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(12) United States Patent
Kuwabara et al.**(10) Patent No.: US 10,559,757 B2**
(45) Date of Patent: Feb. 11, 2020**(54) HOST MATERIAL FOR DELAYED
FLUORESCENT MATERIALS, ORGANIC
LIGHT-EMITTING DEVICE AND
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patent is extended or adjusted under 35
U.S.C. 154(b) by 150 days.**(21) Appl. No.: 15/508,236****(22) PCT Filed: Sep. 2, 2015****(86) PCT No.: PCT/JP2015/074901**

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(30) Foreign Application Priority Data

Sep. 3, 2014 (JP) 2014-179589

(51) Int. Cl.**H01L 51/54** (2006.01)**C09K 11/06** (2006.01)**H01L 51/00** (2006.01)**C07C 49/788** (2006.01)**C07C 15/38** (2006.01)**C09K 11/02** (2006.01)**H01L 51/50** (2006.01)**(52) U.S. Cl.**CPC **H01L 51/0058** (2013.01); **C07C 15/38**
(2013.01); **C07C 49/788** (2013.01); **C09K**
11/025 (2013.01); **C09K 11/06** (2013.01);
H01L 51/006 (2013.01); **H01L 51/0054**
(2013.01); **C09K 2211/1007** (2013.01); **C09K**
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(2013.01); **H01L 51/0052** (2013.01); **H01L**
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(2013.01); **H01L 2251/5384** (2013.01)**(58) Field of Classification Search**CPC ... **C09K 11/025**; **C09K 11/06**; **C09K 2211/00**;
C09K 2211/10; **C09K 2211/1007**; **C09K**2211/1011; **C09K 2211/1014**; **C07C**
15/38; **C07C 49/788**; **H01L 51/0032**;
H01L 51/005; **H01L 51/0058**; **H01L**
51/006; **H01L 51/0052**; **H01L 51/0054**;
H01L 51/0067; **H01L 51/0072**; **H01L**
51/5012; **H01L 51/5016**; **H01L 2251/5384**
USPC **428/690**, **691**, **917**, **411.4**, **336**; **427/58**,
427/66; **313/500-512**; **257/40**, **88-104**,
257/E51.001-E51.052;
252/301.16-301.35

See application file for complete search history.

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PLLC**(57) ABSTRACT**A compound represented by (Tr)_n-Z is useful as a host
material for delayed fluorescent materials. Tr represents a
substituted or unsubstituted triphenylenyl group, and plural
Tr's existing in the general formula (1) may be the same as
or different from each other. Z represents a carbonyl group
or a substituted or unsubstituted, n-valent aromatic hydro-
carbon group. n represents an integer of 2 to 6, but when Z
is a carbonyl group, n is 2.**15 Claims, 3 Drawing Sheets**

