (VIIb-4), and further wherein, Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

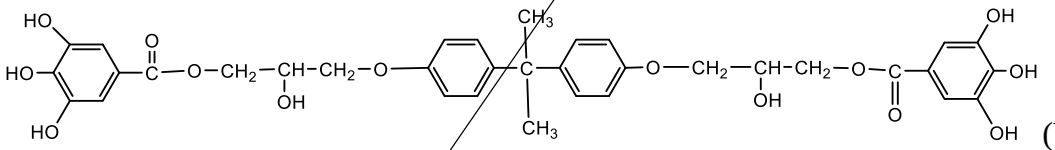


(VIIa-4),

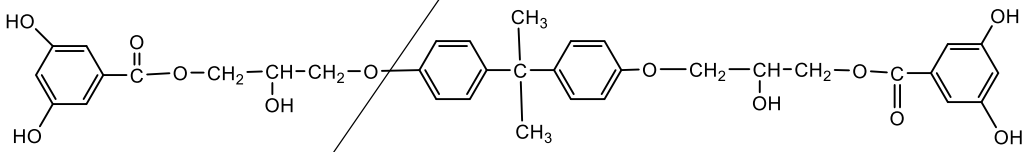


(VIIb-4).

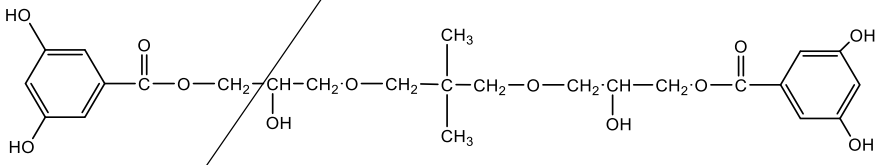
78. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is selected from the group consisting of (VIII), (VIIIa), (VIIIb), (VIIIc), (VIIId) and (VIIIe);



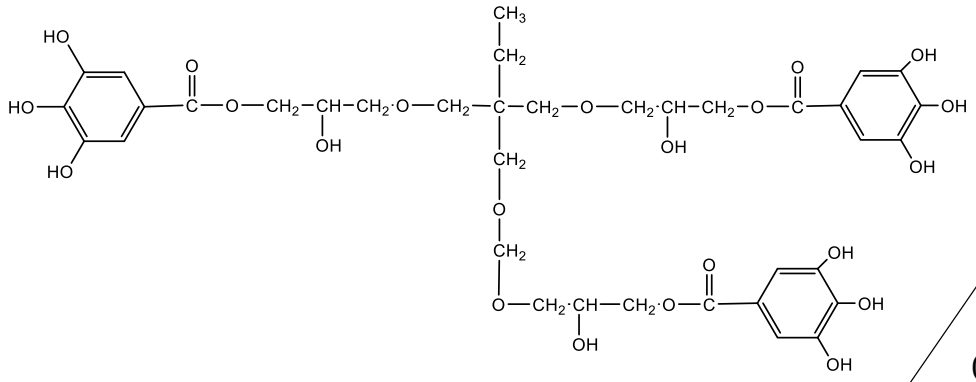
(VIII),



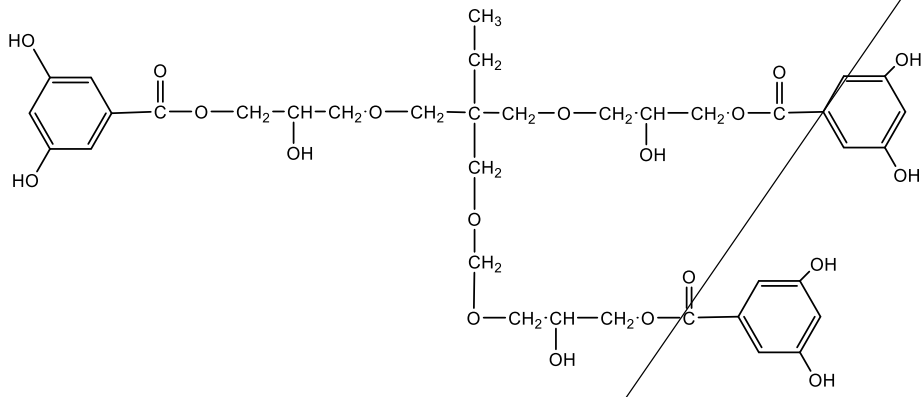
(VIIIa),



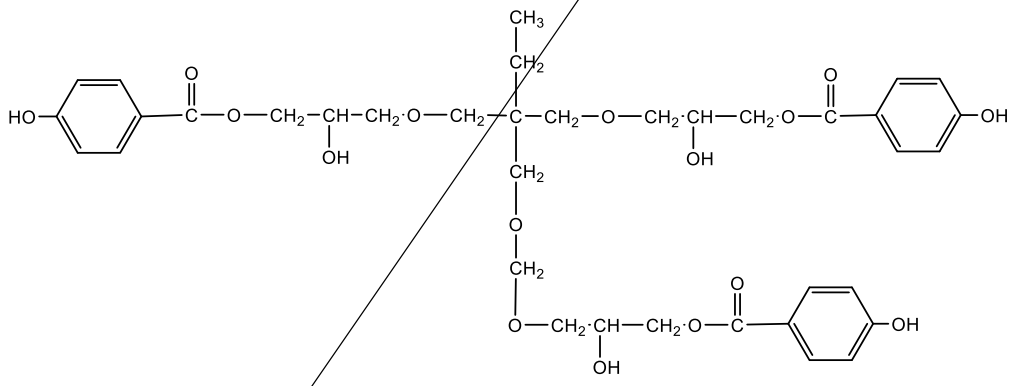
(VIIIb),



(VIIIc),



(VIIId),



(VIIIe).

79. The positive working photosensitive composition of any one of Claims 1 to 3 wherein the at least one photoacid generator is an onium salt, a dicarboximidyl sulfonate ester, an oxime sulfonate ester, a diazo(sulfonyl methyl) compound, a disulfonyl methylene hydrazine compound, a nitrobenzyl sulfonate ester, a biimidazole compound, a diazomethane derivative, a glyoxime derivative, a β-ketosulfone derivative, a disulfone derivative, a sulfonic acid ester derivative, an imidoyl sulfonate derivative, or a halogenated triazine compound.

80. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said Novolak, polymer comprises one or more cresylic repeat units chosen from o-cresol, p-cresol or m-cresol.

81. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said Novolak polymer, is a cresylic Novolak comprising at least 80 mole percent m-cresol.

82. The positive working photosensitive composition of any one of Claims 1 to 3, wherein, said acrylate polymer, is one wherein A is a methylene group, an ethylene group or a 1,2-propylene group, B is a methyl group, an ethyl group, a propyl group, or a butyl group, C is a methyl group, an ethyl group, a propyl group, a butyl group, a cyclohexyl group, an isobornyl group or a tetrahydrodicyclopentadienyl group, D is a direct valence bond, a methylene or an ethylene group, E is a methylene group, an ethylene group or a 1,2-propylene group.

83. The positive working photosensitive composition of any one of Claims 1 to 3, wherein, said acrylate polymer is one wherein G is a high activation energy acid labile group selected from a tertiary alkyl which has at least one vicinal hydrogen to the tertiary attachment point of the oxygen of the carboxylate in the repeat unit designated by z forming a tertiary ester, or a low activation energy protection group selected from an acetal or ketal formed with the oxygen of the carboxylate in the repeat unit designated by z.

84. The positive working photosensitive composition of any one of Claims 1 to 3, wherein, said acrylate polymer is one wherein G is an acid cleavable group chosen from a t-butyl group, a tetrahydropyran-2-yl group, a tetrahydrofuran-2-yl group, a 4-methoxytetrahydropyran-4-yl group, a 1-ethoxyethyl group, a 1-butoxyethyl group, a 1-propoxyethyl group, a 3-oxocyclohexyl group, a 2-methyl-2-adamantyl group, a 2-ethyl-2-adamantyl group, a 8-methyl-8-tricyclo[5.2.1.0 2,6]decyl group, a 1,2,7,7-tetramethyl-2-norbornyl group, a 2-acetoxymenthyl group, a 2-hydroxymenthyl group a 1-methyl-1-

cyclohexylethyl group, a 4-methyl-2-oxotetrahydro-2H-pyran-4-yl group, a 2,3-dimethylbutan-2-yl group, a 2,3,3-trimethylbutan-2-yl group, a 1-methyl cyclopentyl group, a 1-ethyl cyclopentyl group, a 1-methyl cyclohexyl group, 1-ethyl cyclohexyl group, a 1,2,3,3-tetramethylbicyclo[2.2.1]heptan-2-yl group, a 2-ethyl-1,3,3-trimethylbicyclo[2.2.1]heptan-2-yl group, a 2,6,6-trimethylbicyclo[3.1.1]heptan-2-yl group, a 2,3-dimethylpentan-3-yl group, or a 3-ethyl-2-methylpentan-3-yl group.

85. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said acrylate polymer is one wherein t is 0 mole%, v is about 2 mole% to about 15 mole%, w is 0 mole%, x is about 5 mole% to about 30 mole%, y is about 20 mole% to about 45 mole%, and z is about 20 mole% to about 45 mole%, R_2 is methyl, R_4 and R_5 are methyl, and R_6 is H.

86. The positive working photosensitive composition of Claim 85, wherein D is methylene, Ar is Phenyl, E is a $-CH_2-CH(CH_3)-$ group, wherein the $-CH_2-$ part of this group is attached to the carboxylate oxygen of the repeat unit designated by y, and G is a tert-butyl group.

87. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said acrylate polymer is one wherein t is 0 mole%, v is about 2 mole% to about 15 mole%, w is about 5 mole% to about 20 mole%, x is about 5 mole% to about 50 mole%, y is about 20 mole% to about 45 mole%, and z is about 20 mole% to about 45 mole%, R_2 and R_3 are H and R_3, R_4 and R_6 are methyl.

88. The positive working photosensitive composition of Claim 87, wherein A is an ethylene group, B is methyl, D is methylene, Ar is Phenyl, E is a $-CH_2-CH(CH_3)-$ group wherein the $-CH_2-$ part of this group is attached to the carboxylate oxygen of the repeat unit designated by y, and G is a tert-butyl group or a 1-ethylcyclopentyl group.

89. The positive working photosensitive composition of any one of Claims 1 to 81, wherein said acrylate polymer is one wherein t is about 5 mole% to about 30 mole%, v is

about 2 mole% to about 15 mole%, w is 0 mole%, x is 0 mole%, y is about 20 mole% to about 45 mole%, and z is about 20 mole% to about 45 mole%, R_1 is methyl, R_2 is H, R_5 and R_6 are methyl.

90. The positive working photosensitive composition of Claim 89, wherein C is methyl, E is a $-CH_2-CH(CH_3)-$ group wherein the $-CH_2-$ part of this group is attached to the carboxylate oxygen of the repeat unit designated by y, and G is a tert-butyl group or a 1-ethylcyclopentyl group.

91. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said acrylate polymer is one wherein t is about 5 mole% to about 30 mole%, v is about 2 mole% to about 15 mole%, w is 0 mole%, x is about 10 mole% to about 30 mole%, y is about 20 mole% to about 45 mole%, and z is about 20 mole% to about 45 mole%, R_1, R_2, R_4 and R_5, are methyl, and R_6 is H.

92. The positive working photosensitive composition of Claim 91, wherein C is isobornyl or tetrahydrodicyclopentadienyl, E is a $-CH_2-CH(CH_3)-$ group wherein the $-CH_2-$ part of this group is attached to the carboxylate oxygen of the repeat unit designated by y, and G is a tert-butyl group or a 1-ethylcyclopentyl group.

93. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said acrylate polymer is one wherein t is 0 mole%, v is 0 mole%, w is about 5 mole% to about 20 mole%, x is about 5 mole% to about 30 mole%, y is about 20 mole% to about 45 mole%, and z is about 20 mole% to about 45 mole%, R_3 is H, R_4, R_5 and R_6 are methyl.

94. The positive working photosensitive composition of Claim 93, wherein A is an ethylene group, B is methyl, D is methylene, Ar is Phenyl, E is a $-CH_2-CH(CH_3)-$ group wherein the $-CH_2-$ part of this group is attached to the carboxylate oxygen of the repeat unit designated by y, and G is a tert-butyl group or a 1-ethylcyclopentyl group.

95. The positive working photosensitive composition of any one of Claims 1 to 3 wherein the heterocyclic thiol is selected from a group consisting of unsubstituted triazole thiol, substituted triazole thiol, unsubstituted imidazole thiol, substituted imidazole thiol, substituted triazine thiol, unsubstituted triazine thiol, a substituted mercapto pyrimidine, unsubstituted mercapto pyrimidine, a substituted thiadiazole-thiol, unsubstituted thiadiazole-thiol, substituted indazole thiol, unsubstituted indazole thiol, tautomers thereof, and combinations thereof.

96. The positive working photosensitive composition of any one of Claims 1 to 3 wherein the heterocyclic thiol is selected from a group consisting of 1,3,5-triazine-2,4,6-trithiol, 2-mercapto-6-methylpyrimidin-4-ol, 3-mercapto-6-methyl-1,2,4-triazin-5-ol, 2-mercaptopyrimidine-4,6-diol, 1H-1,2,4-triazole-3-thiol, 1H-1,2,4-triazole-5-thiol, 1H-imidazole-2-thiol, 1H-imidazole-5-thiol, 1H-imidazole-4-thiol, 2-azabicyclo[3.2.1]oct-2-ene-3-thiol, 2-azabicyclo[2.2.1]hept-2-ene-3-thiol, 1H-benzo[d]imidazole-2-thiol, 2-mercapto-6-methylpyrimidin-4-ol, 2-mercaptopyrimidin-4-ol, 1-methyl-1H-imidazole-2-thiol, 1,3,4-thiadiazole-2,5-dithiol, 1H-indazole-3-thiol, tautomers thereof and combinations thereof.

97. The positive working photosensitive composition of any one of Claims 1 to 3 wherein the composition further comprises a basic quencher.

98. The positive working photosensitive composition of Claim 97 wherein said basic quencher is selected from an amine, or a tetralkylammonium carboxylate salt.

99. The positive working photosensitive composition of Claim 97 wherein said basic quencher is an amine.

100. The positive working photosensitive composition of Claim 97 wherein said basic quencher is a tetraalkylammonium carboxylate salt.

101. The positive working photosensitive composition of Claim 97 wherein said basic

quencher is a tetraalkylammonium carboxylate salt of a mono functional aliphatic carboxylic acid or a bis[tetraalkylammonium] salt of an aliphatic dicarboxylic acid.

102. The positive working photosensitive composition of Claim 97 wherein said basic quencher is a carboxylate salt of a mono functional aliphatic carboxylic acid.

103. The positive working photosensitive composition of Claim 97 wherein said basic quencher is a bis[tetraalkylammonium] salt of an aliphatic dicarboxylic acid.

104. The positive working photosensitive composition of Claim 97 wherein said bis[tetraalkylammonium] salt of an aliphatic dicarboxylic acid is selected from the salts wherein the bis[tetraalkylammonium] moiety is selected from bis[tetramethylammonium], bis[tetraethylammonium], bis[tetrapropylammonium], bis[tetrabutylammonium], and bis[tetrapentylammonium], bis[benzyltrimethylammonium] and the dicarboxylate is selected from oxalate, malonate, succinate, adipate, and heptadionate.

105. The positive working photosensitive composition of any one of Claims 1 to 104, wherein said solvent is an organic solvent selected from either the group consisting of an organic butyl acetate, amyl acetate, cyclohexyl acetate, 3-methoxybutyl acetate(MBA), methyl ethyl ketone, methyl amyl ketone, cyclohexanone, cyclopentanone, ethyl-3-ethoxy propanoate, methyl-3-ethoxy propanoate, methyl-3-methoxy propanoate, methyl acetoacetate, ethyl acetoacetate, diacetone alcohol, methyl pivalate, ethyl pivalate, propylene glycol monomethyl ether, propylene glycol monoethyl ether, propylene glycol monomethyl ether acetate, propylene glycol propyl ether acetate, propylene glycol monoethyl ether propanoate, ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, 3-methyl-3-methoxybutanol, N-methyl-2-pyrrolidone, anisole, dimethyl sulfoxide, gamma-butyrolactone, methyl lactate, ethyl lactate, propyl lactate, tetramethylene sulfone, propylene glycol dimethyl ether, dipropylene glycol dimethyl ether, ethylene glycol dimethyl ether or diethylene glycol dimethyl ether, and gamma butyrolactone or a mixture of solvents from this group.

106. A method of forming a positive relief image comprising:

a) forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 105 to a substrate, thus forming a film and then baking the film;

b) image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

c) developing the latent image in a developer.

107. A method of forming a positive relief image comprising:

a') forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 105 to a substrate thus forming a film and then baking the film;

b') image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

c') thermally treating the image-wise exposed photosensitive layer forming a baked latent image.

d') developing the baked latent image in a developer.