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Fig.1

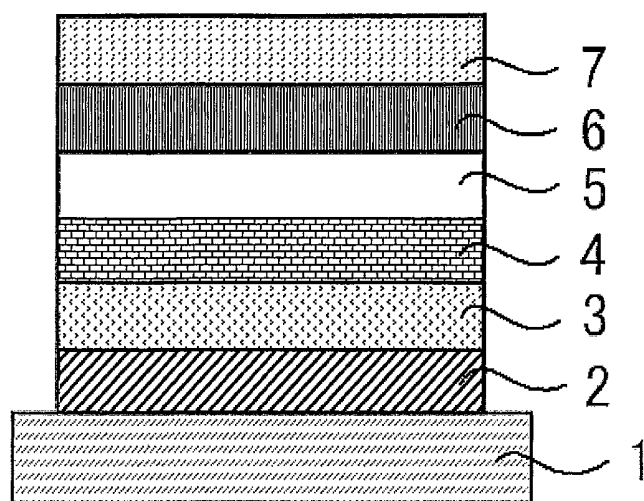


Fig.2

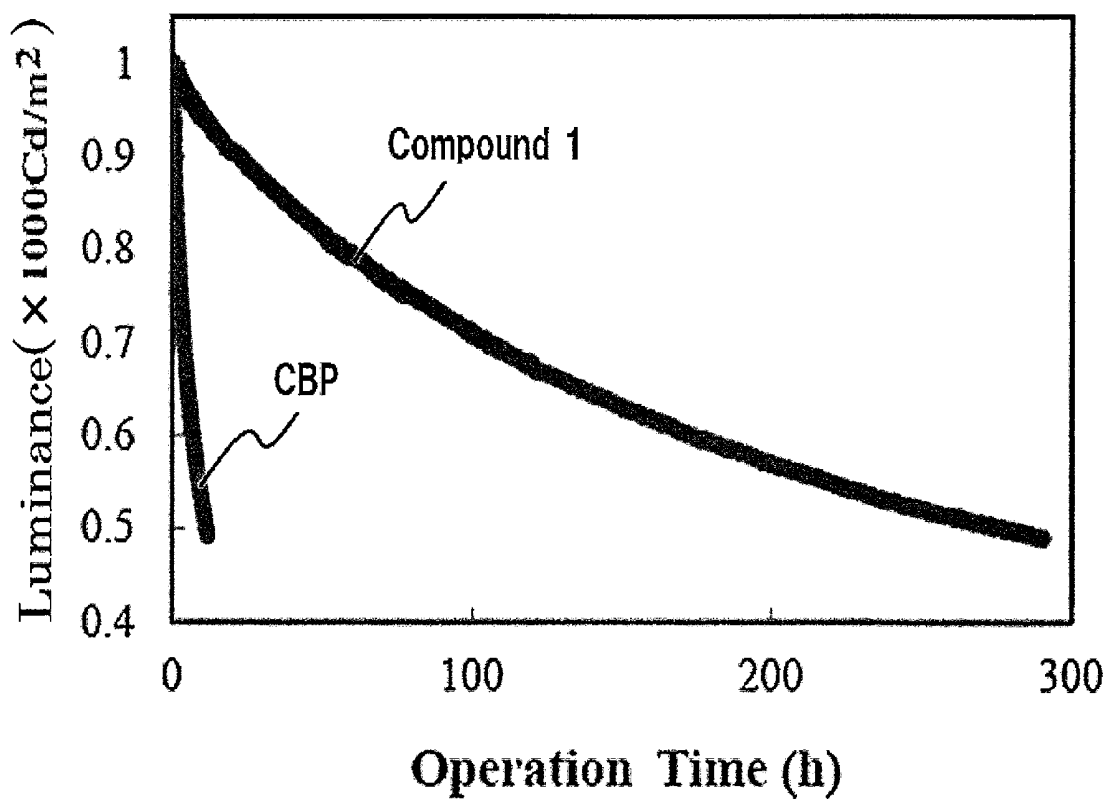


Fig.3

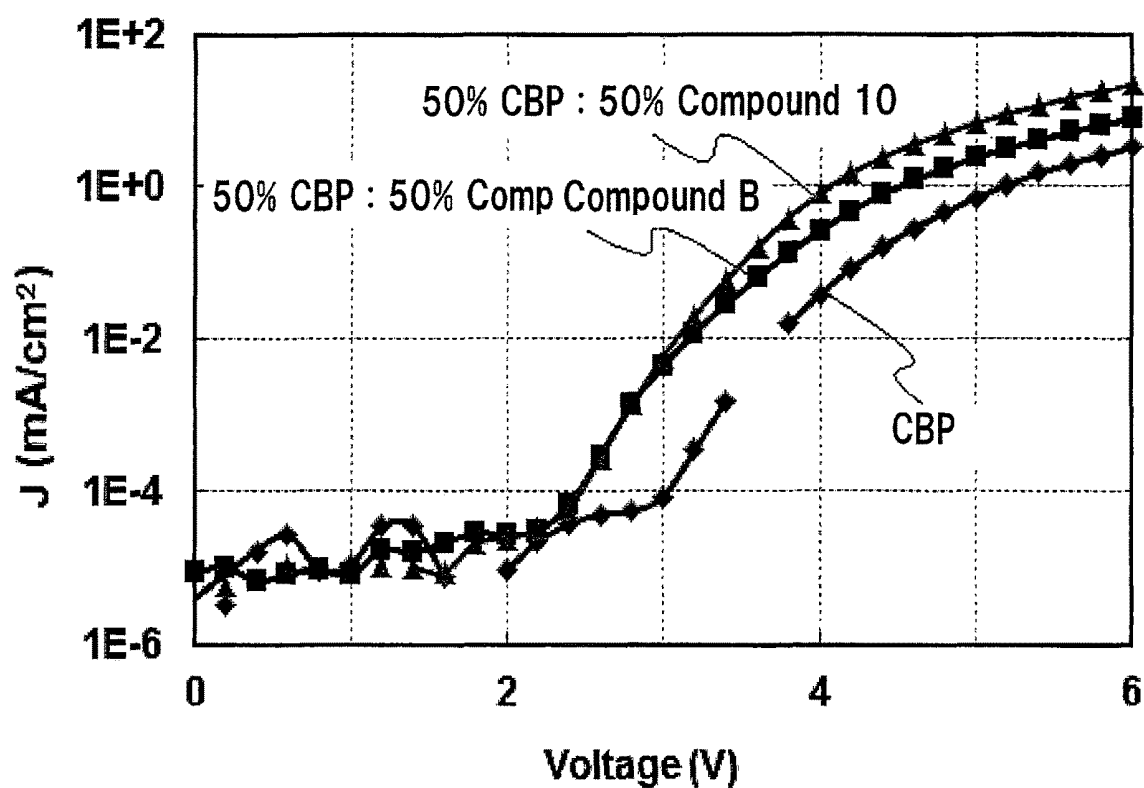


Fig.4

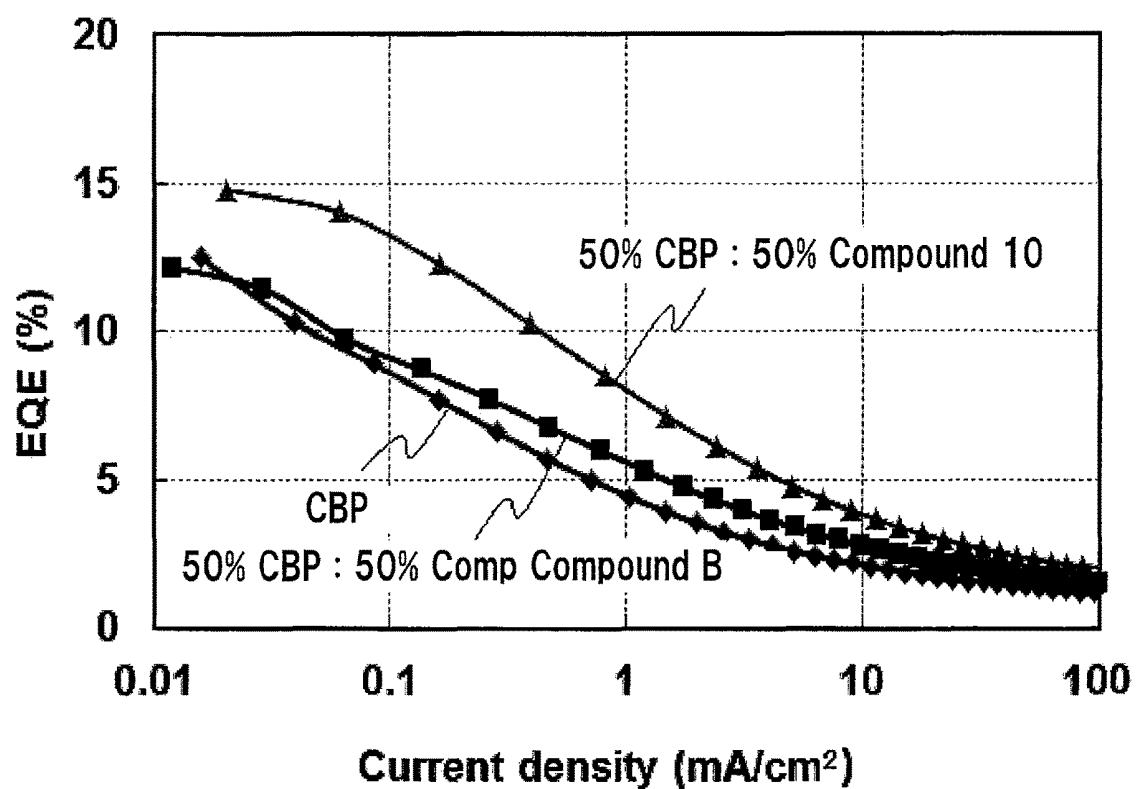
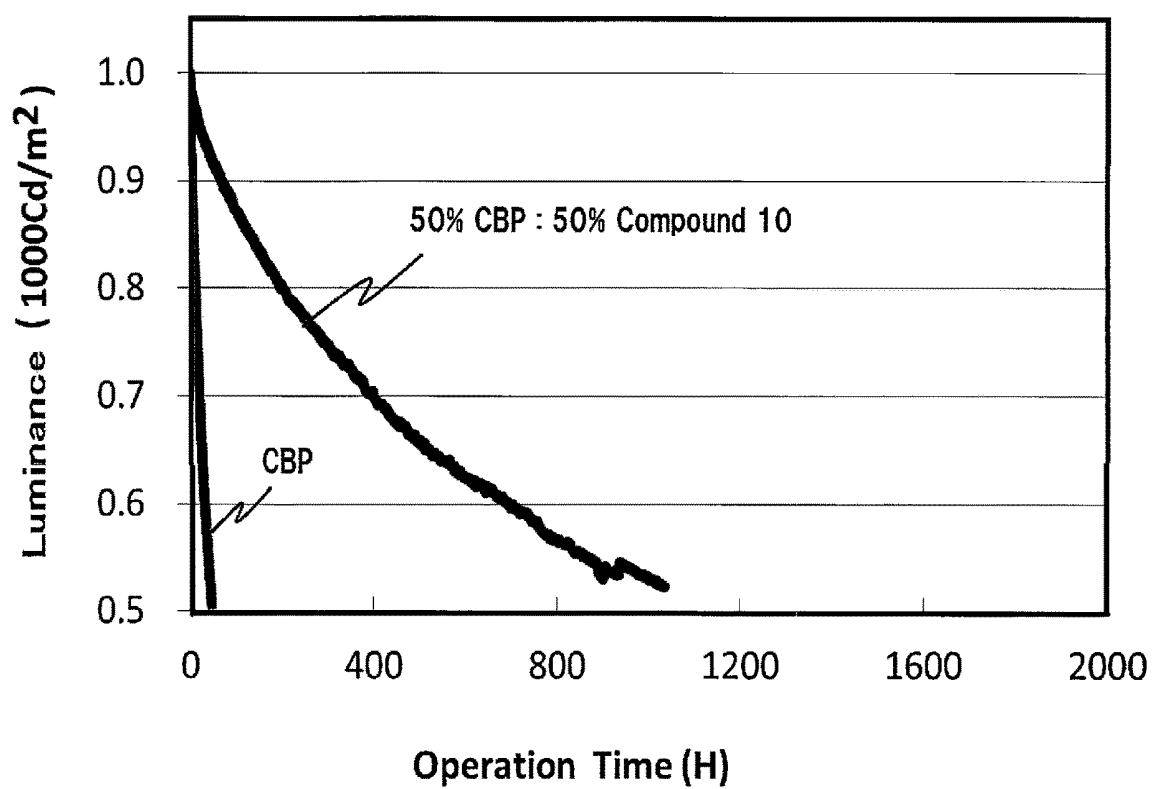


Fig.5



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HOST MATERIAL FOR DELAYED FLUORESCENT MATERIALS, ORGANIC LIGHT-EMITTING DEVICE AND COMPOUND

TECHNICAL FIELD

The present invention relates to a compound useful as a host material for delayed fluorescent materials, and to an organic light-emitting device using the compound.

BACKGROUND ART

Studies are being actively performed for enhancing the light emission efficiency of organic light-emitting devices such as an organic electroluminescence devices (organic EL devices), etc. For example, regarding the light-emitting material for use in a light-emitting layer, development of delayed fluorescent materials is under way as those that can efficiently utilize the excitation energy thereof for light emission. A delayed fluorescent material is a light-emitting material that radiates fluorescence directly from the excited singlet state and radiates fluorescence (delayed fluorescence) also from the excited singlet state formed through reverse intersystem crossing from the excited triplet state, and the excited triplet state can also be made to contribute toward fluorescence emission along with the excited singlet state. As an application of the delayed fluorescent material, there are seen some publications describing an organic electroluminescence device having therein a light-emitting layer formed by a combination of a delayed fluorescent material and a host material.

For example, PTL 1 describes an example of producing an organic EL device having a light-emitting layer that contains 1,3-bis(carbazol-9-yl)benzene (mCP) and a delayed fluorescent material.

PTL 2 describes an example of producing an organic EL device having a light-emitting layer that contains 4,4'-bis(N-carbazolyl)biphenyl (CBP) and a delayed fluorescent material.

CITATION LIST

Patent Literature

PTL 1: JP-A 2013-253121

PTL 2: JP-A 2013-256490

SUMMARY OF INVENTION

Technical Problem

As described above, PTL 1 describes formation of a light-emitting layer by combining a delayed fluorescent material and mCP, and PTL 2 describes formation of a light-emitting layer by combining a delayed fluorescent material and CBP. Here, mCP and CBP employed in these publications have heretofore been generally used as a host material for a fluorescent material and a phosphorescent material. However, the present inventors have actually investigated the organic EL devices having the host material as combined with a delayed fluorescent material, and have found that the device lifetime is only 50 hours or so and is short, and the devices are impracticable. This is considered to be because a delayed fluorescent material differs from an ordinary fluorescent material or phosphorescent material in point of the light emission mechanism and, in addition, a

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delayed fluorescent material greatly differs from an ordinary light-emitting material in point of the characteristics necessary for host materials and the preferred structures of the materials. However, there exists no literature that investigates the characteristics and the structures of host materials to be combined with delayed fluorescent materials, and no one could expect what type of compound would be useful as a host material for delayed fluorescent materials, and the situation is such that no one could sufficiently utilize the characteristics of delayed fluorescent materials.

Given the situation, the present inventors have made assiduous studies of investigating the usefulness of various materials as a host material for delayed fluorescent materials. With that, the inventors have hit on a general formula of a compound useful as a host material for delayed fluorescent materials, and have further promoted assiduous investigations for generalizing the constitution of an organic light-emitting device having a high light emission efficiency and a long device lifetime.

Solution to Problem

As a result of assiduous studies, the present inventors have found that, by using a compound having a structure where plural triphenylenyl groups bond via a carbonyl group or an aromatic hydrocarbon group as a host material for delayed fluorescent materials, not only the device lifetime can be more greatly prolonged than in the case of using a carbazole-type host material but also high efficiency and low-voltage driving can be expected. Based on these findings, the present inventors have now reached providing the present invention as described below as a means for solving the above-mentioned problems.

[1] A host material for delayed fluorescent materials, containing a compound represented by the following general formula (1):

$$(\text{Tr})_n\text{-Z}$$

General Formula (1)

[In the general formula (1), Tr represents a substituted or unsubstituted triphenylenyl group, and plural Tr's existing in the general formula (1) may be the same as or different from each other. Z represents a carbonyl group or a substituted or unsubstituted, n-valent aromatic hydrocarbon group. n represents an integer of 2 to 6, but when Z is a carbonyl group, n is 2.]

[2] The host material for delayed fluorescent materials according to [1], wherein Z is a substituted or unsubstituted, n-valent aromatic hydrocarbon group.

[3] The host material for delayed fluorescent materials according to [2], wherein Z is an n-valent benzene residue.

[4] The host material for delayed fluorescent materials according to [3], wherein Tr bonds to at least the 1-position and the 3-position of the benzene residue.

[5] The host material for delayed fluorescent materials according to [2], wherein Z is an n-valent biphenyl residue.

[6] The host material for delayed fluorescent materials according to [2], wherein Z is an n-valent aromatic hydrocarbon group substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

[7] The host material for delayed fluorescent materials according to [1], wherein Z is a carbonyl group.

[8] The host material for delayed fluorescent materials according to [7], wherein at least one Tr has a substituent represented by the following general formula (2):

$$\text{Tr}^A\text{-CO-}$$

General Formula (2)

[In the general formula (2), Tr^4 represents a substituted or unsubstituted triphenylenyl group.]

[9] The host material for delayed fluorescent materials according to [8], wherein two Tr's have, in total, 1 to 5 substituents each represented by the general formula (2).

[10] The host material for delayed fluorescent materials according to any one of [7] to [9], which contains a partial structure with a carbonyl group bonding to the 2-position, the 3-position, the 6-position, the 7-position, the 10-position or the 11-position of the triphenylene ring inside the molecule.

[11] The host material for delayed fluorescent materials according to [10], wherein all the carbonyl groups bonding to the triphenylene ring existing inside the molecule bond to the 2-position, the 3-position, the 6-position, the 7-position, the 10-position or the 11-position of the triphenylene ring.

[12] The host material for delayed fluorescent materials according to any one of [1] to [11], wherein at least one Tr in the general formula (1) is a triphenylenyl group substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

[13] An organic light-emitting device comprising a layer that contains the host material of any one of [1] to [12] and a delayed fluorescent material.

[14] The organic light-emitting device according to [13], comprising a layer that contains the host material of any one of [1] to [12] and any other host material other than that host material, and a delayed fluorescent material.

[15] The organic light-emitting device according to [13] or [14], which is an organic electroluminescence device.

[16] A compound represented by the following general formula (3):



[In the general formula (3), Tr^1 and Tr^2 each independently represent a substituted or unsubstituted triphenylenyl group, and Tr^1 and Tr^2 may be the same as or different from each other.]

[17] A compound represented by the following general formula (4):



[In the general formula (4), Tr^3 represents a substituted or unsubstituted triphenylenyl group, and plural Tr^3 's existing in the general formula (4) may be the same as or different from each other. Z^1 represents a substituted or unsubstituted n-valent aromatic hydrocarbon group. n1 represents an integer of 2 to 6. At least one of Tr^3 and Z^1 is substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group. When Tr^3 is unsubstituted, Z^1 is a benzene ring residue substituted with a phenyl group or a methyl group and bonds to Tr^3 at least at the 1-position and the 3-position, or is a biphenyl residue substituted with a phenyl group.]

Advantageous Effects of Invention

The compound of the present invention is useful as a host material for delayed fluorescent materials. In addition, the organic light-emitting device using the compound of the present invention as a host material for delayed fluorescent materials requires a low driving voltage and realizes a high light emission efficiency, and has a long device lifetime.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 This is a schematic cross-sectional view showing an example of a layer configuration of an organic electroluminescence device.

FIG. 2 This is a graph showing the lifetime characteristics of the organic electroluminescence device using the compound 1 of Example 1 and the organic electroluminescence device using the comparative compound A of Comparative Example 1.

FIG. 3 This is a graph showing the voltage-current density characteristics of the organic electroluminescence device using the compound 10 and CBP of Example 2, the organic electroluminescence device using CBP of Comparative Example 2, and the organic electroluminescence device using the comparative compound B and CBP of Comparative Example 3.

FIG. 4 This is a graph showing the current density-external quantum efficiency characteristics of the organic electroluminescence device using the compound 10 and CBP of Example 2, the organic electroluminescence device using CBP of Comparative Example 2, and the organic electroluminescence device using the comparative compound B and CBP of Comparative Example 3.

FIG. 5 This is a graph showing the lifetime characteristics of the organic electroluminescence device using the compound 10 and CBP of Example 2 and the organic electroluminescence device using CBP of Comparative Example 2.

DESCRIPTION OF EMBODIMENTS

The contents of the present invention are described in detail hereinafter. The constitutional elements may be described below with reference to representative embodiments and specific examples of the invention, but the invention is not limited to the embodiments and the examples. In the description, a numerical range expressed with reference to the expressions, an upper limit or less and/or a lower limit or more, means a range that includes the upper limit and/or the lower limit.