108. A method of forming a metal pattern on a substrate comprising:

a'') forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 105 to a substrate thus forming a film, and then baking the film;

b'') image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

c'') developing the latent image in a developer to form a resist pattern on the substrate.

d'') selectively electroplating on the substrate using the resist pattern as a barrier

e'') stripping the resist pattern leaving behind the selectively electroplated metal, thereby creating a metal pattern on the substrate.

109. A method of forming a metal pattern on a substrate comprising:

a''') forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 105 to a substrate thus forming a film and then baking the film;

b''') image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

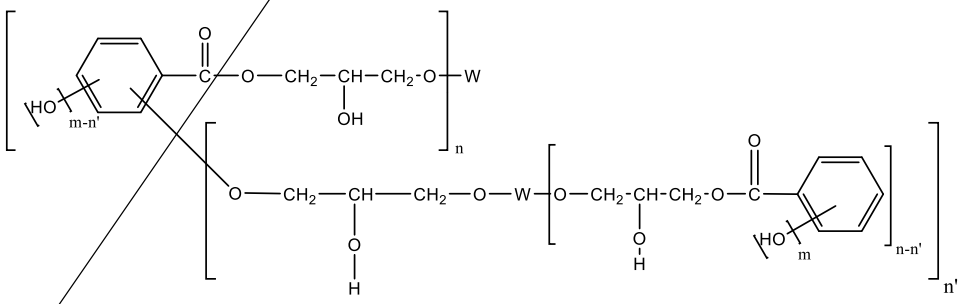
c''') thermally treating the image-wise exposed photosensitive layer forming a baked latent image.

d''') developing the baked latent image in a developer to form a resist pattern on the substrate.

e''') selectively electroplating on the substrate using the resist pattern as a barrier

f''') stripping the resist pattern leaving behind the selectively electroplated metal, thereby creating a metal pattern on the substrate.

110. A glycidyl hydroxy benzoic acid condensate material comprising one or more compounds having structure (II),



(II),

wherein,

W is an organic moiety having a molecular weight of 600 or less, wherein W forms an ether bond with the oxygen to which it is bound,

m is an integer from 1 to 3 and

n is an integer from 1 to 4, and further provided that

when m is 1, n is 3 or 4,

and when m is 2 or 3, n is an integer from 1 to 4,

n' is 0 or 1.

111. The glycidyl hydroxy benzoic acid condensate material of Claim 110, wherein the moiety W is an aliphatic moiety selected from the group consisting an aliphatic hydrocarbon, an aliphatic alkyl ether, a bis(alkyl) sulfone, and a bis(alkyl)ketone.

112. The glycidyl hydroxy benzoic acid condensate material of Claim 110, wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aromatic moiety selected from an arene, a polycyclic arene, an bis(aryl)ether, a biphenyl, a bis(aryl) sulfone, bis(phenyl)alkylene, an (alkyl)(aryl)ketone, a bis(aryl)ketone, a bis(aryl) sulfone, and an (alkyl)(aryl) sulfone.

113. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein m is 1.

114. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein m is 2.

115. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein m is 3.

116. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein n is 1.

117. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein n is 2.

118. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110

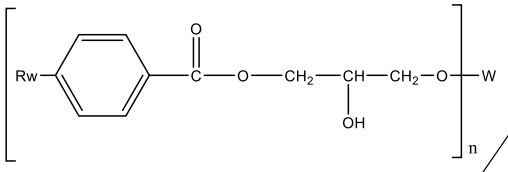
to 112, wherein n is 3.

119. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein n is 4.

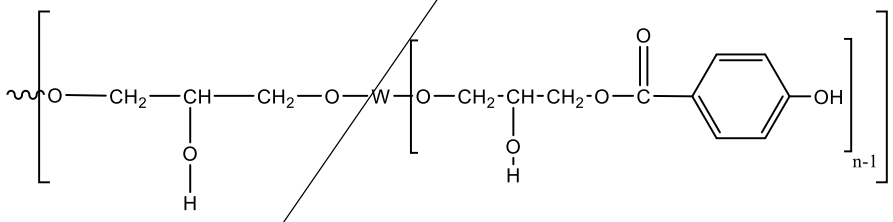
120. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 118, wherein n' is 0.

121. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 118, wherein n' is 1.

122. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 118, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-1), wherein n is 3 to 4, and Rw is OH or the moiety (IVb-1), wherein ~~ represents the point of attachment in this moiety;

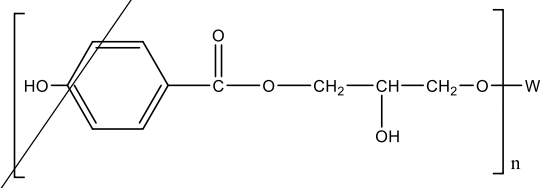


(IVa-1),



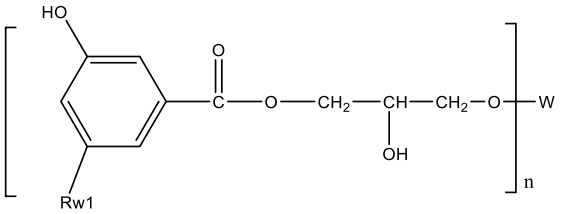
(IVb-1).

123. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IV-1), wherein n is 3 to 4;

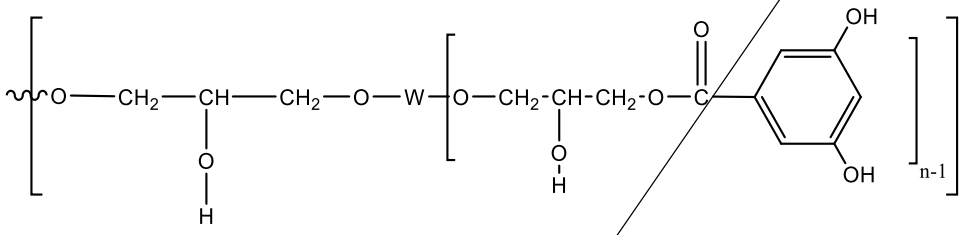


(IV-1).

124. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-2), wherein n is 1 to 4, and Rw1 is OH or the moiety (IVb-2), wherein ~~ represents the point of attachment in this moiety;

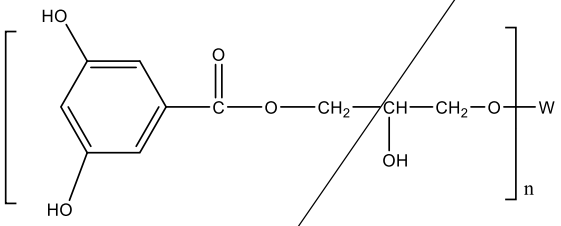


(IVa-2),



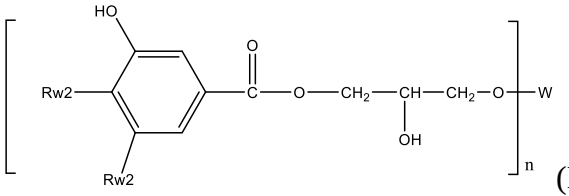
(IVb-2).

125. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IV-2), wherein n is 1 to 4;

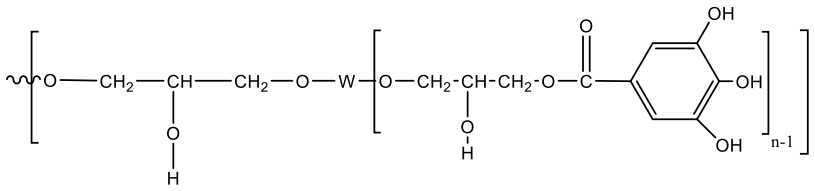


(IV-2).

126. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-3), wherein n is 1 to 4, and Rw2 is OH or the moiety (IVa), provided that no more than one Rw2 is the moiety (IVb-3), wherein ~~ represents the point of attachment in this moiety;

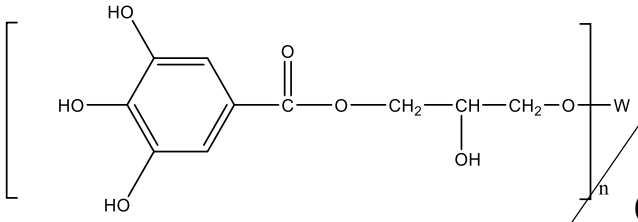


(IVa-3),



(IVb-3).

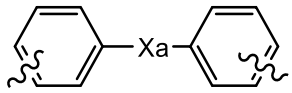
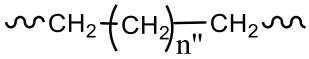
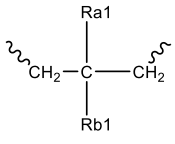
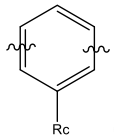
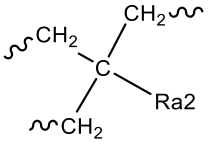
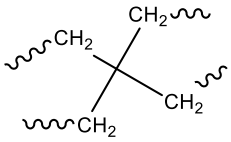
127. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IV-3), wherein n is 1 to 4;



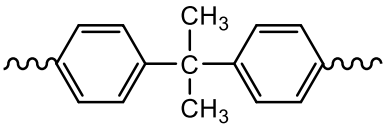
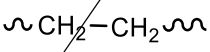
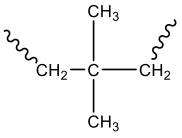
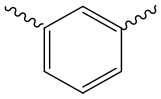
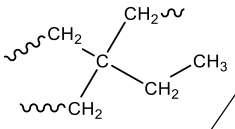
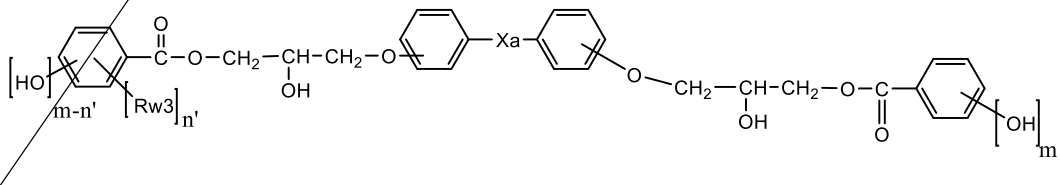
(IV-3).

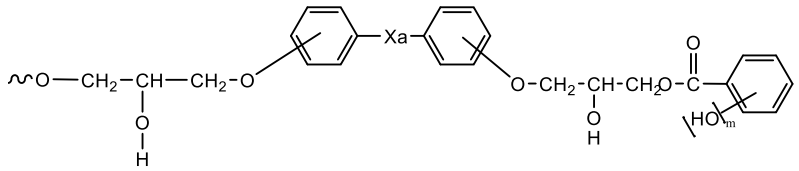
128. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said organic moiety W is selected from the group consisting of moieties of structures (Wa), (Wb), (Wc), (Wd), (We) and (Wf); wherein

~~~ represents an attachment point within each of these organic moieties, where it forms an ether bond with the oxygen in said glycidyl hydroxy benzoic acid condensate material of structure (II);

Xa is a moiety selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-; Ra1,

Rb1 and Rc are independently selected from a C_1 to C_5 alkyl or C_2 to C_5 alkyleneoxyalkyl;

Ra2 is selected from a C_1 to C_5 alkyl an C_2 to C_5 alkyleneoxyalkyl, a C_1 to C_5 alkyloxy, a halide, a C_1 to C_5 alkylsulfonyl a C_1 to C_5 alkylcarbonyl, and a C_1 to C_5 alkylcarbonyloxy, and n'' ranges from 0 to 12;
~~~


(Wa),

(Wb),

(Wc),

(Wd),

(We),

(Wf).

129. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said organic moiety W is selected from the group consisting of moieties of structure (Wa1), (Wb1), (Wc1), (Wd1), and (We1) wherein;

~~~ represents an attachment point within each of these organic moieties, where it forms an ether bond with the oxygen in said glycidyl hydroxy benzoic acid condensate material of structure (II);


(Wa1),

(Wb1),

(Wc1),

(Wd1),

(We1).

130. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-1), wherein Rw3 is OH, or a moiety of structure (Vb-1), wherein ~~~ represents the point of attachment in this moiety, provided

m is 2 to 3,

n' is 1 or 0; and

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O- ;


(Va-1),
~~~

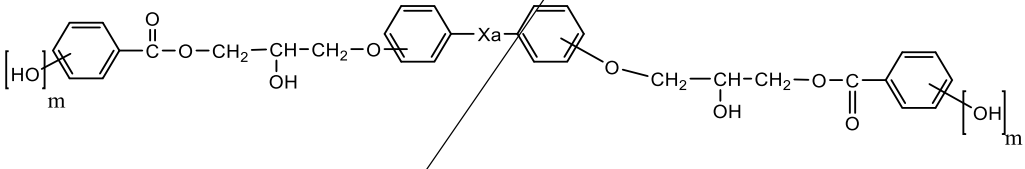


(Vb-1).

131. The glycidyl hydroxy benzoic acid condensate material of claim 130, wherein m is 2.

132. The glycidyl hydroxy benzoic acid condensate material of claim 130, wherein m is 3.

133. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-1), wherein m is 2 to 3, and further wherein,
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-.



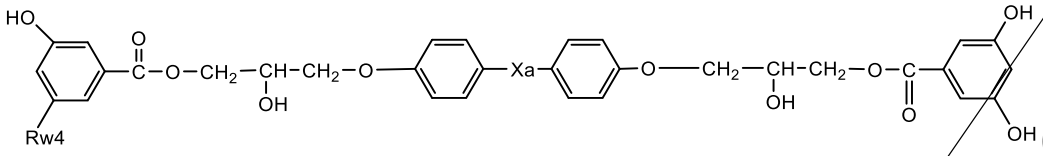
(V-1).

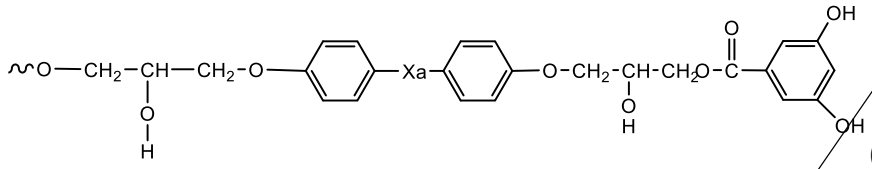
134. The glycidyl hydroxy benzoic acid condensate material of Claim 133, wherein m is 2.

135. The glycidyl hydroxy benzoic acid condensate material of Claim 133, wherein m is 3.

136. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-2), wherein Rw4 is OH or a moiety of structure (Vb-2), wherein ∿∿ represents the point of attachment in this moiety, and further wherein,

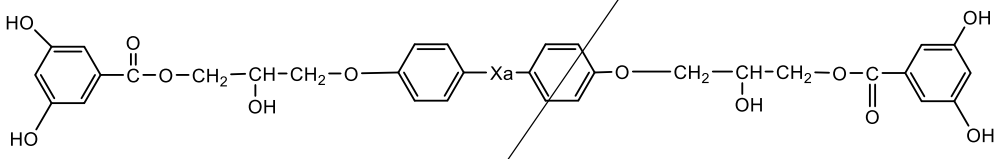
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-,


(Va-2),

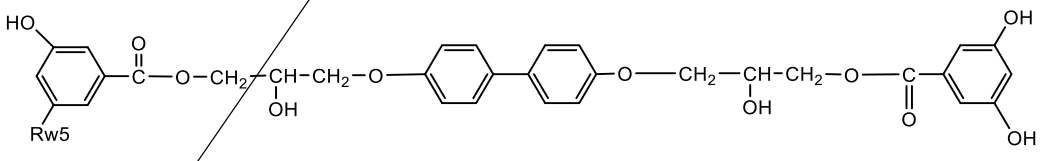

(Vb-2).

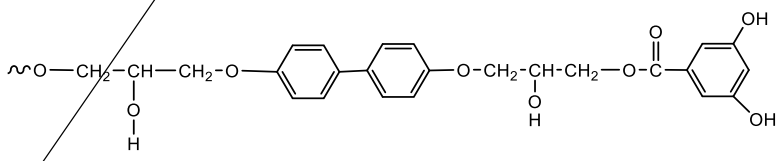
137. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-2), and further wherein,

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-

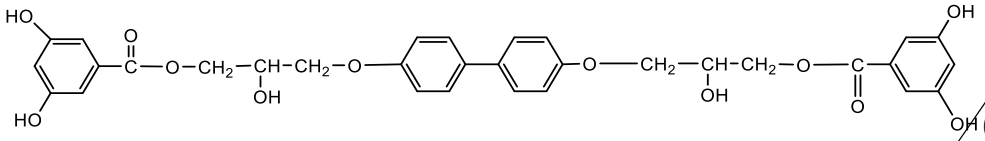

(V-2).

138. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-3), wherein Rw5 is OH or a moiety of structure (Vb-3), wherein ∿∿ represents the point of attachment in this moiety;

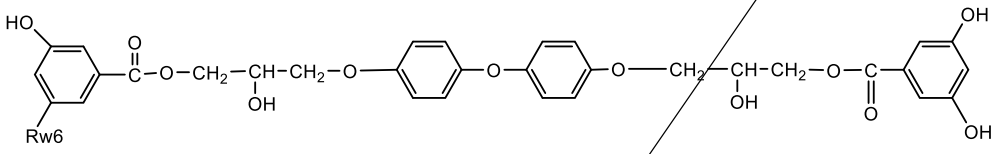

(Va-3),

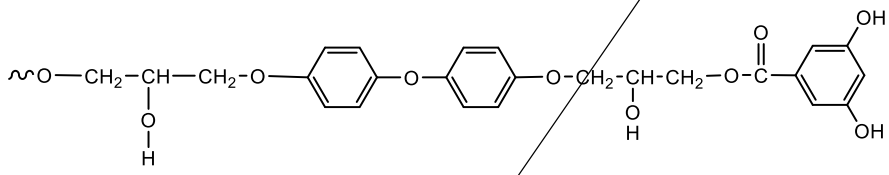

(Vb-3).

139. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is the compound having structure (V-3),

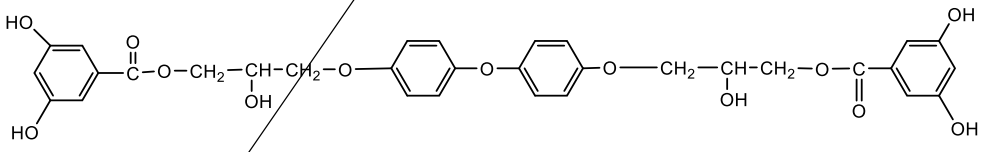

(V-3).

140. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-4), wherein Rw6 is OH or a moiety of structure (Vb-4), wherein ∿∿ represents the point of attachment in this moiety

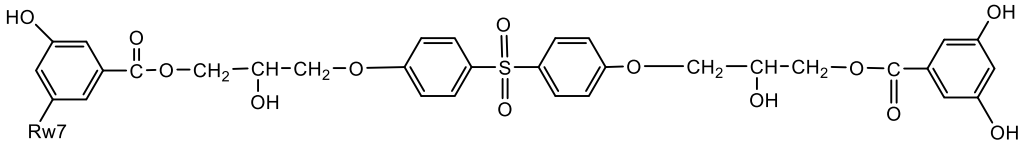

(Va-4),

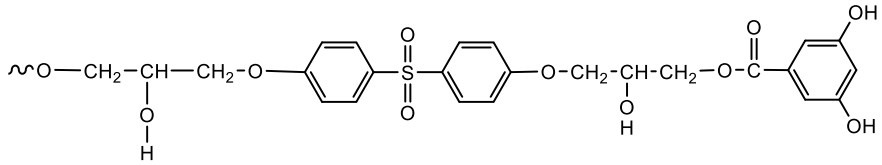

(Vb-4).

141. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate is the compound having structure (V-4),

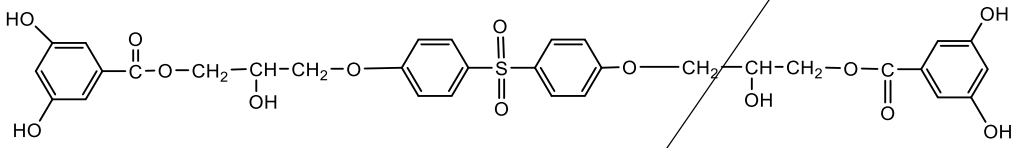

(V-4).

142. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-5), wherein Rw7 is OH or a moiety of structure (Vb-5), wherein ∿∿ represents the point of attachment in this moiety,

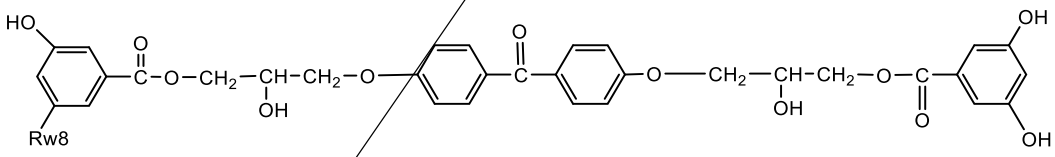

(Va-5),

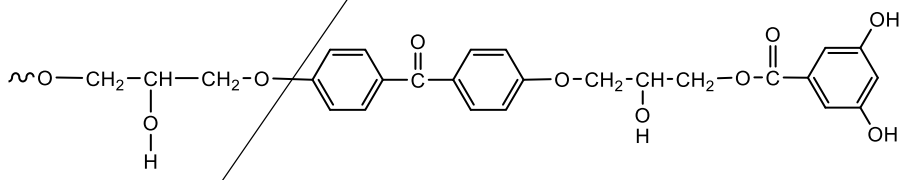

(Vb-5).

143. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is the compound having structure, (V-5),

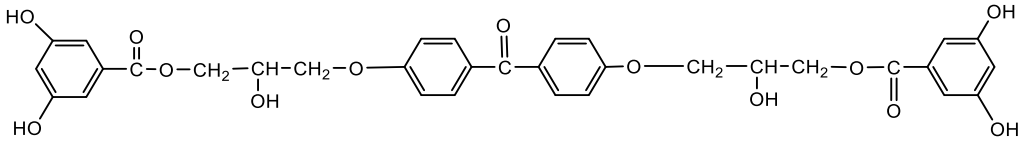

(V-5).

144. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-6), wherein Rw8 is OH or a moiety of structure (Vb-6), wherein ∿∿ represents the point of attachment in this moiety,

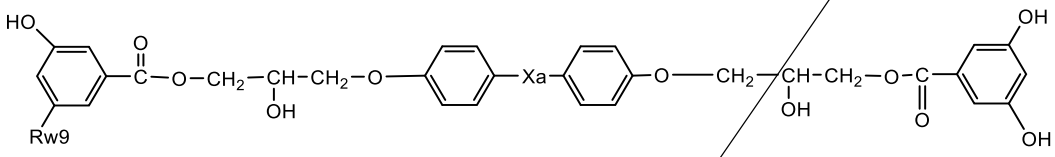

(Va-6),

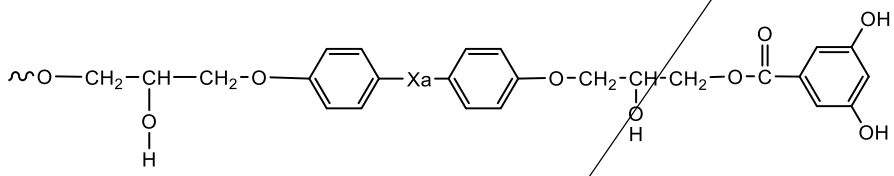

(Vb-6).

145. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-6),

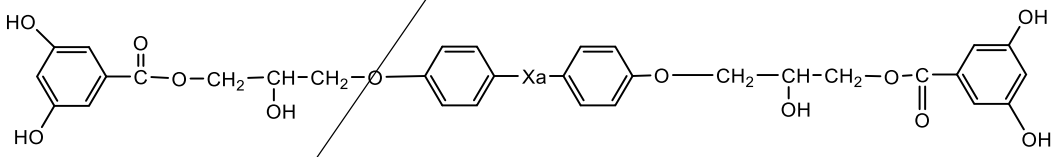

(V-6).

146. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-7), wherein Rw9 is OH or a moiety of structure (Vb-7), wherein ∿∿ represents the point of attachment in this moiety, and further wherein Xa is an alkylene moiety,

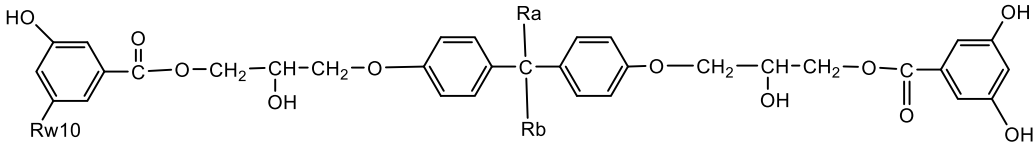

(Va-7),

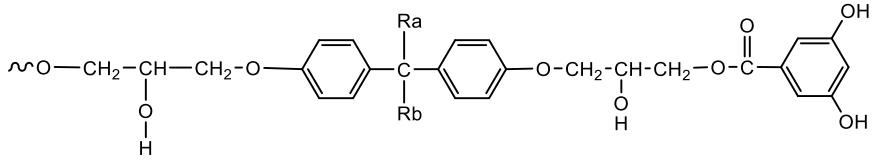

(Vb-7).

147. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-7), wherein Xa is an alkylene moiety,

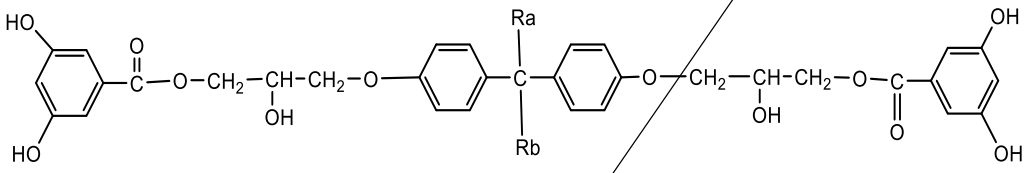

(V-7).

148. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-8), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety, and Rw10 is OH or a moiety of structure (Vb-8), wherein ∿∿ represents the point of attachment in this moiety,

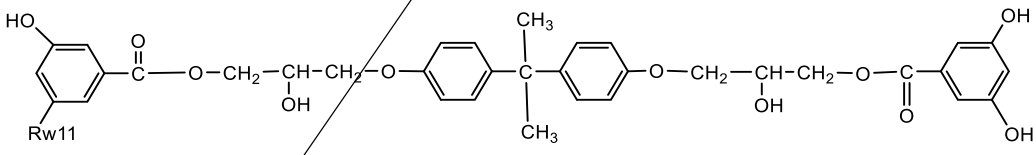

(Va-8),

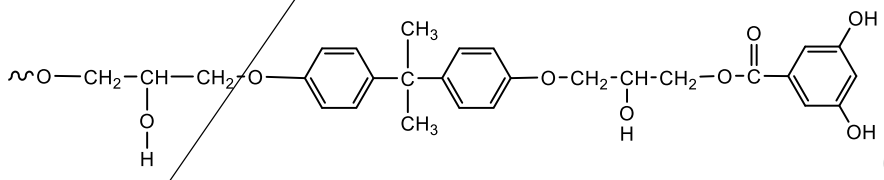

(Vb-8).

149. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-8), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety,

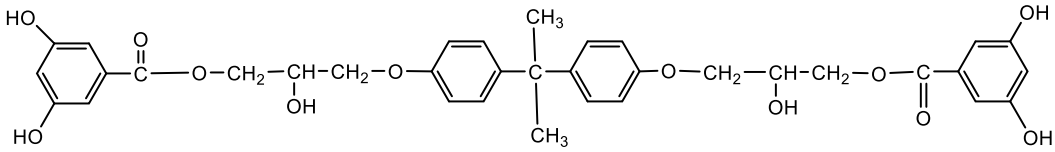

(V-8).

150. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-9), wherein Rw11 is OH or a moiety of structure (Vb-9), wherein ∿∿ represents the point of attachment in this moiety


(Va-9),

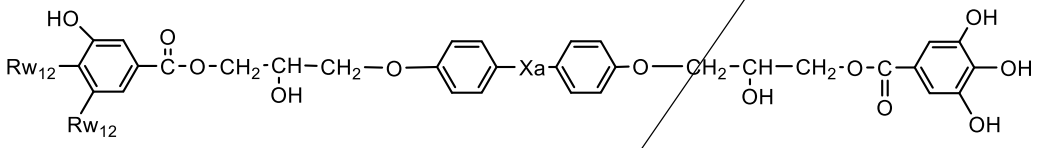

(Vb-9).

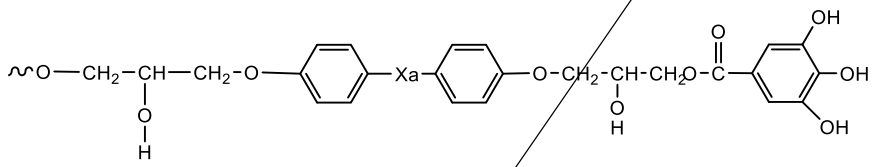
151. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound having structure (V-9),


(V-9).

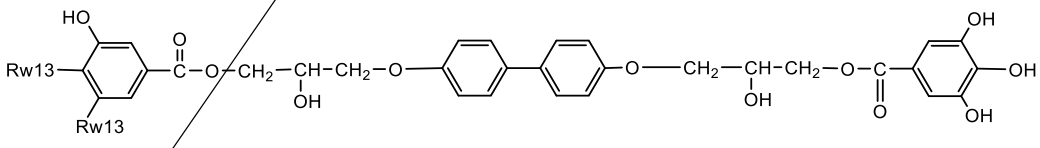
152. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-10), wherein Rw12 is OH or the moiety (Vb-10), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw12 is the moiety (Vb-10), and further wherein,

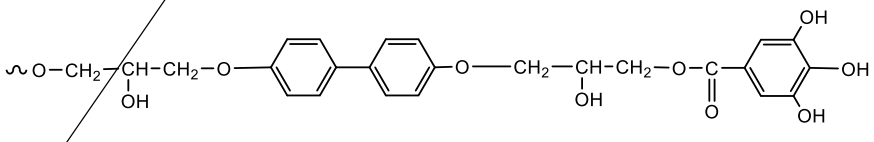
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-;


(Va-10),


(Vb-10).

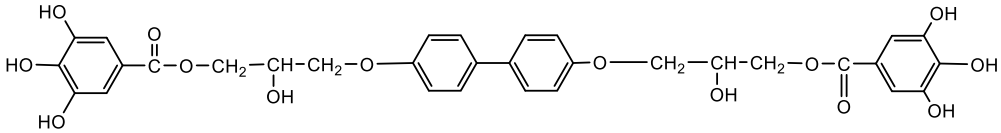
153. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-11), wherein Rw13 is OH or the moiety (Vb-11), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw13 is (Vb-11),


(Va-11),


(Vb-11).

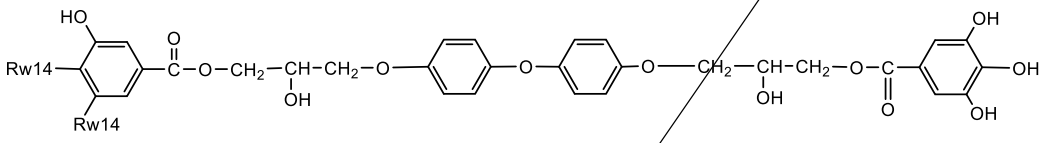
154. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110

to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-11),

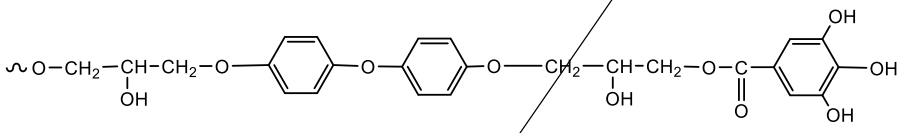


(V-11).

155. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-12), wherein Rw14 is OH or the moiety (Vb-12), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw14 is the moiety (Vb-12),



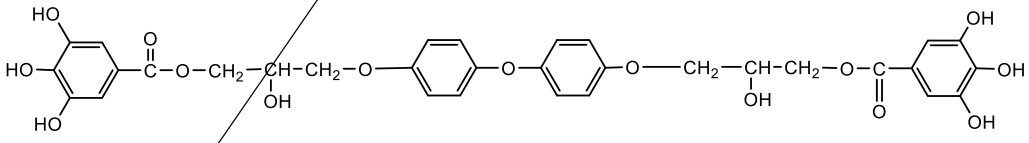
(Va-12),



Vb-12.

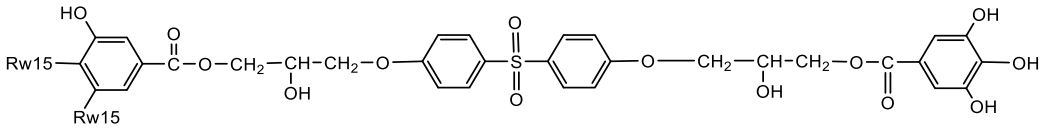
156. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure

(V-12),

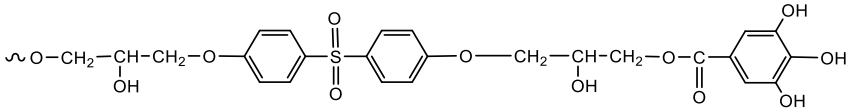


(V-12).

157. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-13), wherein Rw15 is OH or the moiety (Vb-13), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw15 is the moiety (Vb-13),

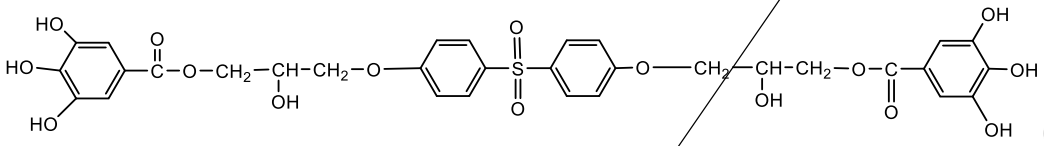


(Va-13),



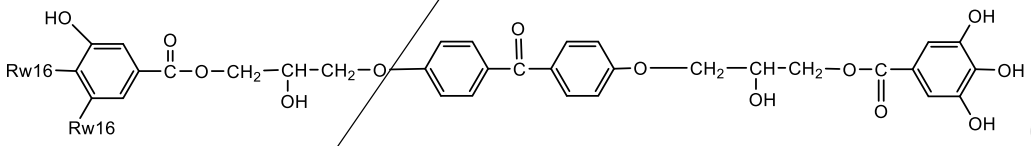
(Vb-13).

158. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-13),

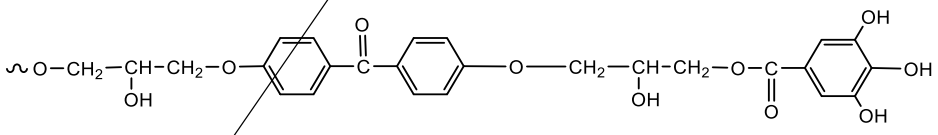


(V-13).

159. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-14), wherein Rw16 is OH or the moiety (Vb-14), wherein ∿∿ represents the point of attachment in this moieties, provided that no more than one Rw16 is the moiety (Vb-14),

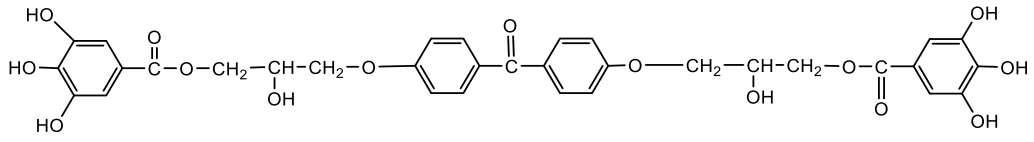


(Va-14),



(Vb-14).

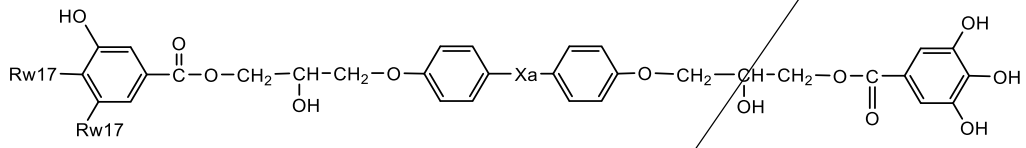
160. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-14),



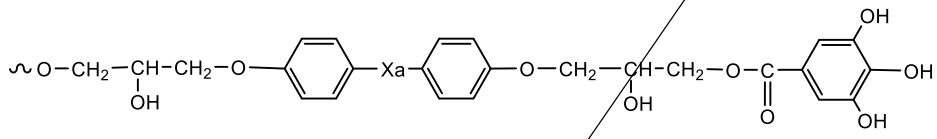
(V-14).

161. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-15), wherein Rw17 is OH or the moiety (Vb-15), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw17 is the moiety (Vb-15), and further wherein

Xa is an alkylene moiety,

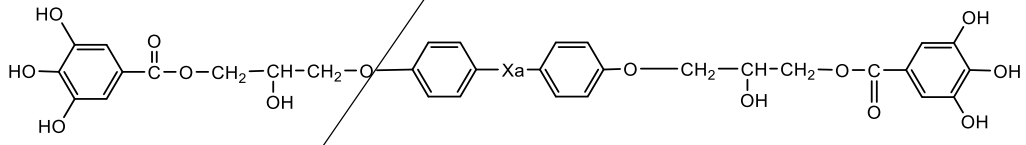


(Va-15),



(Vb-15).

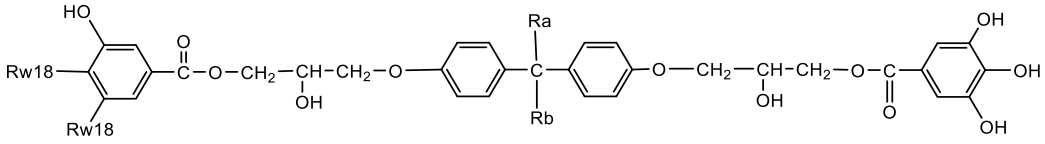
162. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-15), wherein Xa is an alkylene moiety,

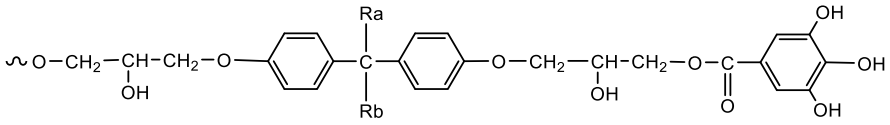


(V-15).

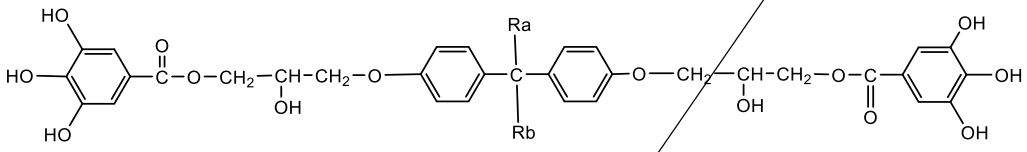
163. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-16), wherein Rw18 is OH or the moiety (Vb-16), wherein ∿∿ represents the point of attachment in these moieties, provided that no more than one Rw18 is the moiety (Vb-16), and further wherein,

Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety,

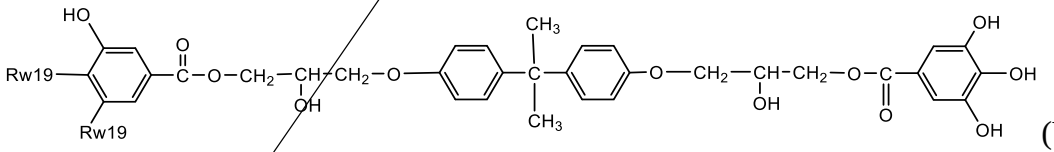

(Va-16)

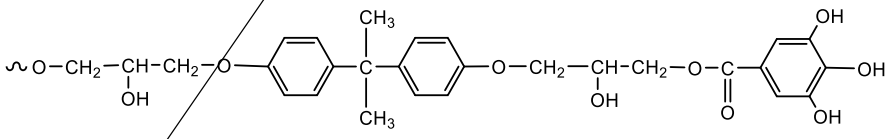

(Vb-16).

164. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-16), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety,

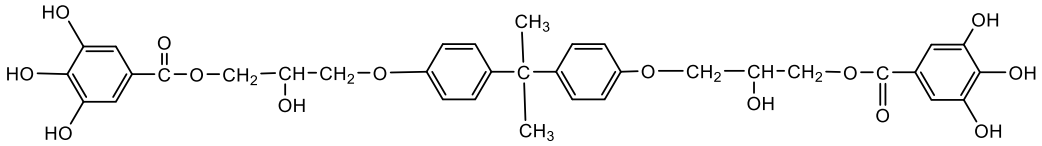

(V-16).

165. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-17), wherein Rw19 is OH or the moiety (Vb-17), wherein ∿∿ represents the point of attachment in these moieties, provided that no more than one Rw19 is the moiety (Vb-17), and further wherein,


(Va-17),


(Vb-17).

166. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material is a compound of structure (V-17),

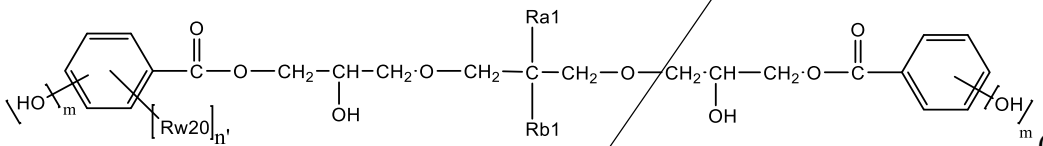

(V-17).

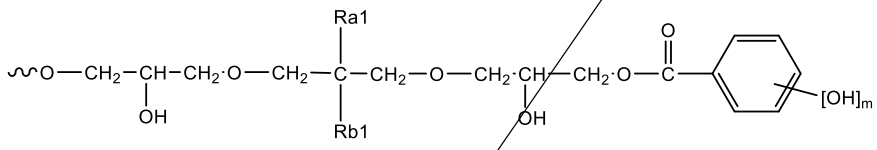
167. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VIa-1), wherein Rw20 is OH, or a moiety of structure (VIb-1), wherein ~~ represents the point of attachment in this moiety, provided that

m is 2 to 3,

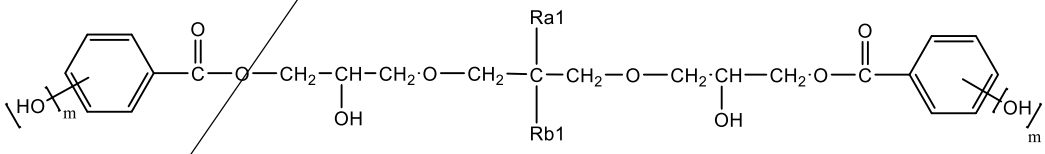
n' is 0 or 1, and further wherein,

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,


(VIa-1),


(VIb-1).

168. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VI-1), wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety, and m is 2 or 3


(VI-1).

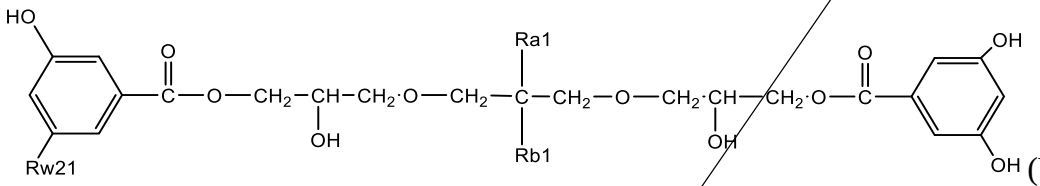
169. The glycidyl hydroxy benzoic acid condensate material of Claim 168 wherein m is 3.

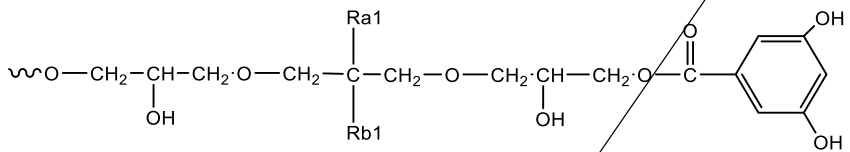
170. The glycidyl hydroxy benzoic acid condensate material of Claim 168 wherein m is

2.

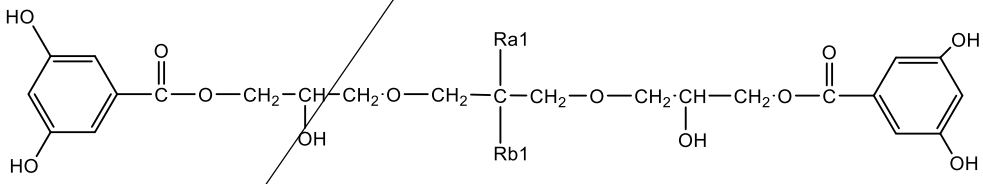
171. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VIa-2), wherein Rw21 is OH or a moiety of structure (VIb-2), wherein ~~ represents the point of attachment in this moiety, and further wherein

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,


(VIa-2)


(VIb-2).

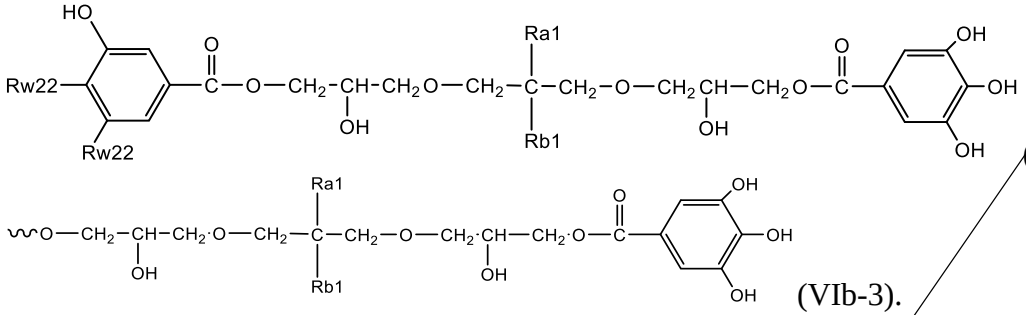
172. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VI-2), wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,


(VI-2).

173. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIa-3), wherein Rw22 is OH or the moiety (VIb-3), wherein ~~ represents the point of attachment in this moiety, provided that no more than one Rw22 is the moiety (VIb-3), and further wherein,

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-

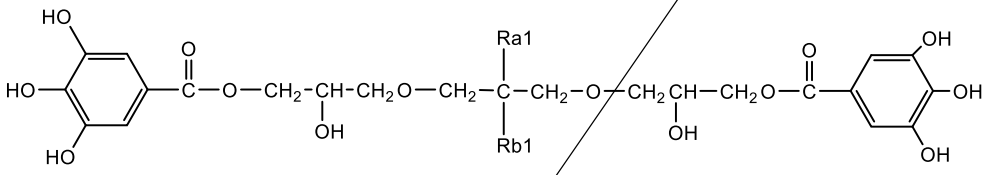
alkyl moiety,



(VIa-3),

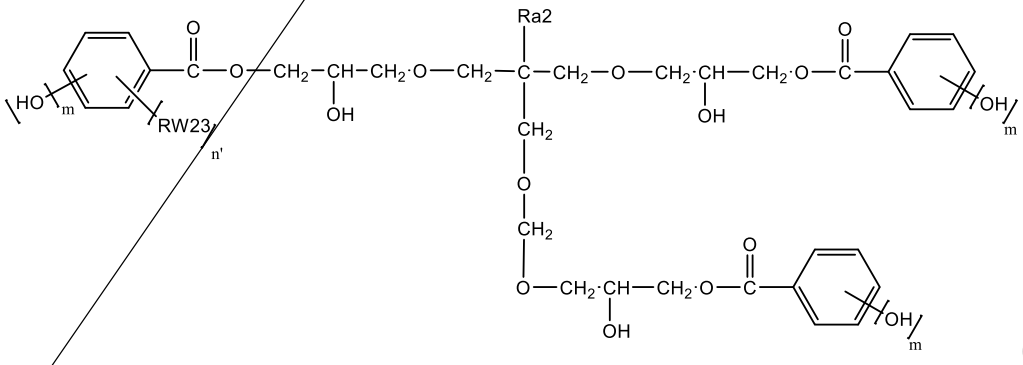
(VIb-3).

174. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VI-3), wherein Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

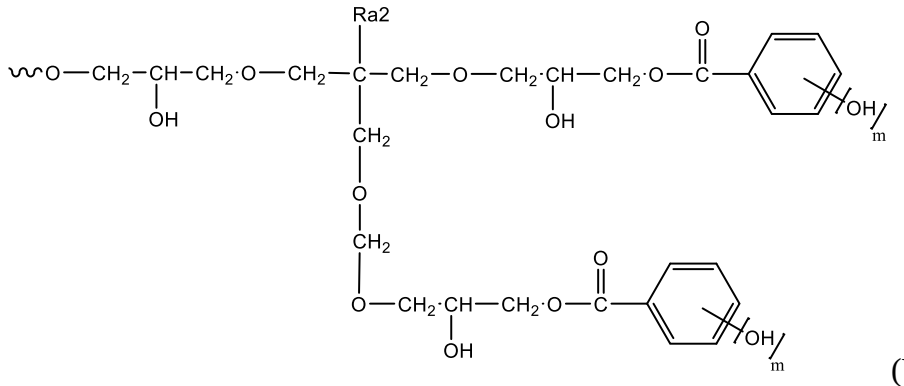


(VI-3).

175. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-1), wherein Rw23 is OH, or a moiety of structure (VIIb-1), wherein ∿∿ represents the point of attachment in this moiety, provided
m is 1, 2 or 3, and n' is 0 or 1, and further wherein,
Ra2 is selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety;



(VIIa-1),



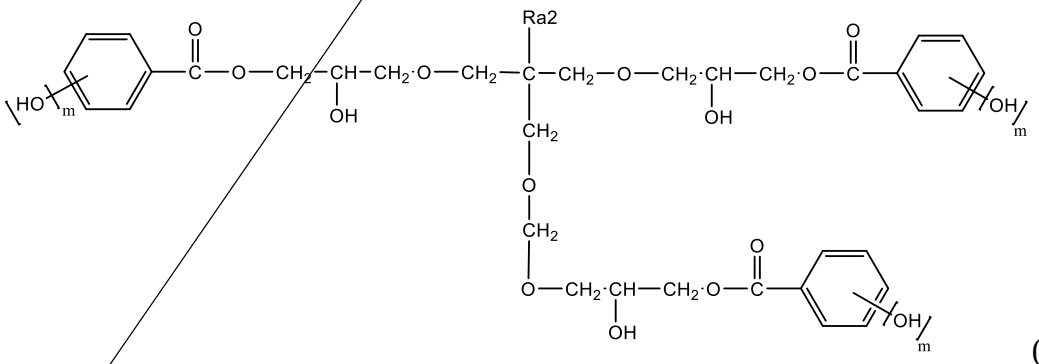
(VIIb-1).