[Compound Represented by General Formula (1)]

The host material for delayed fluorescent materials of the present invention contains a compound represented by the following general formula (1):



In the general formula (1), Z represents a carbonyl group or a substituted or unsubstituted, n-valent aromatic hydrocarbon group.

The aromatic ring of the aromatic hydrocarbon group that Z represents may be a single-ring aromatic ring, or may be an aromatic ring of a ring-assembly structure where two or more aromatic rings bond via a single bond, such as a biphenyl ring, or may also be an aromatic ring of a polycyclic condensed structure where two or more aromatic rings are condensed such as naphthalene. Specifically, the aromatic hydrocarbon group is preferably an aromatic hydrocarbon group having a ring skeleton carbon number of 6 to 18. Preferably, the group is a residue of a benzene ring, a biphenyl ring, a naphthalene ring or a fluorene ring, more preferably a benzene residue or a biphenyl residue, and even more preferably a benzene residue.

When Z is a carbonyl group, n is 2.

When Z is an aromatic hydrocarbon group, n is 2 to 6, preferably 2 to 3. The bonding position of Tr in the aromatic hydrocarbon group is not specifically defined, but when Z is a benzene residue, preferably, Tr bonds to at least the 1-position and the 3-position of the residue. In the methine group and the methylene group of the aromatic hydrocarbon group to which Tr does not bond, the hydrogen atom may be substituted with a substituent, or may not be substituted. The substituent that may substitute in the aromatic hydrocarbon

group includes those selected from a group of the substituents to be mentioned hereinunder, and among these, a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group is preferred. With that, the stability of the compound represented by the general formula (1) may tend to increase. The alkyl group is preferably an alkyl group having 1 to 18 carbon atoms, and is more preferably a methyl group. For the description and the preferred range of the aromatic ring that constitutes the aryl group, the description and the preferred range of the aromatic ring of the aromatic hydrocarbon group that Z may represent may be referred to. Among these, the aryl group that may substitute in the aromatic hydrocarbon group is preferably a biphenyl residue, or a benzene residue (a phenyl group), and is more preferably a phenyl group.

Tr represents a substituted or unsubstituted triphenylenyl group. The bonding position of the triphenylenyl group to Z is not specifically defined, but is preferably the 2-position. In the methine group of the triphenylenyl group that does not bond to Z, the hydrogen atom may be substituted with a substituent, or may not be substituted. The substituting position in the case where the triphenylenyl group is substituted with a substituent is preferably at least one of the 6-position, the 7-position, the 10-position and the 11-position.

The substituent that may substitute in the triphenylenyl group includes those selected from a group of the substituents to be mentioned hereinunder. Here, at least one Tr is preferably substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group. With that, the stability of the compound represented by the general formula (1) may tend to increase. The alkyl group is preferably an alkyl group having 1 to 18 carbon atoms, and is more preferably a methyl group. For the description and the preferred range of the aromatic ring that constitutes the aryl group, the description and the preferred range of the aromatic ring of the aromatic hydrocarbon group that Z may represent may be referred to. Among these, the aryl group that may substitute in the triphenylenyl group is preferably a biphenyl residue, or a benzene residue (a phenyl group), and is more preferably a phenyl group.

Preferably, at least one Tr has a substituent represented by the following general formula (2). Among plural Tr's, one or more may have the substituent represented by the general formula (2), but preferably two of them have the substituent. When two Tr's have a group represented by the general formula (2), the total of the groups represented by the general formula (2) is preferably 1 to 5, more preferably 1 to 4, even more preferably 1 to 3.



General Formula (2)

In the general formula (2), Tr^4 represents a substituted or unsubstituted triphenylenyl group. The bonding position to the carbonyl group (-CO-) in the triphenylenyl group is not specifically defined, but is preferably the 2-position. In the methine group not bonding to the carbonyl group in the triphenylenyl group, the hydrogen atom may be substituted with a substituent, or may not be substituted. For the description and the preferred range of the substituent that may substitute in the triphenylenyl group, the description and the preferred range of the substituent that may substitute in the triphenylenyl group of Tr may be referred to.

When plural Tr's exist inside the molecule of the compound represented by the general formula (1), the plural Tr's may be the same as or different from each other, but are preferably the same. When plural Tr^4 's represented by the general formula (2) exist inside the molecule of the com-

pound represented by the general formula (1), the plural Tr^4 's may be the same as or different from each other, but are preferably the same.

The compound represented by the general formula (1) preferably contains 1 to 6 carbonyl groups, more preferably 1 to 3 carbonyl groups. Further, the compound represented by the general formula (1) preferably has a partial structure with a carbonyl group bonding to the 2-position, the 3-position, the 6-position, the 7-position, the 10-position or the 11-position of the triphenylene ring inside the molecule, and more preferably, all the carbonyl groups bonding to the triphenylene ring existing inside the molecule bond to the 2-position, the 3-position, the 6-position, the 7-position, the 10-position or the 11-position of the triphenylene ring.

Examples of the substituent of the aromatic hydrocarbon group that Z may represent, the substituent that may substitute in the triphenylenyl group of Tr and Tr^4 , and the substituent of the substituted alkyl group and the substituted aryl group that may substitute in the aromatic hydrocarbon group of the triphenylenyl group include a hydroxy group, a halogen atom, a cyano group, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an alkylthio group having 1 to 20 carbon atoms, an alkyl-substituted amino group having 1 to 20 carbon atoms, an acyl group having 2 to 20 carbon atoms, an aryl group having 6 to 40 carbon atoms, a heteroaryl group having 3 to 40 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms, an alkoxycarbonyl group having 2 to 10 carbon atoms, an alkylsulfonyl group having 1 to 10 carbon atoms, a haloalkyl group having 1 to 10 carbon atoms, an amide group, an alkylamide group having 2 to 10 carbon atoms, a trialkylsilyl group having 3 to 20 carbon atoms, a trialkylsilylalkyl group having 4 to 20 carbon atoms, a trialkylsilylalkenyl group having 5 to 20 carbon atoms, trialkylsilylalkynyl group having 5 to 20 carbon atoms, a nitro group, a substituent represented by the above-mentioned general formula (2), etc. Among these examples, the substituents that may be further substituted with a substituent may be substituted. More preferred substituents include a halogen atom, a cyano group, a substituted or unsubstituted alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, a substituted or unsubstituted aryl group having 6 to 40 carbon atoms, a substituted or unsubstituted heteroaryl group having 3 to 40 carbon atoms, and a dialkyl-substituted amino group having 1 to 20 carbon atoms. Even more preferred substituents include a fluorine atom, a chlorine atom, a cyano group, a substituted or unsubstituted alkyl group having 1 to 10 carbon atoms, a substituted or unsubstituted alkoxy group having 1 to 10 carbon atoms, a substituted or unsubstituted aryl group having 6 to 15 carbon atoms, a substituted or unsubstituted heteroaryl group having 3 to 12 carbon atoms, and a substituent represented by the general formula (2).

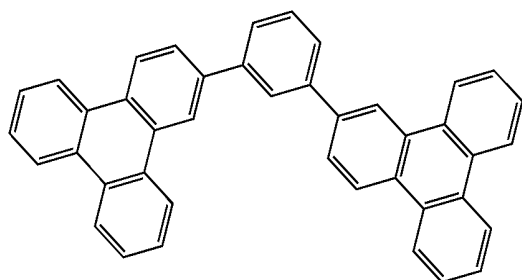
In the following, specific examples of the compound represented by the general formula (1) are exemplified. However, the compound represented by the general formula (1) that is usable in the present invention should not be interpreted in a limited way by these examples. In the compounds represented by the following formulae, R represents a methyl group, a phenyl group, a benzoyl group, a triphenylenyl group or a triphenylenylcarbonyl group. Plural R's each representing the substituent may be the same as or different from each other.