176. The glycidyl hydroxy benzoic acid condensate material of Claim 175 wherein m is 3.

177. The glycidyl hydroxy benzoic acid condensate material of Claim 175 wherein m is 2.

178. The glycidyl hydroxy benzoic acid condensate material of Claim 175 wherein m is 1.

179. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VII-1), wherein Ra2 is selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety, and m is 1, 2 or 3,



(VII-1).

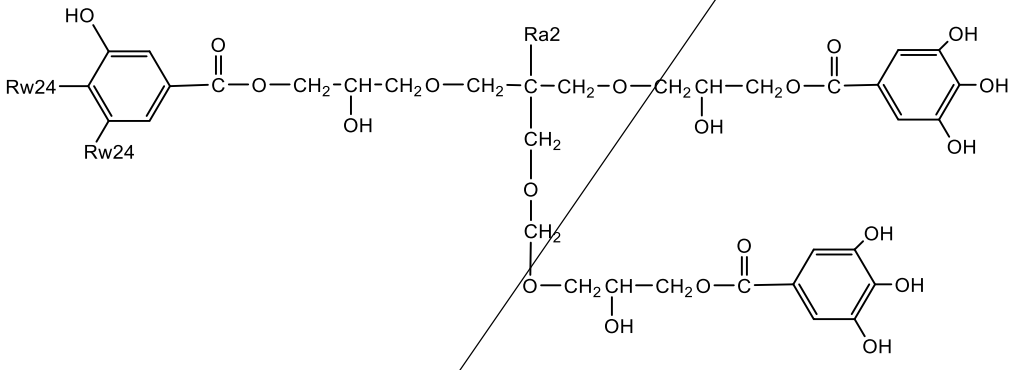
180. The glycidyl hydroxy benzoic acid condensate material of Claim 179 wherein m is 3.

181. The glycidyl hydroxy benzoic acid condensate material of Claim 179 wherein m is 2.

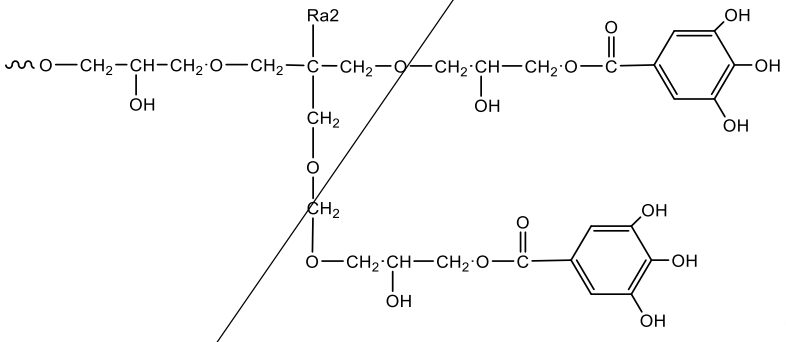
182. The glycidyl hydroxy benzoic acid condensate material of Claim 179 wherein m is 1.

183. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-2), wherein Rw24 is OH or the moiety (VIIb-2), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw24 is the moiety (VIIb-2), and further wherein,

Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

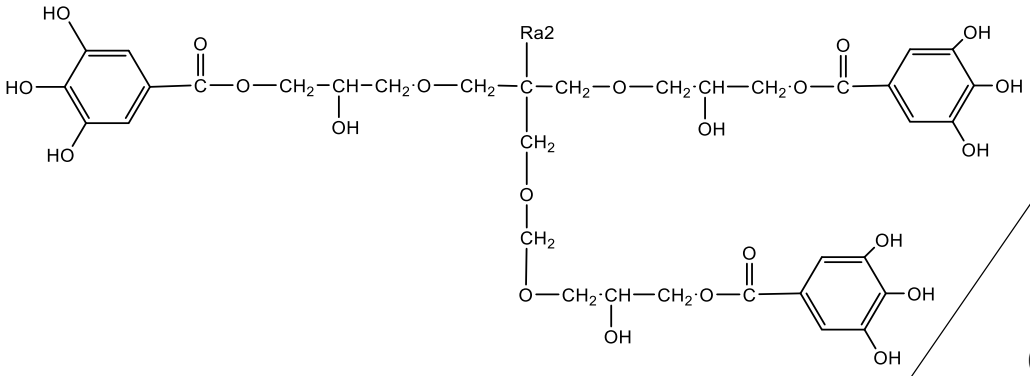


(VIIa-2),



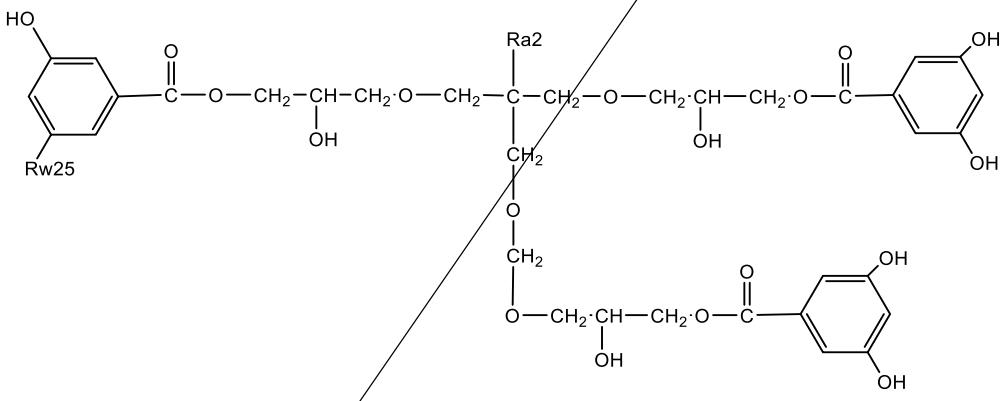
(VIIb-2).

184. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material has structure (VII-2), wherein Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

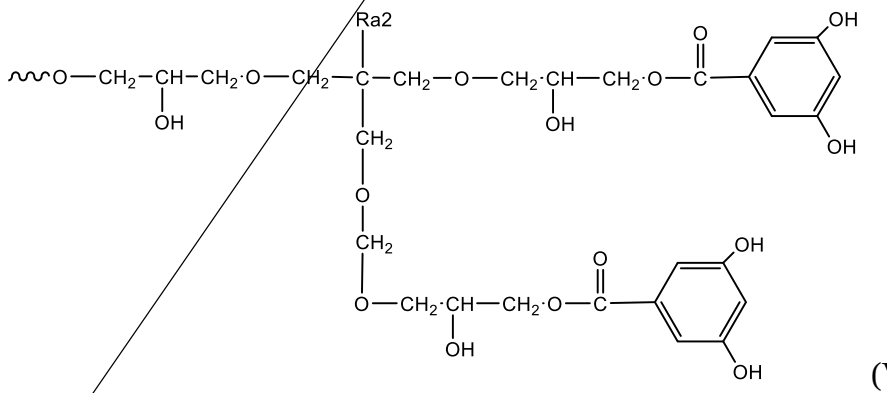


(VII-2).

185. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-3), wherein Rw25 is OH or the moiety (VIIb-3), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw25 is the moiety (VIIb-3), and further wherein, Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,



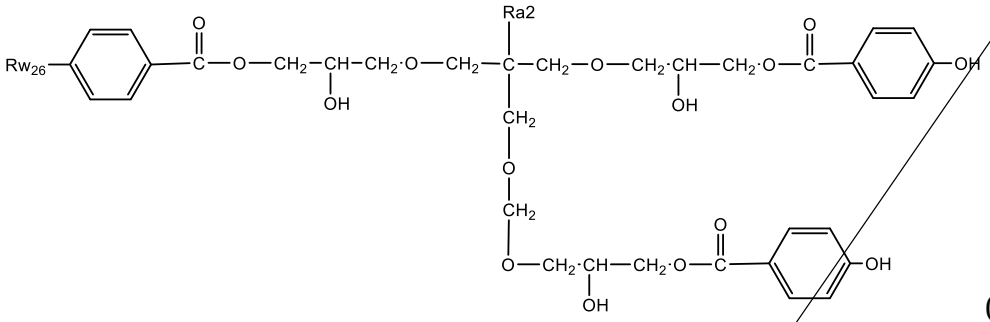
(VIIa-3),



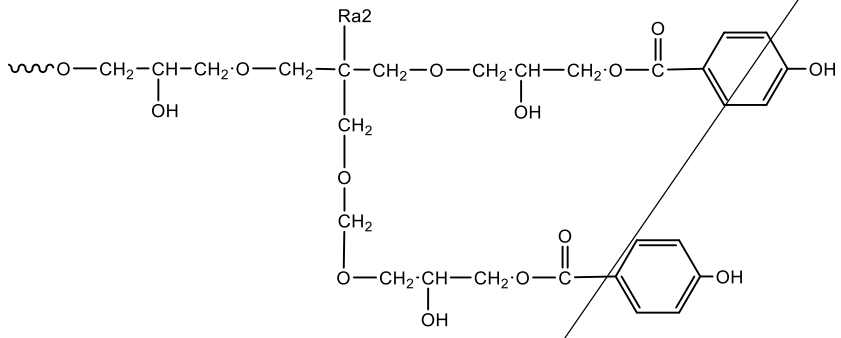
(VIIb-3).

186. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least

one compound of structure (VIIa-4), wherein Rw26 is OH or the moiety (VIIb-4), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw26 is the moiety (VIIb-4), and further wherein, Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

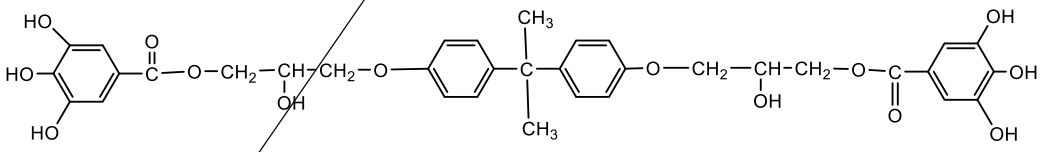


(VIIa-4),

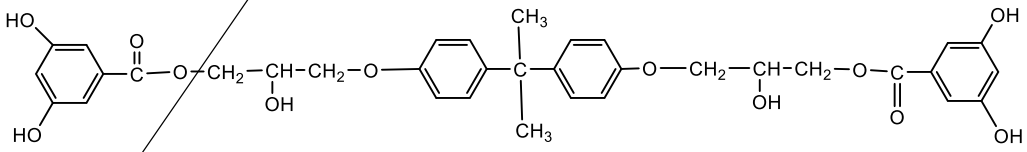


(VIIb-4).

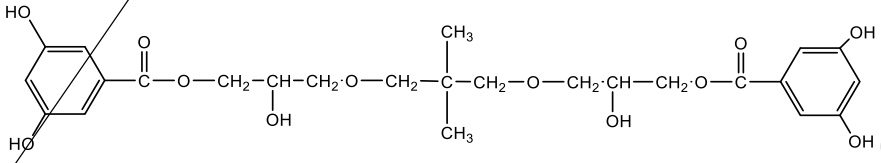
187. The glycidyl hydroxy benzoic acid condensate material of any one of Claims 110 to 112, wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is selected from the group consisting of (VIII), (VIIIa), (VIIIb), (VIIIc), (VIIId) and (VIIIe);



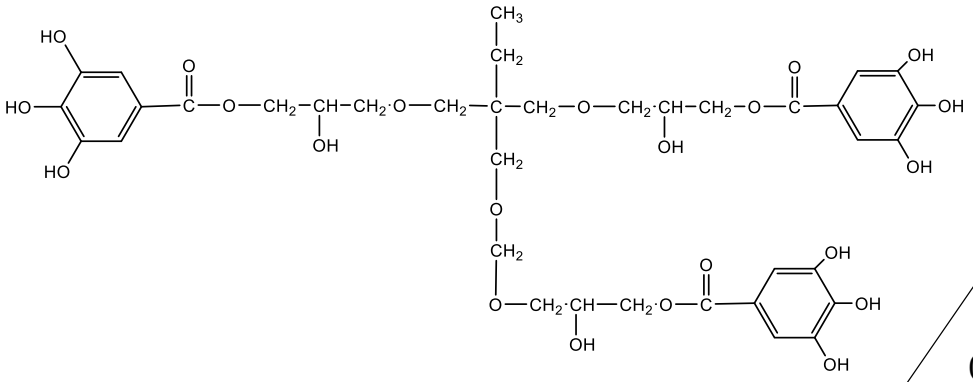
(VIII),



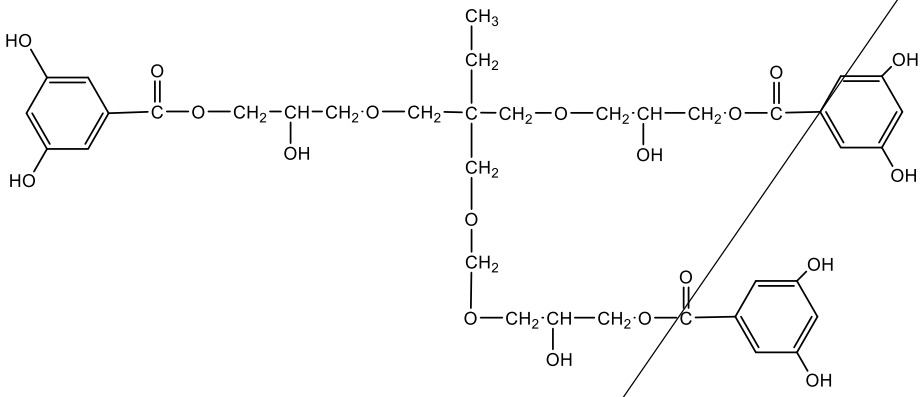
(VIIIa),



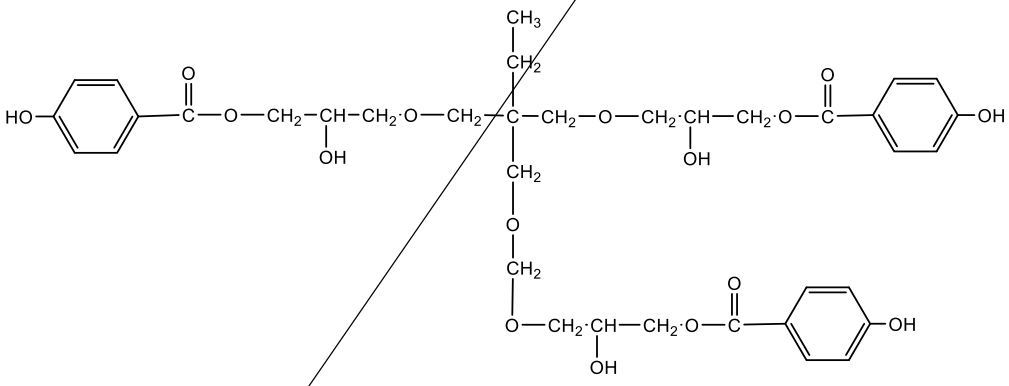
(VIIIb),



(VIIIc),



(VIIId),



(VIIIe).

188. The use of a glycidyl hydroxy benzoic acid condensate material comprising one or more compounds having structure (II) of any one of claims 110 to 187 in a process for forming a positive relief image on a substrate.

189. The use of the positive working photosensitive composition of any one of claims 1 to 105 in a process for forming a positive relief image on a substrate.

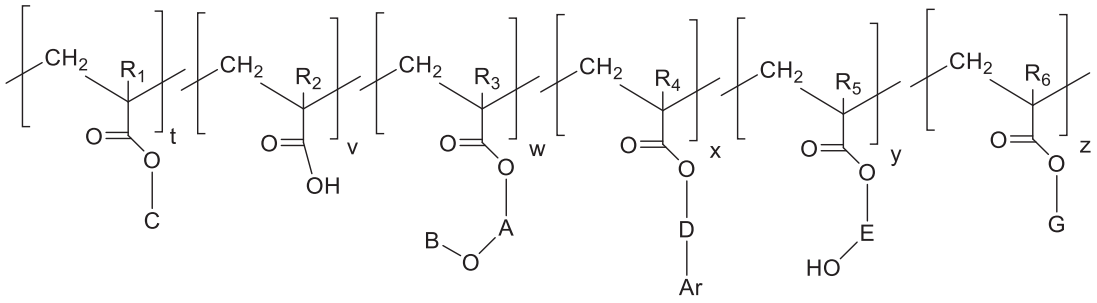
What is claimed is:

1. A positive working photosensitive composition comprising:

a) at least one photoacid generator;

b) at least one Novolak polymer;

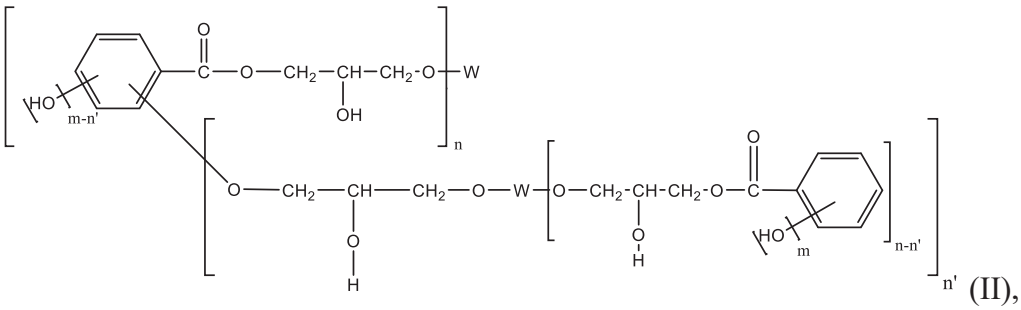
c) at least one acrylate polymer, comprising a component having structure (I),



(I)

wherein R_1 to R_6 are, independently, -H, or $-CH_3$, A is a linear or branched C_2 to C_{10} alkylene group, B is a C_1 to C_{12} primary or secondary unsubstituted linear, branched, cyclic or alicyclic alkyl group, C is a C_1 to C_{12} primary or secondary unsubstituted linear, branched, cyclic or alicyclic alkyl group, D is a linking group that is a direct valence bond, or a linear or branched C_2 to C_{10} alkylene group, Ar is a substituted or unsubstituted aromatic group or heteroaromatic group, E is a linear or branched C_2 to C_{10} alkylene group, G is an acid cleavable group, t is 0 mole% to about 40 mole%, v is 0 mole% to about 15 mole%, w is 0 mole% to about 45 mole%, x is 0 mole% to about 80 mole%, y is about 20 mole% to about 50 mole% and z is about 20 mole% to about 50 mole%, and further wherein the sum of t, v, w, x, y and z equals 100 mole%;

d) at least one glycidyl hydroxy benzoic acid condensate material comprising one or more compounds having structure (II),



(II),

wherein,

W is an organic moiety having a molecular weight of 600 or less, wherein W forms an ether bond with the oxygen to which it is bound,

m is an integer from 1 to 3 and

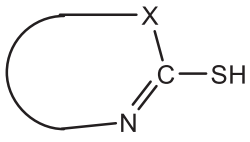
n is an integer from 1 to 4, and further provided that

when m is 1, n is 3 or 4,

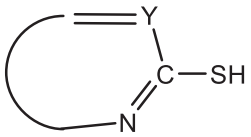
and when m is 2 or 3, n is an integer from 1 to 4,

n' is 0 or 1,

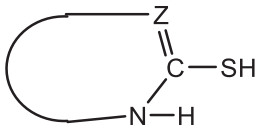
e) at least one heterocyclic thiol compound comprising a ring structure chosen from the general structures (III), (IIIa) or (IIIb), or tautomers thereof; and



(III)



(IIIa)



(IIIb),

wherein,

said ring structure is a single ring structure having from 4 to 8 atoms, or a multi ring structure having from 5 to 20 atoms; and wherein the single ring structure, or the multi ring structure comprises an aromatic, non-aromatic, or heteroaromatic ring, and

in said structure (III), X is selected from the group consisting of $C(Rt_1)(Rt_2)$, O, S, Se, and Te;

in said structure (IIIa), Y is selected from the group consisting of $C(Rt_3)$ and N;

in said structure (IIIb), Z is selected from the group consisting of $C(Rt_3)$ and N; and

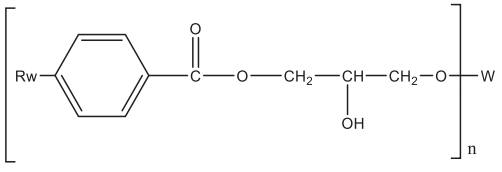
Rt_1, Rt_2, and Rt_3 are independently selected from the group consisting of H, a substituted alkyl group having 1 to 8 carbon atoms, an unsubstituted alkyl group having 1 to 8 carbon atoms, a substituted alkenyl group having 2 to 8 carbon atoms, unsubstituted alkenyl group having 2 to 8 carbon atoms, a substituted alkynyl group having 2 to 8 carbon atoms, unsubstituted alkynyl group having 2 to 8 carbon atoms, a substituted aromatic group having 6 to 20 carbon atoms, a substituted heteroaromatic group having 3 to 20 carbon atoms, unsubstituted aromatic group having 6 to 20 carbon atoms and unsubstituted heteroaromatic group having 3 to 20 carbon atoms;

f) at least one solvent.

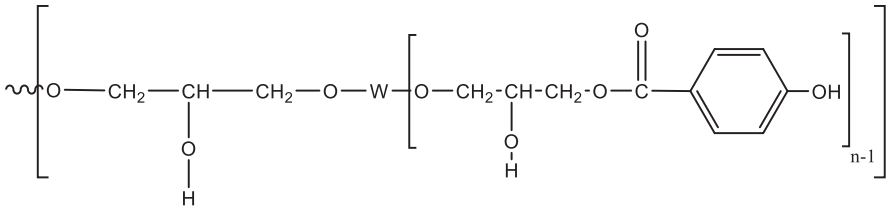
2. The positive working photosensitive composition of Claim 1, wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aliphatic moiety selected from the group consisting an aliphatic hydrocarbon, an aliphatic alkyl ether, a bis(alkyl) sulfone, and a bis(alkyl)ketone.

3. The positive working photosensitive composition of Claim 1, wherein glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aromatic moiety selected from an arene, a polycyclic arene, an bis(aryl)ether, a biphenyl, a bis(aryl) sulfone, bis(phenyl)alkylene, an (alkyl)(aryl)ketone, a bis(aryl)ketone, a bis(aryl) sulfone, and an (alkyl)(aryl) sulfone.

4. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-1), wherein n is 3 to 4, and Rw is OH or the moiety (IVb-1), wherein ∿∿ represents the point of attachment in this moiety;

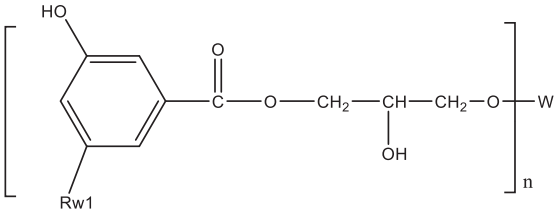


(IVa-1),

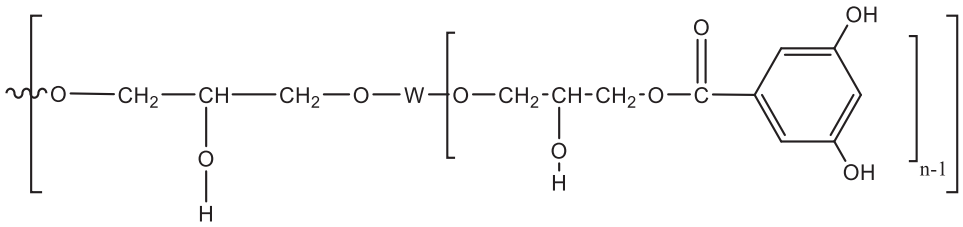


(IVb-1).

5. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-2), wherein n is 1 to 4, and Rw1 is OH or the moiety (IVb-2), wherein ∿∿ represents the point of attachment in this moiety;

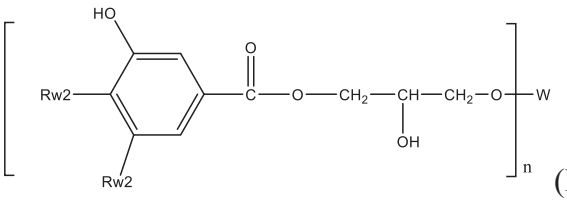


(IVa-2),

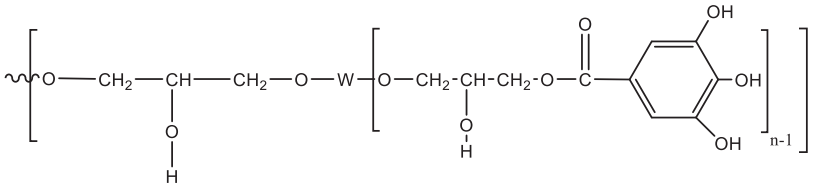


(IVb-2).

6. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (IVa-3), wherein n is 1 to 4, and Rw2 is OH or the moiety (IVa), provided that no more than one Rw2 is the moiety (IVb-3), wherein ∿∿ represents the point of attachment in this moiety;

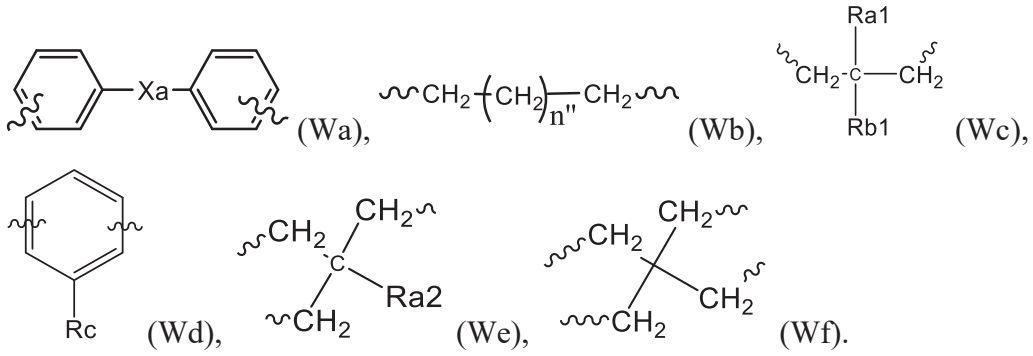


(IVa-3),

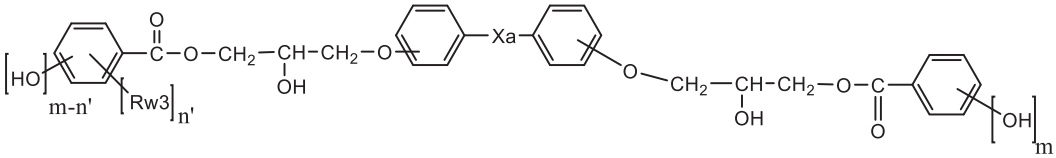


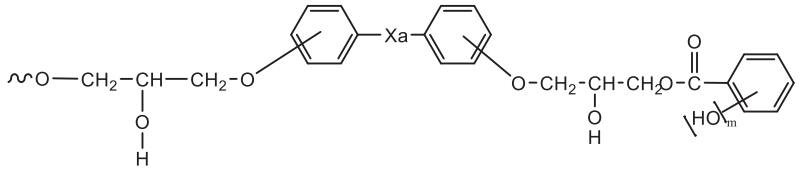
(IVb-3).

7 The positive working photosensitive composition of any one of Claims 1 to 3 wherein said organic moiety W is selected from the group consisting of moieties of structures (Wa), (Wb), (Wc), (Wd), (We) and (Wf); wherein

~~~ represents an attachment point within each of these organic moieties, where it forms an ether bond with the oxygen in said glycidyl hydroxy benzoic acid condensate material of structure (II);

Xa is a moiety selected from the group consisting of a direct valence bond, alkylene, $-SO_2-$ -C(=O)- and -O-;

Ra1, Rb1 and Rc are independently selected from a C_1 to C_5 alkyl or C_2 to C_5 alkyleneoxyalkyl;

Ra2 is selected from a C_1 to C_5 alkyl an C_2 to C_5 alkyleneoxyalkyl, a C_1 to C_5 alkyloxy, a halide, a C_1 to C_5 alkylsulfonyl a C_1 to C_5 alkylcarbonyl, and a C_1 to C_5 alkylcarbonyloxy, and n'' ranges from 0 to 12;



(Wa), (Wb), (Wc), (Wd), (We), (Wf).

8. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-1), wherein Rw3 is OH, or a moiety of structure (Vb-1), wherein ~~~ represents the point of attachment in this moiety, provided

m is 2 to 3,

n' is 1 or 0; and
~~~

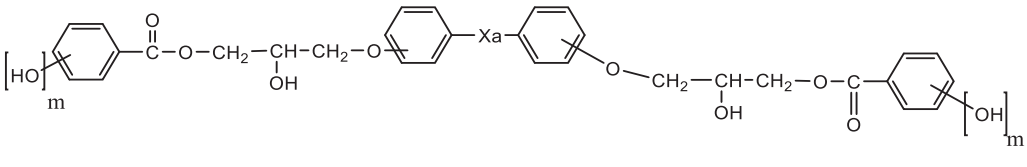
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2- -C(=O)- and -O- ;


(Va-1),


(Vb-1).

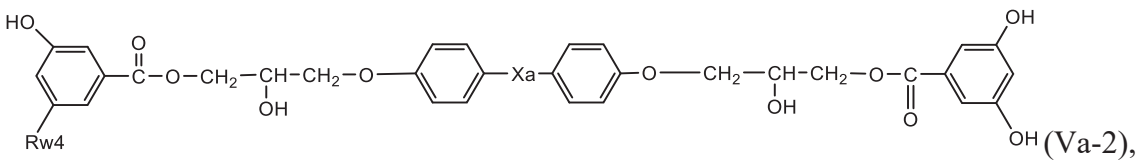
9. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (V-1), wherein m is 2 to 3, and further wherein,

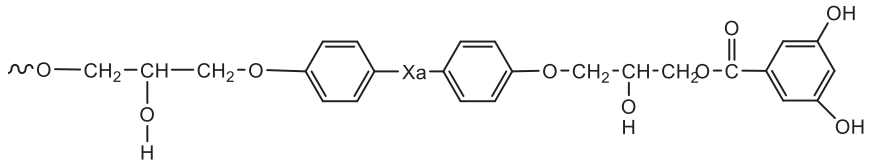
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2- -C(=O)- and -O-.


(V-1).

10. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-2), wherein Rw4 is OH or a moiety of structure (Vb-2), wherein ∿∿ represents the point of attachment in this moiety, and further wherein,

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-,

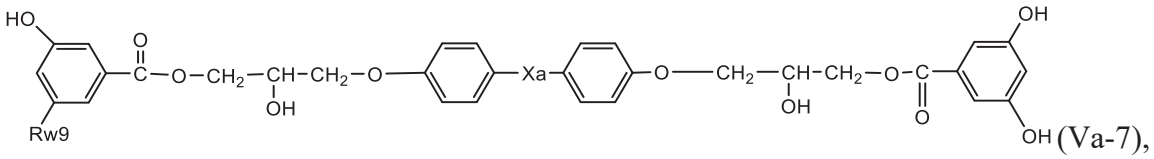

(Va-2),



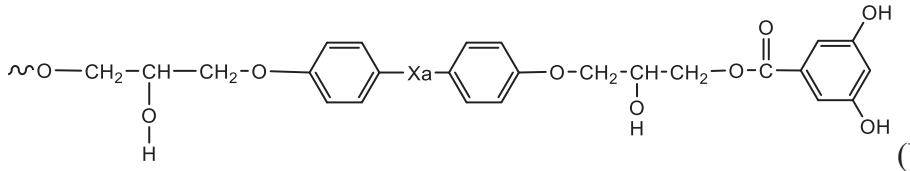
(Vb-2).

11. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-7), wherein Rw9 is OH or a moiety of structure (Vb-7), wherein ~~ represents the point of attachment in this moiety, and further wherein

Xa is an alkylene moiety,

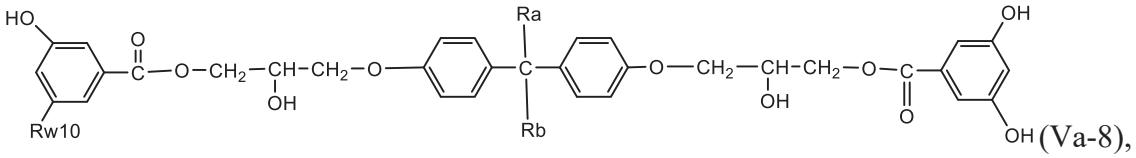


(Va-7),

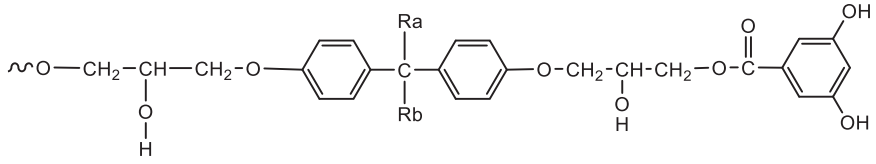


(Vb-7).

12. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-8), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety, and Rw10 is OH or a moiety of structure (Vb-8), wherein ~~ represents the point of attachment in this moiety,



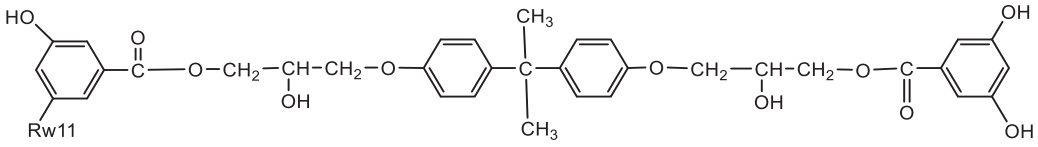
(Va-8),

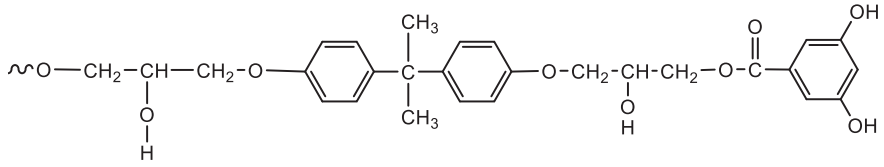


(Vb-8).

13. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said

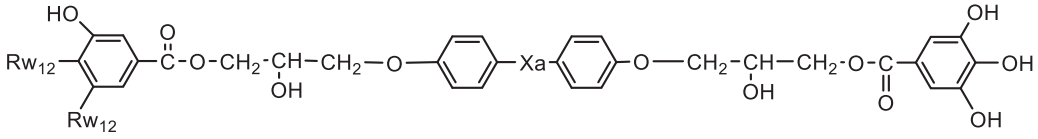
glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (Va-9), wherein Rw11 is OH or a moiety of structure (Vb-9), wherein ∿∿ represents the point of attachment in this moiety

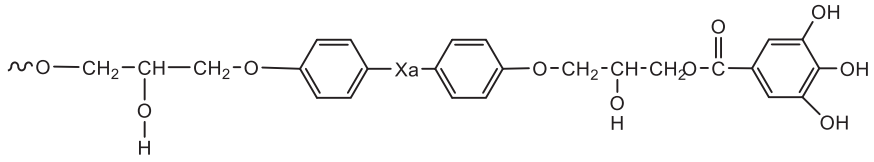

(Va-9),


(Vb-9).

14. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-10), wherein Rw12 is OH or the moiety (Vb-10), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw12 is the moiety (Vb-10), and further wherein,

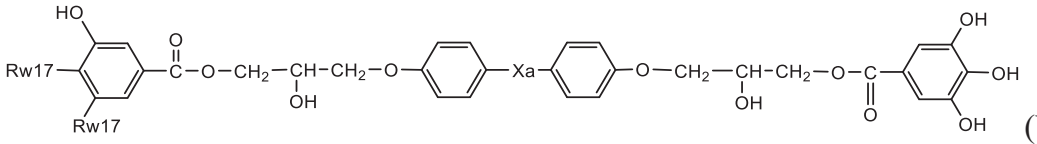
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-;

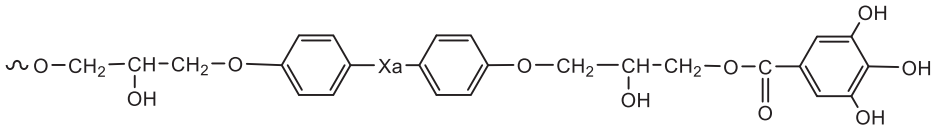

(Va-10),


(Vb-10).

15. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (Va-15), wherein Rw17 is OH or the moiety (Vb-15), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw17 is the moiety (Vb-15), and further wherein

Xa is an alkylene moiety,


(Va-15),

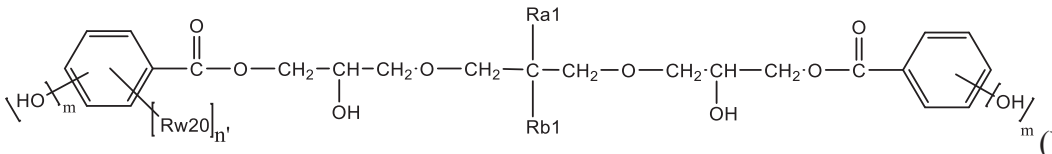

(Vb-15).

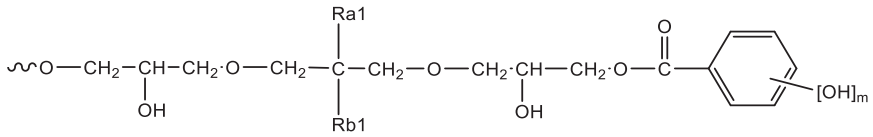
16. The positive working photosensitive composition of any one of Claims 1 to 3, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound having structure (VIa-1), wherein Rw20 is OH, or a moiety of structure (VIb-1), wherein ∿∿ represents the point of attachment in this moiety, provided that

m is 2 to 3,

n' is 0 or 1, and further wherein,

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

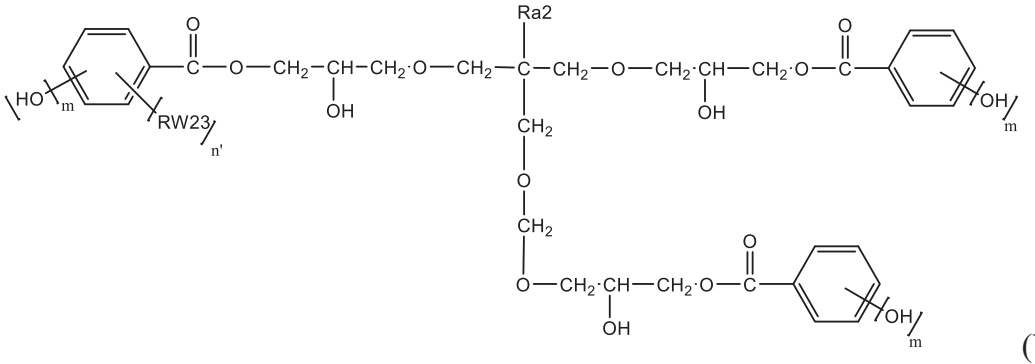

(VIa-1),


(VIb-1).

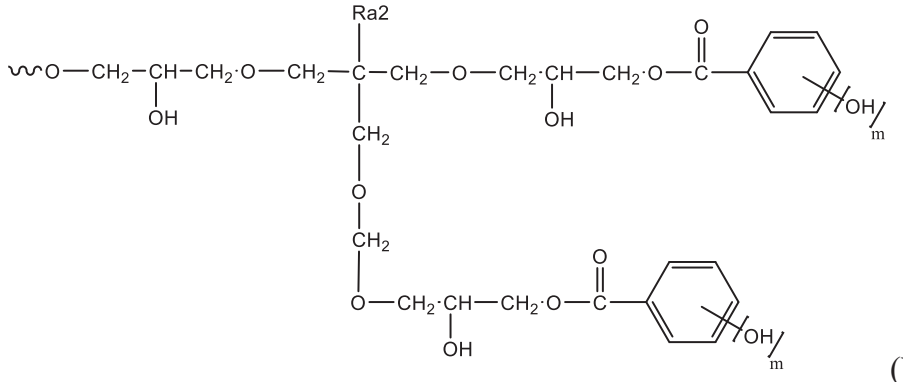
17. The positive working photosensitive composition of any one of Claims 1 to 3 wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-1), wherein Rw23 is OH, or a moiety of structure (VIIb-1), wherein ∿∿ represents the point of attachment in this moiety, provided

m is 1, 2 or 3, and n' is 0 or 1, and further wherein,

Ra2 is selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety;



(VIIa-1),



(VIIb-1).

18. The positive working photosensitive composition of any one of Claims 1 to 3, wherein, said acrylate polymer, is one wherein A is a methylene group, an ethylene group or a 1,2-propylene group, B is a methyl group, an ethyl group, a propyl group, or a butyl group, C is a methyl group, an ethyl group, a propyl group, a butyl group, a cyclohexyl group, an isobornyl group or a tetrahydrodicyclopentadienyl group, D is a direct valence bond, a methylene or an ethylene group, E is a methylene group, an ethylene group or a 1,2-propylene group.

19. The positive working photosensitive composition of any one of Claims 1 to 3, wherein, said acrylate polymer is one wherein G is a high activation energy acid labile group selected from a tertiary alkyl which has at least one vicinal hydrogen to the tertiary attachment point of the oxygen of the carboxylate in the repeat unit designated by z forming a tertiary ester, or a low activation energy protection group selected from an acetal or ketal formed with the oxygen of the carboxylate in the repeat unit designated by z.

20. The positive working photosensitive composition of any one of Claims 1 to 3 wherein the composition further comprises a basic quencher.

21. A method of forming a positive relief image comprising:

a) forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 20 to a substrate, thus forming a film and then baking the film;

b) image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

c) developing the latent image in a developer.

22. A method of forming a positive relief image comprising:

a') forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 20 to a substrate thus forming a film and then baking the film;

b') image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

c') thermally treating the image-wise exposed photosensitive layer forming a baked latent image.

d') developing the baked latent image in a developer.

23. A method of forming a metal pattern on a substrate comprising:

a'') forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 20 to a substrate thus forming a film, and then baking the film;

b'') image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

c'') developing the latent image in a developer to form a resist pattern on the substrate.

d'') selectively electroplating on the substrate using the resist pattern as a barrier

e'') stripping the resist pattern leaving behind the selectively electroplated metal, thereby creating a metal pattern on the substrate.

24. A method of forming a metal pattern on a substrate comprising:

a''') forming a photosensitive layer by applying the positive working photosensitive composition of any one of Claims 1 to 20 to a substrate thus forming a film and then baking the film;

b''') image-wise exposing the photosensitive layer to actinic radiation to form a latent image;

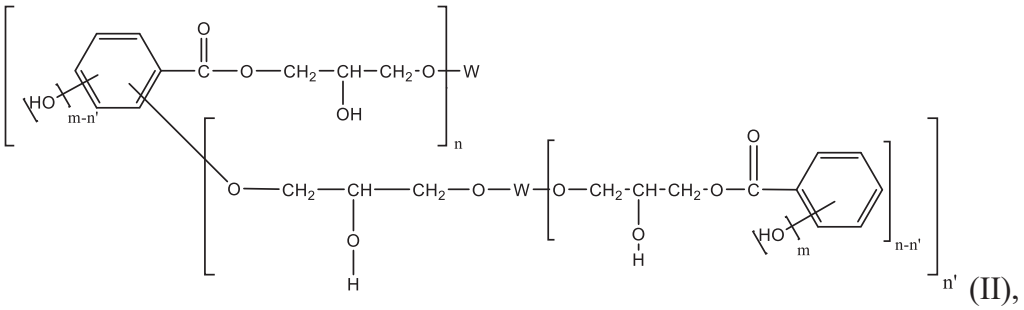
c''') thermally treating the image-wise exposed photosensitive layer forming a baked latent image.

d''') developing the baked latent image in a developer to form a resist pattern on the substrate.

e''') selectively electroplating on the substrate using the resist pattern as a barrier

f''') stripping the resist pattern leaving behind the selectively electroplated metal, thereby creating a metal pattern on the substrate.

25. A glycidyl hydroxy benzoic acid condensate material comprising one or more compounds having structure (II),



(II),

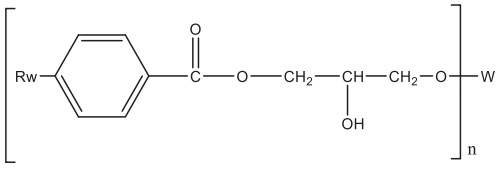
wherein,

W is an organic moiety having a molecular weight of 600 or less, wherein W forms an ether bond with the oxygen to which it is bound,
m is an integer from 1 to 3 and
n is an integer from 1 to 4, and further provided that
when m is 1, n is 3 or 4,
and when m is 2 or 3, n is an integer from 1 to 4,
n' is 0 or 1.

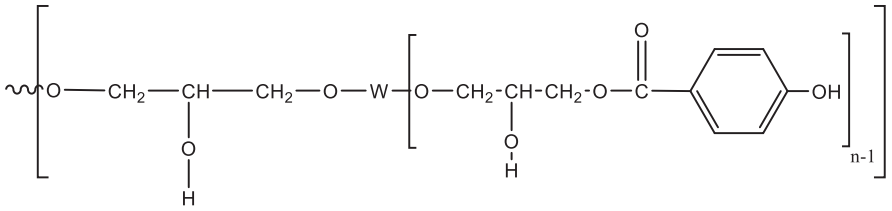
26. The glycidyl hydroxy benzoic acid condensate material of Claim 25, wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aliphatic moiety selected from the group consisting an aliphatic hydrocarbon, an aliphatic alkyl ether, a bis(alkyl) sulfone, and a bis(alkyl)ketone.

27. The glycidyl hydroxy benzoic acid condensate material of Claim 25 or 26, wherein said glycidyl hydroxy benzoic acid condensate material having structure (II) is one wherein the moiety W is an aromatic moiety selected from an arene, a polycyclic arene, an bis(aryl)ether, a biphenyl, a bis(aryl) sulfone, bis(phenyl)alkylene, an (alkyl)(aryl)ketone, a bis(aryl)ketone, a bis(aryl) sulfone, and an (alkyl)(aryl) sulfone.

28. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (IVa-1), wherein n is 3 to 4, and Rw is OH or the moiety (IVb-1), wherein ∿∿ represents the point of attachment in this moiety;

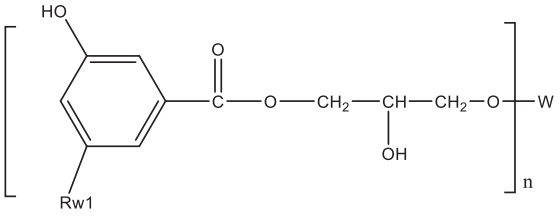


(IVa-1),

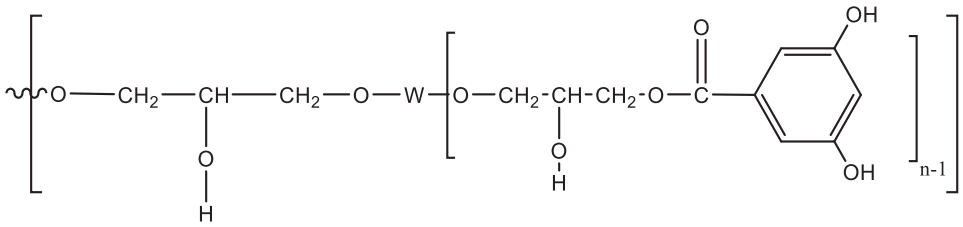


(IVb-1).

29. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (IVa-2), wherein n is 1 to 4, and Rw1 is OH or the moiety (IVb-2), wherein ∿∿ represents the point of attachment in this moiety;

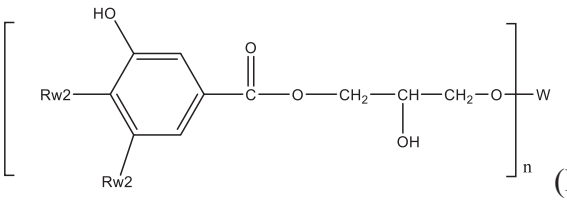


(IVa-2),

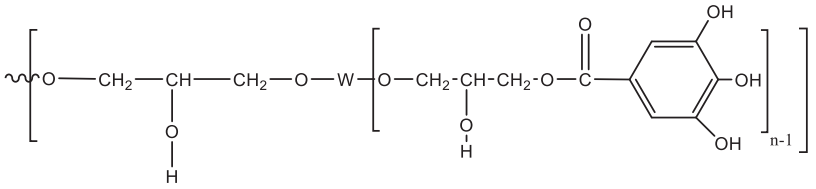


(IVb-2).

30. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (IVa-3), wherein n is 1 to 4, and Rw2 is OH or the moiety (IVa), provided that no more than one Rw2 is the moiety (IVb-3), wherein ∿∿ represents the point of attachment in this moiety;

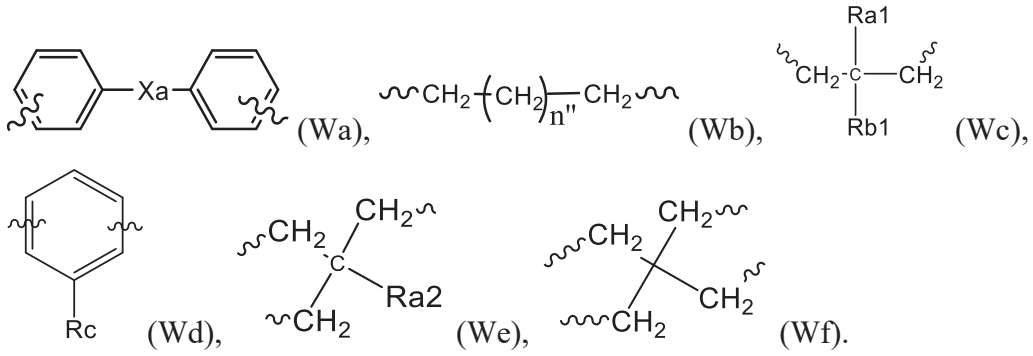


(IVa-3),

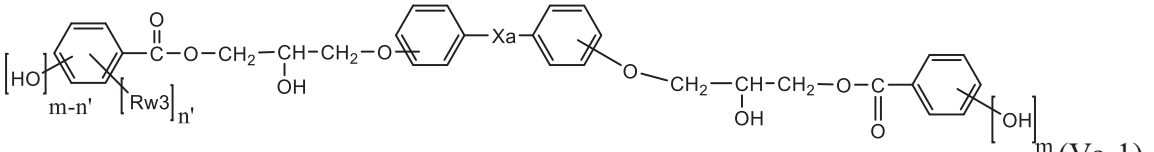


(IVb-3).