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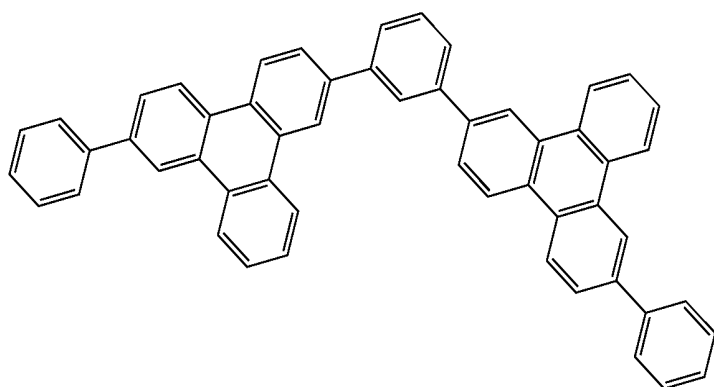
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[Chem. 1]

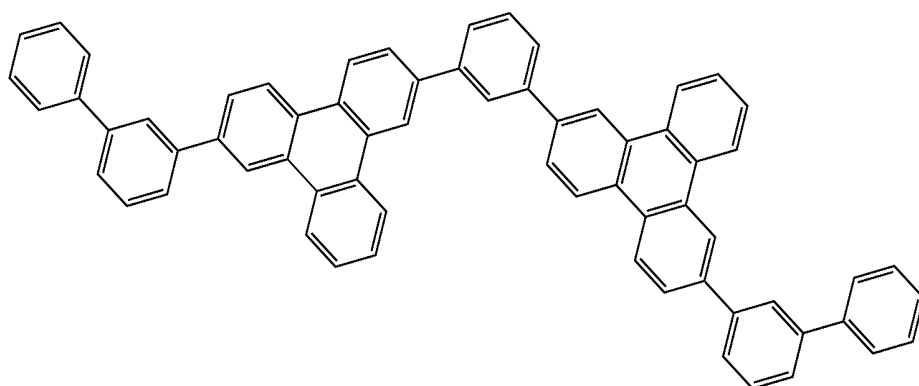
Compound 1



Compound 2

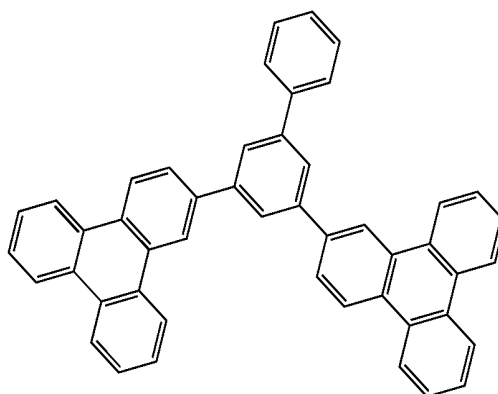
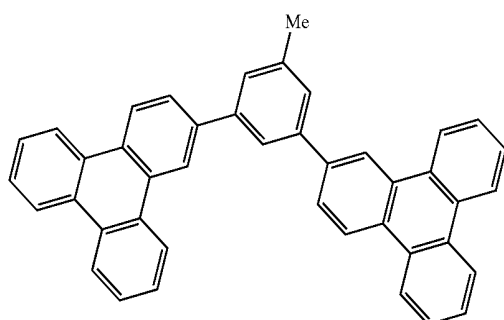


Compound 3



Compound 4

Compound 5

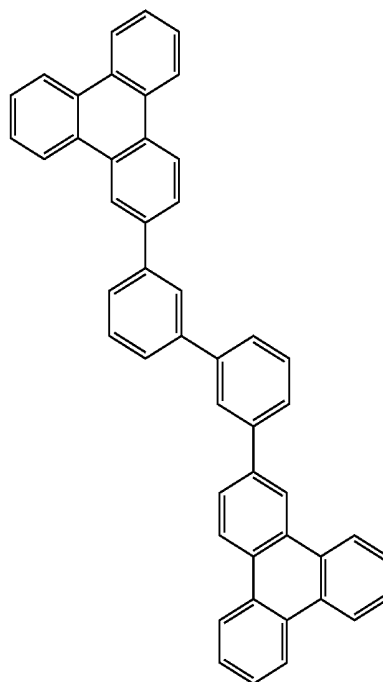
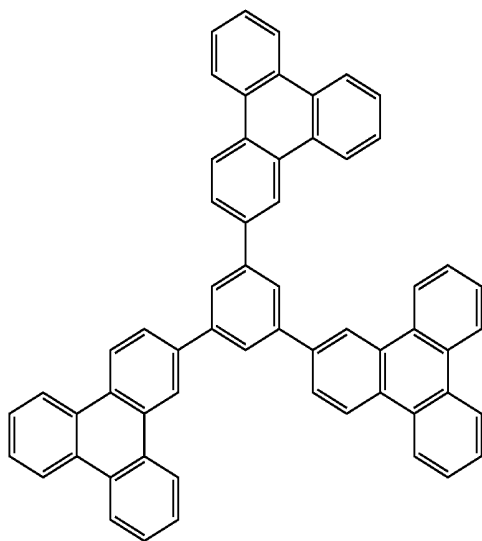


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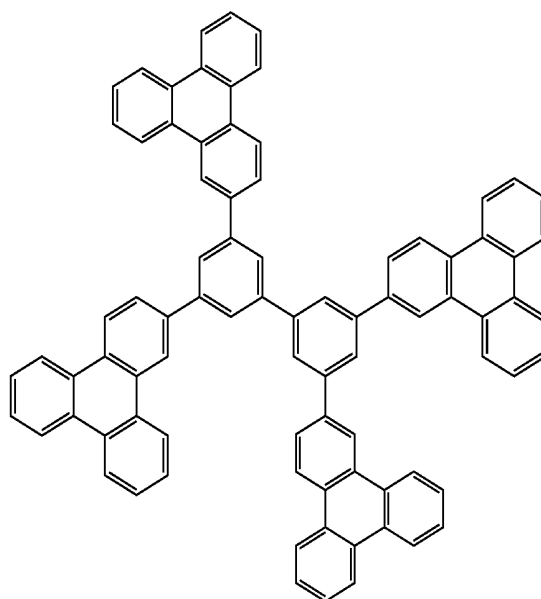
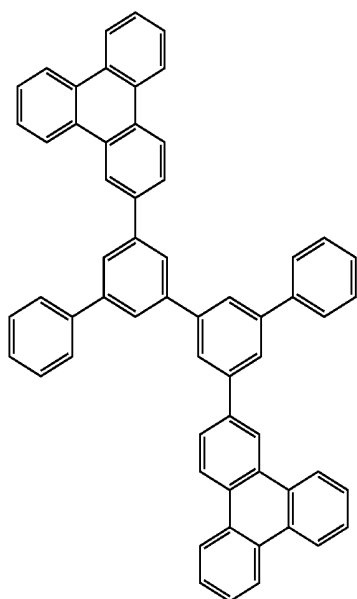
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Compound 6

Compound 7



Compound 8

Compound 9



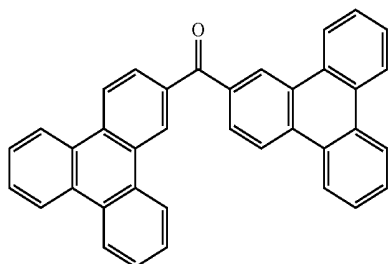
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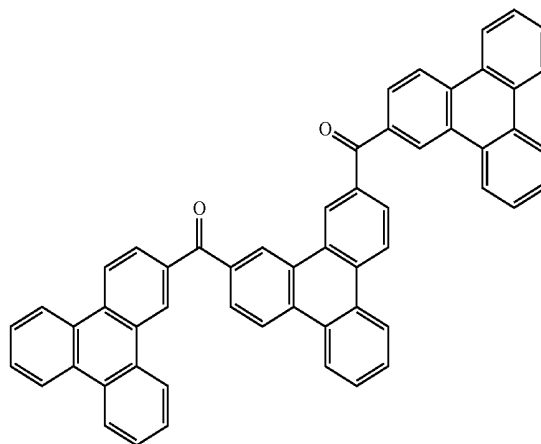
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[Chem. 2]