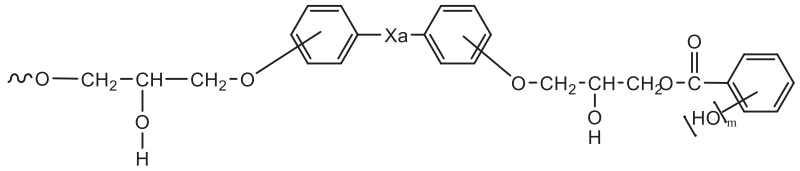
31. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said organic moiety W is selected from the group consisting of moieties of structures (Wa), (Wb), (Wc), (Wd), (We) and (Wf); wherein

~~~ represents an attachment point within each of these organic moieties, where it forms an ether bond with the oxygen in said glycidyl hydroxy benzoic acid condensate material of structure (II);

Xa is a moiety selected from the group consisting of a direct valence bond, alkylene, $-SO_2-$ -C(=O)- and -O-;

Ra1, Rb1 and Rc are independently selected from a C_1 to C_5 alkyl or C_2 to C_5 alkyleneoxyalkyl;

Ra2 is selected from a C_1 to C_5 alkyl an C_2 to C_5 alkyleneoxyalkyl, a C_1 to C_5 alkyloxy, a halide, a C_1 to C_5 alkylsulfonyl a C_1 to C_5 alkylcarbonyl, and a C_1 to C_5 alkylcarbonyloxy, and n'' ranges from 0 to 12;



(Wa), (Wb), (Wc), (Wd), (We), (Wf).

32. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (Va-1), wherein Rw3 is OH, or a moiety of structure (Vb-1), wherein ~~~ represents the point of attachment in this moiety, provided

m is 2 to 3,

n' is 1 or 0; and
~~~

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2- -C(=O)- and -O- ;



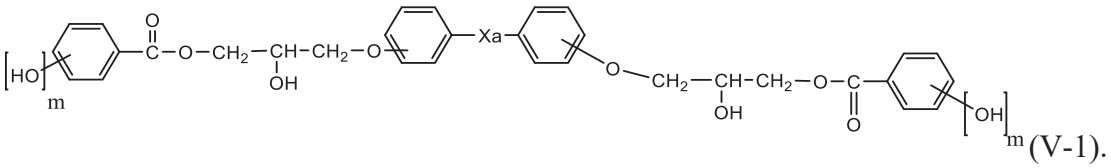
(Va-1),



(Vb-1).

33. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (V-1), wherein m is 2 to 3, and further wherein,

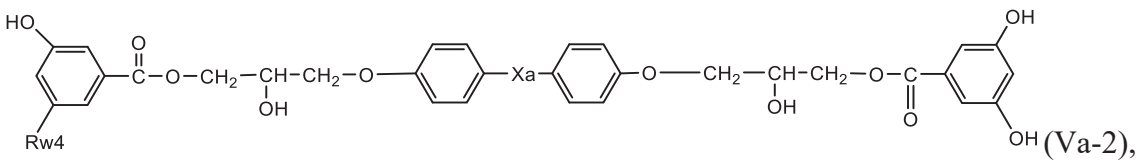
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2- -C(=O)- and -O-.



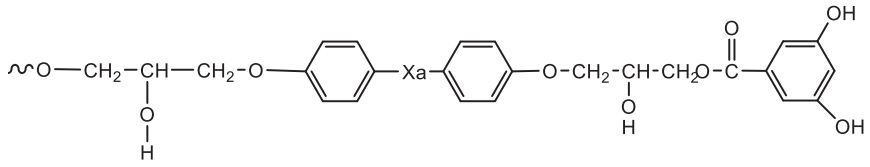
(V-1).

34. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (Va-2), wherein Rw4 is OH or a moiety of structure (Vb-2), wherein ∿∿ represents the point of attachment in this moiety, and further wherein,

Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-,



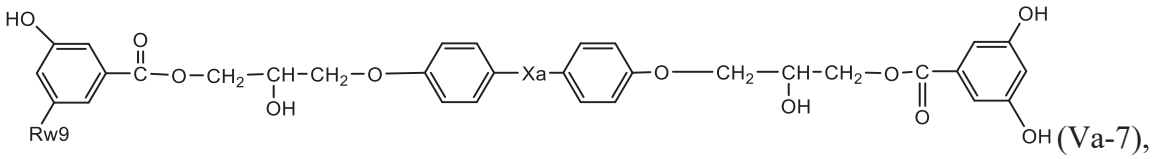
(Va-2),



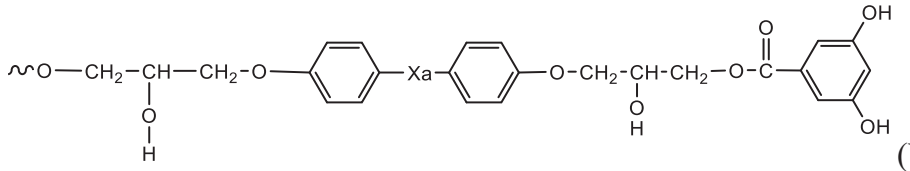
(Vb-2).

35. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (Va-7), wherein Rw9 is OH or a moiety of structure (Vb-7), wherein ∿∿ represents the point of attachment in this moiety, and further wherein

Xa is an alkylene moiety,

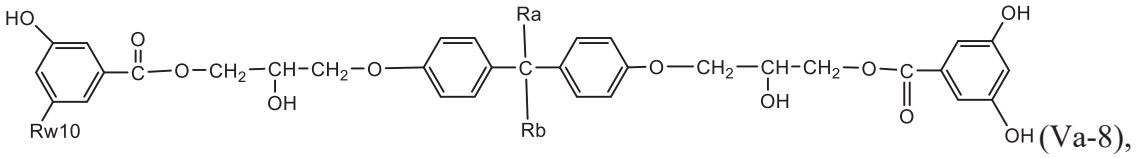


(Va-7),

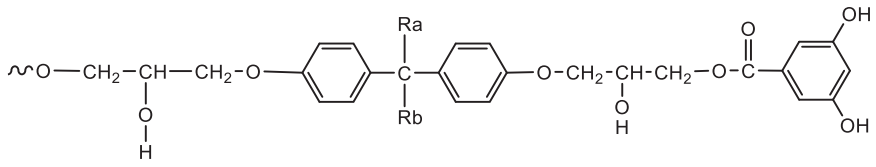


(Vb-7).

36. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (Va-8), wherein Ra and Rb are independently a C_1 to C_5 alkyl moiety, or a C_2 to C_5 -alkylene-O-alkyl moiety, and Rw10 is OH or a moiety of structure (Vb-8), wherein ∿∿ represents the point of attachment in this moiety,



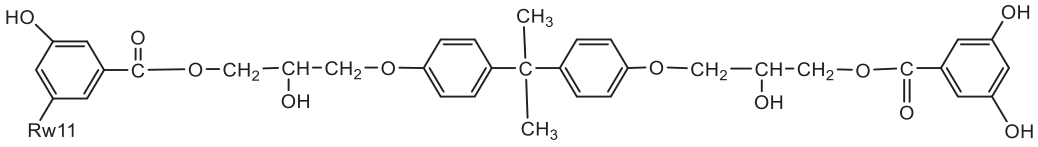
(Va-8),

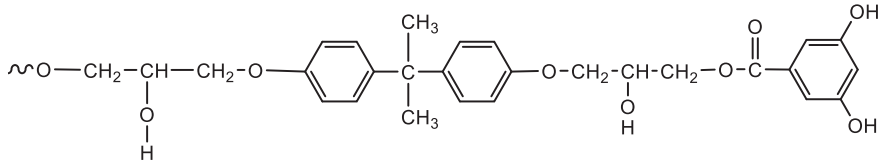


(Vb-8).

37. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27,

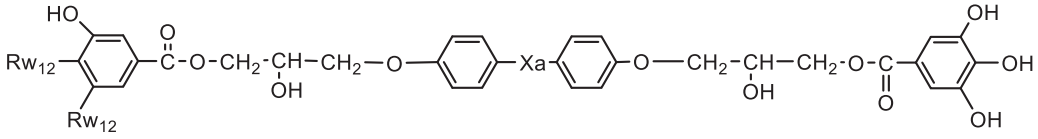
wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (Va-9), wherein Rw11 is OH or a moiety of structure (Vb-9), wherein ∿∿ represents the point of attachment in this moiety

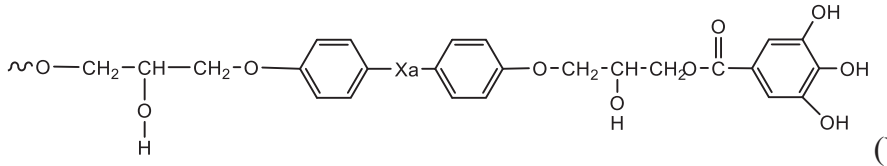

(Va-9),


(Vb-9).

38. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound of structure (Va-10), wherein Rw12 is OH or the moiety (Vb-10), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw12 is the moiety (Vb-10), and further wherein,

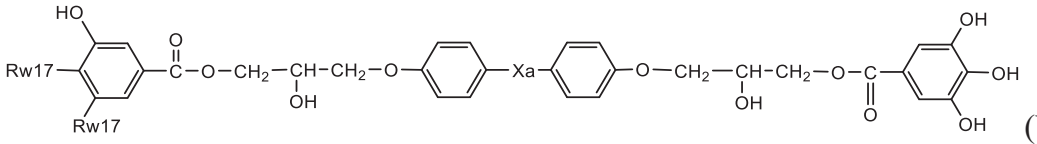
Xa is selected from the group consisting of a direct valence bond, alkylene, -SO_2-, -C(=O)- and -O-;

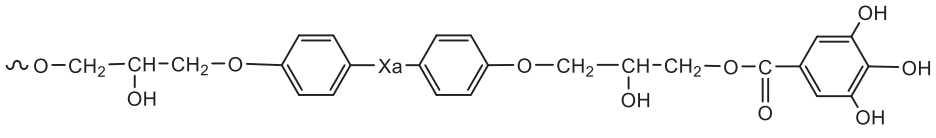

(Va-10),


(Vb-10).

39. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound of structure (Va-15), wherein Rw17 is OH or the moiety (Vb-15), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw17 is the moiety (Vb-15), and further wherein

Xa is an alkylene moiety,


(Va-15),

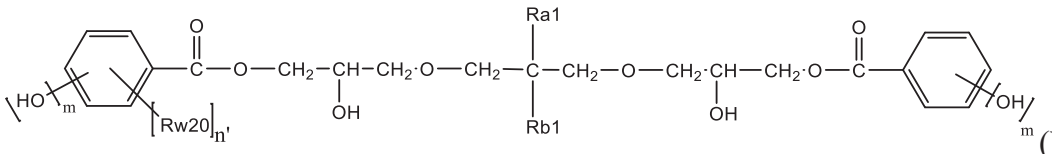

(Vb-15).

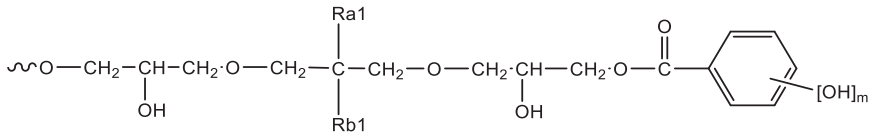
40. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound having structure (VIa-1), wherein Rw20 is OH, or a moiety of structure (VIb-1), wherein ∿∿ represents the point of attachment in this moiety, provided that

m is 2 to 3,

n' is 0 or 1, and further wherein,

Ra1 and Rb1 are independently selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,

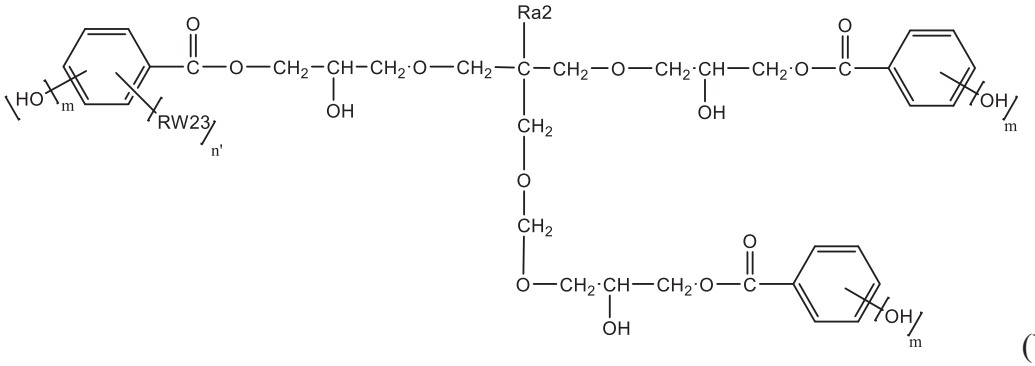

(VIa-1),


(VIb-1).

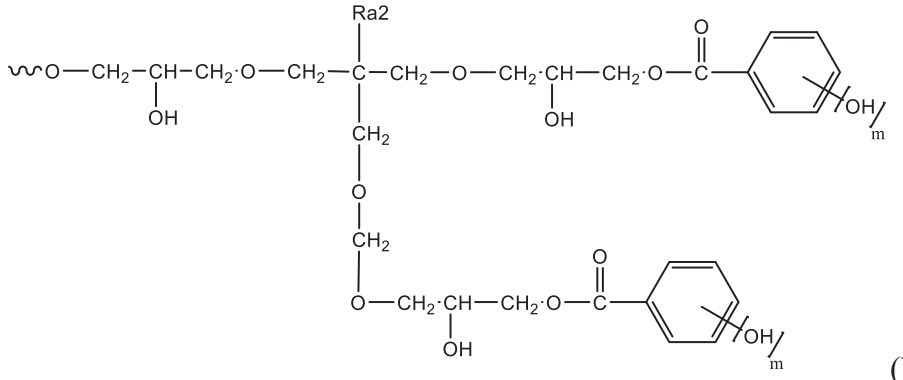
41. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate comprises at least one compound of structure (VIIa-1), wherein Rw23 is OH, or a moiety of structure (VIIb-1), wherein ∿∿ represents the point of attachment in this moiety, provided

m is 1, 2 or 3, and n' is 0 or 1, and further wherein,

Ra2 is selected from a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety;

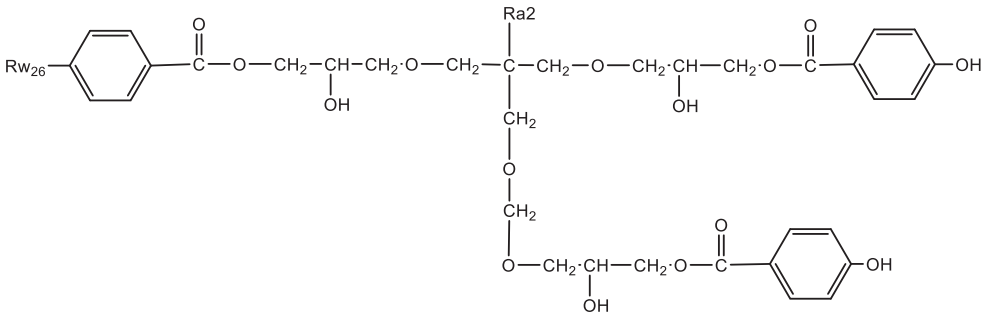


(VIIa-1),

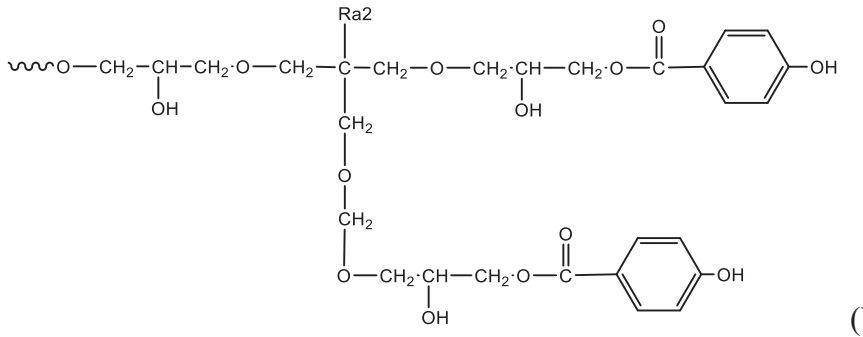


(VIIb-1).

42. The glycidyl hydroxy benzoic acid condensate material of any one of claims 25, 26 and 27, wherein said glycidyl hydroxy benzoic acid condensate material comprises at least one compound of structure (VIIa-4), wherein Rw26 is OH or the moiety (VIIb-4), wherein ∿∿ represents the point of attachment in this moiety, provided that no more than one Rw26 is the moiety (VIIb-4), and further wherein, Ra2 is a C_1 to C_5 alkyl or a C_2 to C_5 -alkylene-O-alkyl moiety,



(VIIa-4),


Ra2
O
CH2
CH
CH2·O
CH2
C
CH2
O
CH2·CH
CH2·O
C
OH
OH
OH
CH2
O
CH2
O
CH2·CH
CH2·O
C
OH
OH
OH

(VIIb-4).