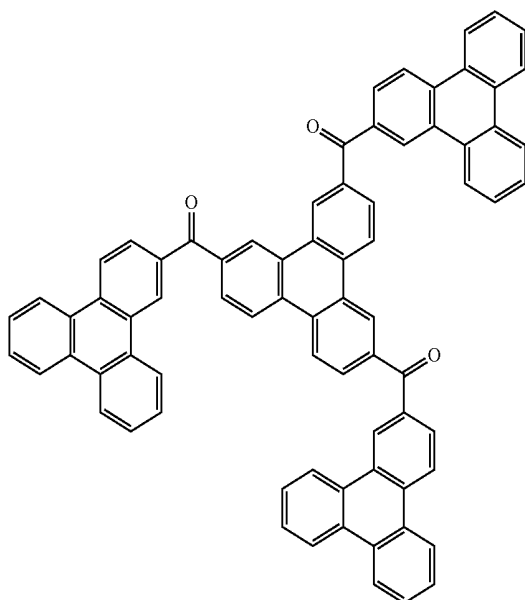
Compound 10



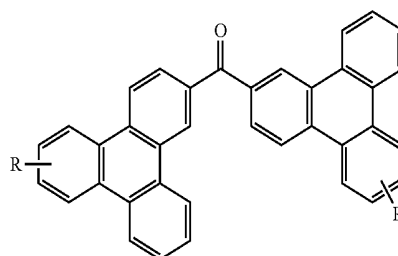
Compound 11



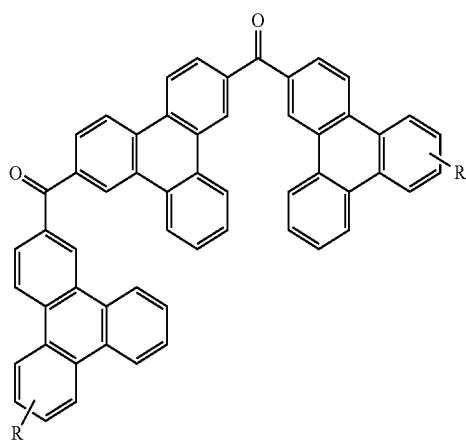
Compound 12



Compound 13



Compound 14



The molecular weight of the compound represented by the general formula (1) is, for example, in the case of using it by forming an organic layer that contains a compound represented by the general formula (1) according to a vapor deposition method, preferably 1500 or less, more preferably 1200 or less, even more preferably 1000 or less, still more

preferably 800 or less. The lower limit of the molecular weight is the molecular weight of the smallest compound represented by the general formula (1).

The compound represented by the general formula (1) may be formed into a film according to a coating method irrespective of the molecular weight thereof. According to a

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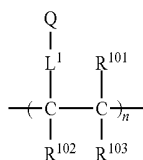
coating method, even a compound having a relatively large molecular weight can be formed into a film.

By applying the present invention, it may be taken into consideration to use a compound containing plural structures represented by the general formula (1) in the molecule thereof, as a host material for delayed fluorescent materials.

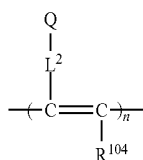
For example, a polymerizable group is previously introduced in the structure represented by the general formula (1), and it may be taken into consideration to use a polymer obtained through polymerization of the polymerizable group as a host material for delayed fluorescent materials. Specifically, a monomer containing a polymerizable functional group in any of Tr and Z in the general formula (1) is prepared, and this is homo-polymerized singly or copolymerized with any other monomer to give a polymer having a repeating unit, and use of the polymer as a host material for delayed fluorescent materials may be taken into consideration. Alternatively, compounds each having a structure represented by the general formula (1) are coupled to give a dimer or a trimer, and use of these as a host material for delayed fluorescent materials may be taken into consideration.

Examples of the polymer having a repeating unit that contains a structure represented by the general formula (1) include polymers containing a structure represented by the following general formula (5) or (6).

[Chem. 3]



General Formula (5)



General Formula (6)

In the general formulae (5) and (6), Q represents a group containing the structure represented by the general formula (1), and L¹ and L² each represent a linking group. The carbon number of the linking group is preferably 0 to 20, more preferably 1 to 15, even more preferably 2 to 10. The linking group preferably has a structure represented by —X¹¹-L¹¹-. Here, X¹¹ represents an oxygen atom or a sulfur atom, and is preferably an oxygen atom. L¹¹ represents a linking group, and is preferably a substituted or unsubstituted alkylene group or a substituted or unsubstituted arylene group, more preferably a substituted or unsubstituted alkylene group having 1 to 10 carbon atoms or a substituted or unsubstituted phenylene group.

In the general formulae (5) and (6), R¹⁰¹, R¹⁰², R¹⁰³ and R¹⁰⁴ each independently represent a substituent. Preferably, they each are a substituted or unsubstituted alkyl group having 1 to 6 carbon atoms, a substituted or unsubstituted alkoxy group having 1 to 6 carbon atoms, or a halogen atom, more preferably an unsubstituted alkyl group having 1 to 3

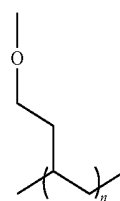
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carbon atoms, an unsubstituted alkoxy group having 1 to 3 carbon atoms, a fluorine atom or a chlorine atom, and even more preferably an unsubstituted alkyl group having 1 to 3 carbon atoms, or an unsubstituted alkoxy group having 1 to 3 carbon atoms.

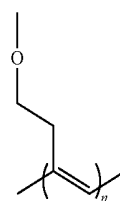
The linking group represented by L¹ and L² may bond to any of Tr and Z in the structure of the general formula (1) that constitutes Q, or to Tr⁴ in the general formula (2). Two or more linking groups may bond to one Q to form a crosslinked structure or a network structure.

Specific structural examples of the repeating unit include structures represented by the following formulae (7) to (10).

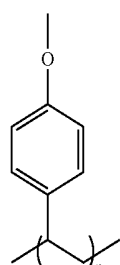
[Chem. 4]



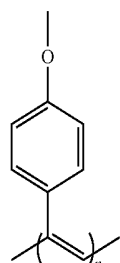
Formula (7)



Formula (8)



Formula (9)

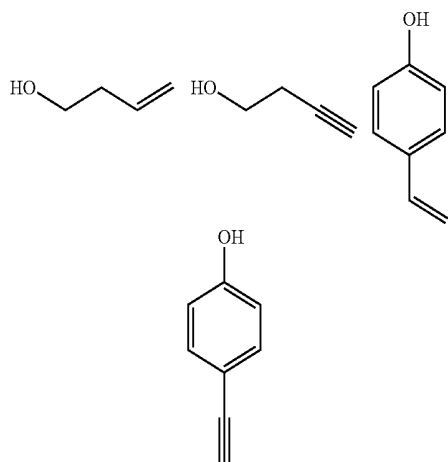


Formula (10)

Polymers having a repeating unit of the formulae (7) to (10) may be synthesized by previously introducing a hydroxy group into any of Tr and Z in a structure of the general formula (1), then introducing a polymerizable group into the structure through reaction with any of the following compounds via the hydroxy group serving as a linker, and polymerizing the polymerizable group.

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[Chem. 5]



The polymer having a structure represented by the general formula (1) in the molecule may be a polymer containing a repeating unit alone having a structure represented by the general formula (1) or may be a polymer containing a repeating unit having any other structure. The repeating unit having a structure represented by the general formula (1) contained in the polymer may be one type alone or may contain two or more types of repeating units. A repeating unit not having a structure represented by the general formula (1) includes those derived from monomers to be used in ordinary copolymerization. For example, there are mentioned repeating units derived from monomers having an ethylenic unsaturated bond such as ethylene, styrene, etc. [Compound Represented by General Formula (3)]

Among the compounds represented by the general formula (1), compounds represented by the following general formula (3) are novel compounds.

[Chem. 6]



General Formula (3)

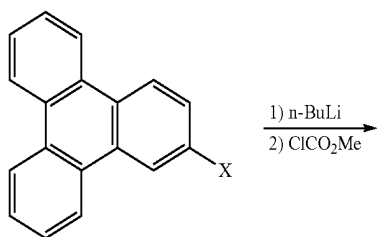
In the general formula (3), Tr^1 and Tr^2 each independently represent a substituted or unsubstituted triphenylenyl group, and Tr^1 and Tr^2 may be the same as or different from each other.

For the description and the preferred range of Tr^1 and Tr^2 in the general formula (3), the description of Tr in the general formula (1) may be referred to.

[Synthesis Method for Compound Represented by General Formula (3)]

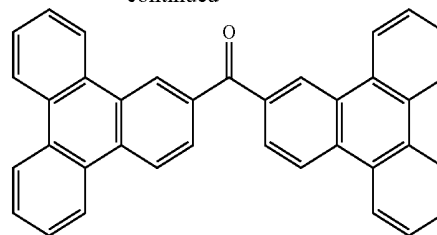
The compound represented by the general formula (3) may be synthesized by combining known reactions. For example, the compound of the general formula (3) where Tr^1 and Tr^2 are unsubstituted triphenylenyl groups may be synthesized according to the reaction shown by the following formula.

[Chem. 7]



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-continued



X in the above reaction formula represents a halogen atom, including a fluorine atom, a chlorine atom, a bromine atom and an iodine atom, and is preferably a chlorine atom, a bromine atom or an iodine atom.

For the details of the reaction, Synthesis Examples to be given hereunder may be referred to.

In addition, the compound represented by the general formula (3) may also be synthesized by combining any other known synthesis reactions.

[Compound Represented by General Formula (4)]

Among the compounds represented by the general formula (1), compounds represented by the following general formula (4) are also novel compounds.



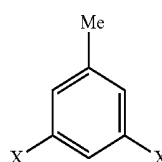
General Formula (4)

In the general formula (4), Tr^3 represents a substituted or unsubstituted triphenylenyl group, and plural Tr^3 's existing in the general formula (4) may be the same as or different from each other. Z^1 represents a substituted or unsubstituted n-valent aromatic hydrocarbon group. $n1$ represents an integer of 2 to 6. For the description and the preferred range of Tr^3 , Z^1 and $n1$ in the general formula (4), the description of Tr , Z and n in the general formula (1) may be referred to. However, at least one of Tr^3 and Z^1 is substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group. Among Tr^3 and Z^1 , one or more Tr^3 's or one Z^1 alone, or one or more Tr^3 's and Z^1 may be substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group. Here, when all Tr^3 's are unsubstituted, Z^1 is a benzene ring residue substituted with a phenyl group or a methyl group and bonds to Tr^3 at least at the 1-position and the 3-position, or is a biphenyl residue substituted with a phenyl group.

[Synthesis Method for Compound Represented by General Formula (4)]

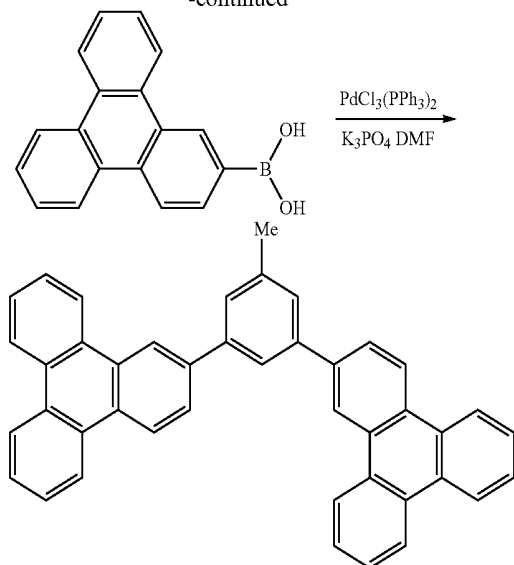
The compound represented by the general formula (4) may be synthesized by combining known reactions. For example, a compound represented by the general formula (4) where Tr^3 is an unsubstituted triphenylenyl group, Z^1 is a benzene residue with a methyl group substituting in the 5-position, and Z^1 bonds to Tr^3 at the 1-position and the 3-position may be synthesized according to the reaction shown by the following formula.

[Chem. 8]



17

-continued



X in the above reaction formula represents a halogen atom, including a fluorine atom, a chlorine atom, a bromine atom and an iodine atom, and is preferably a chlorine atom, a bromine atom or an iodine atom.

For the details of the reaction, Synthesis Examples to be given hereinafter may be referred to. In addition, the compound represented by the general formula (4) may also be synthesized by combining any other known synthesis reactions.

Triphenylene derivatives (halide derivatives, borate derivatives) that are the starting materials for synthesizing the compounds represented by the general formulae (3) and (4) can be synthesized according to the method described in PCT Int. Appl., 2013085243, PCT Int. Appl., 2013073896, PCT Int. Appl., 2012002221, or are available as commercial products.

[Organic Light-Emitting Device]

The compound represented by the general formula (1) of the invention is useful as a host material for a delayed fluorescent material in an organic light emitting device. Accordingly, the compound represented by the general formula (1) of the invention may be effectively used as host material in an organic light-emitting device that uses a delayed fluorescent material as a light-emitting material therein. For example, it is presumed that, in an organic light-emitting device having a light-emitting layer that contains a host material of the compound represented by the general formula (1) and a delayed fluorescent material, the energy generated inside the molecule of the compound represented by the general formula (1) can be efficiently transferred to the delayed fluorescent material, and accordingly, the delayed fluorescent material can efficiently radiate delayed fluorescence. Consequently, the driving voltage for the organic light-emitting device of the type is low and the device can realize a high light emission efficiency. Further, the organic light-emitting device is almost free from a problem of brightness reduction with the lapse of driving time, and can realize a long lifetime. This is presumed because the compound represented by the general formula (1) could have high stability as compared with a host material having a carbazole ring such as CBP.

Here, in order that the organic light-emitting device can express a high light emission efficiency, it is important to use a delayed fluorescent material as a light-emitting material, as

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combined with the compound represented by the general formula (1) of the present invention. The principle of realizing a high light emission efficiency by the use of a delayed fluorescent material may be described as follows for an organic electroluminescence device as an example.

In an organic electroluminescence device, carriers are injected from an anode and a cathode to a light emitting material to form an excited state for the light emitting material, with which light is emitted. In the case of a carrier injection type organic electroluminescence device, in general, excitons that are excited to the excited singlet state are 25% of the total excitons generated, and the remaining 75% thereof are excited to the excited triplet state. Accordingly, the use of phosphorescence, which is light emission from the excited triplet state, provides a high energy use efficiency. However, the excited triplet state has a long lifetime and thus causes saturation of the excited state and deactivation of energy through mutual action with the excitons in the excited triplet state, and therefore the quantum yield of phosphorescence may generally be often not high. A delayed fluorescent material emits fluorescent light through the mechanism that the energy of excitons transits to the excited triplet state through intersystem crossing or the like, and then transits to the excited singlet state through reverse intersystem crossing due to triplet-triplet annihilation or absorption of thermal energy, thereby emitting fluorescent light. It is considered that among the materials, a thermal activation type delayed fluorescent material emitting light through absorption of thermal energy is particularly useful for an organic electroluminescence device. In the case where a delayed fluorescent material is used in an organic electroluminescence device, the excitons in the excited singlet state normally emit fluorescent light. On the other hand, the excitons in the excited triplet state emit fluorescent light through intersystem crossing to the excited singlet state by absorbing the heat generated by the device. At this time, the light emitted through reverse intersystem crossing from the excited triplet state to the excited singlet state has the same wavelength as fluorescent light since it is light emission from the excited singlet state, but has a longer lifetime (light emission lifetime) than the normal fluorescent light and phosphorescent light, and thus the light is observed as fluorescent light that is delayed from the normal fluorescent light and phosphorescent light. The light may be defined as delayed fluorescent light. The use of the thermal activation type exciton transition mechanism may raise the proportion of the compound in the excited singlet state, which is generally formed in a proportion only of 25%, to 25% or more through the absorption of the thermal energy after the carrier injection. A compound that emits strong fluorescent light and delayed fluorescent light at a low temperature of lower than 100° C. undergoes the intersystem crossing from the excited triplet state to the excited singlet state sufficiently with the heat of the device, thereby emitting delayed fluorescent light, and thus the use of the compound may drastically enhance the light emission efficiency.

By using the compound represented by the general formula (1) of the invention as a host material for a delayed fluorescent material, there can be provided excellent organic light-emitting devices such as organic photoluminescence devices (organic PL devices), organic electroluminescence devices (organic EL devices), etc. An organic photoluminescence device has a structure that contains a substrate having formed thereon at least a light-emitting layer. An organic electroluminescence device has a structure containing at least an anode, a cathode and an organic layer formed between the anode and the cathode. The organic layer

contains at least a light-emitting layer, and may be formed only of a light-emitting layer, or may have one or more organic layer in addition to the light-emitting layer. Examples of the organic layer include a hole transport layer, a hole injection layer, an electron barrier layer, a hole barrier layer, an electron injection layer, an electron transport layer and an exciton barrier layer. The hole transport layer may be a hole injection and transport layer having a hole injection function, and the electron transport layer may be an electron injection and transport layer having an electron injection function. A specific structural example of an organic electroluminescence device is shown in FIG. 1. In FIG. 1, the numeral 1 denotes a substrate, 2 denotes an anode, 3 denotes a hole injection layer, 4 denotes a hole transport layer, 5 denotes a light-emitting layer, 6 denotes an electron transport layer, and 7 denotes a cathode.

The members and the layers of the organic electroluminescence device will be described below. The descriptions for the substrate and the light-emitting layer may also be applied to the substrate and the light-emitting layer of the organic photoluminescence device.

(Substrate)

The organic electroluminescence device of the invention is preferably supported by a substrate. The substrate is not particularly limited and may be those that have been commonly used in an organic electroluminescence device, and examples thereof used include those formed of glass, transparent plastics, quartz and silicon.

(Anode)

The anode of the organic electroluminescence device used is preferably formed of as an electrode material include a metal, an alloy or an electroconductive compound each having a large work function (4 eV or more), or a mixture thereof. Specific examples of the electrode material include a metal, such as Au, and an electroconductive transparent material, such as CuI, indium tin oxide (ITO), SnO_2 and ZnO . A material that is amorphous and is capable of forming a transparent electroconductive film, such as IDIXO ($\text{In}_2\text{O}_3\text{—ZnO}$), may also be used. The anode may be formed in such a manner that the electrode material is formed into a thin film by such a method as vapor deposition or sputtering, and the film is patterned into a desired pattern by a photolithography method, or in the case where the pattern may not require high accuracy (for example, approximately 100 μm or more), the pattern may be formed with a mask having a desired shape on vapor deposition or sputtering of the electrode material. In alternative, in the case where a material capable of being applied as a coating, such as an organic electroconductive compound, is used, a wet film forming method, such as a printing method and a coating method, may be used. In the case where emitted light is to be taken out through the anode, the anode preferably has a transmittance of more than 10%, and the anode preferably has a sheet resistance of several hundred ohm per square or less. The thickness thereof may be generally selected from a range of from 10 to 1,000 nm, and preferably from 10 to 200 nm, while depending on the material used.

(Cathode)

The cathode is preferably formed of as an electrode material including a metal having a small work function (4 eV or less) (referred to as an electron injection metal), an alloy or an electroconductive compound, or a mixture thereof. Specific examples of the electrode material include sodium, a sodium-potassium alloy, magnesium, lithium, a magnesium-copper mixture, a magnesium-silver mixture, a magnesium-aluminum mixture, a magnesium-indium mixture, an aluminum-aluminum oxide (Al_2O_3) mixture,

indium, a lithium-aluminum mixture, and a rare earth metal. Among these, a mixture of an electron injection metal and a second metal that is a stable metal having a larger work function than the electron injection metal, for example, a magnesium-silver mixture, a magnesium-aluminum mixture, a magnesium-indium mixture, an aluminum-aluminum oxide (Al_2O_3) mixture, a lithium-aluminum mixture, and aluminum, are preferred from the standpoint of the electron injection property and the durability against oxidation and the like. The cathode may be produced by forming the electrode material into a thin film by such a method as vapor deposition or sputtering. The cathode preferably has a sheet resistance of several hundred ohm per square or less, and the thickness thereof may be generally selected from a range of from 10 nm to 5 μm , and preferably from 50 to 200 nm. For transmitting the emitted light, any one of the anode and the cathode of the organic electroluminescence device is preferably transparent or translucent, thereby enhancing the light emission luminance.

The cathode may be formed with the electroconductive transparent materials described for the anode, thereby forming a transparent or translucent cathode, and by applying the cathode, a device having an anode and a cathode, both of which have transmittance, may be produced.

(Light-Emitting Layer)

The light-emitting layer is a layer, in which holes and electrons injected from the anode and the cathode, respectively, are recombined to form excitons, and the layer contains a delayed fluorescent material and a host material for the delayed fluorescent material. As the host material for the delayed fluorescent material, one kind or two or more kinds selected from the group of compounds represented by the general formula (1) of the invention can be used. In order that the organic electroluminescence device and the organic photoluminescence device of the invention exhibit a high light emission efficiency, it is important that the singlet excitons and the triplet excitons generated in the delayed fluorescent material are confined in the delayed fluorescent material. Accordingly, as the host material for the delayed fluorescent material, those of the compounds represented by the general formula (1) are preferably so selected that at least any one of the excited singlet energy and the excited triplet energy thereof could be higher than that of the delayed fluorescent material. Consequently, the singlet excitons and the triplet excitons generated in the delayed fluorescent material can be confined in the molecule of the delayed fluorescent material, thereby eliciting the light emission efficiency of the material sufficiently.

In addition, the light-emitting layer may contain any other host material along with the host material for the delayed fluorescent material of the present invention. As the other host material, a compound having carrier transportability and excited energy transferability is preferably used. Accordingly, electrons and holes can be readily injected into the light-emitting layer and the probability of recombining the holes and the electrons increases. In addition, the excited energy formed by recombination of holes and electrons can be readily transferred to the delayed fluorescent material and the delayed fluorescent material can be thereby efficiently excited. As a result, the device can realize a high brightness at a low driving voltage. The host material having carrier transportability and excited energy transferability may be suitably selected from known host materials, and for the same reason as that for the compound represented by the general formula (1), it is desirable to select those of such that at least any one of the excited singlet energy and the excited triplet energy thereof is higher than that of the delayed

fluorescent material. Specifically, as the other host material, a compound having a carbazole ring such as CBP or the like can be used.

In the organic light-emitting device or the organic electroluminescence device of the present invention, light emission forms from the delayed fluorescent material contained in the light-emitting layer. The light emission includes both fluorescence emission and delayed fluorescence emission. However, the light emission may partly include light emission from the compound represented by the general formula (1) as a part thereof.

The content of the delayed fluorescent material in the light-emitting layer is preferably 0.1 to 50% by mass, more preferably 0.1 to 20% by mass, even more preferably 0.5 to 5% by mass.

In the case where the host material for delayed fluorescent materials of the present invention is combined with any other host material for use herein, the ratio by mass of the two may be any arbitrary ratio, but is preferably 90/10 to 10/90, more preferably 75/25 to 25/75, even more preferably 66/33 to 33/66.

(Injection Layer)

The injection layer is a layer that is provided between the electrode and the organic layer, for decreasing the driving voltage and enhancing the light emission luminance, and includes a hole injection layer and an electron injection layer, which may be provided between the anode and the light-emitting layer or the hole transport layer and between the cathode and the light-emitting layer or the electron transport layer. The injection layer may be provided depending on necessity.

(Barrier Layer)

The barrier layer is a layer that is capable of inhibiting charges (electrons or holes) and/or excitons present in the light-emitting layer from being diffused outside the light-emitting layer. The electron barrier layer may be disposed between the light-emitting layer and the hole transport layer, and inhibits electrons from passing through the light-emitting layer toward the hole transport layer. Similarly, the hole barrier layer may be disposed between the light-emitting layer and the electron transport layer, and inhibits holes from passing through the light-emitting layer toward the electron transport layer. The barrier layer may also be used for inhibiting excitons from being diffused outside the light-emitting layer. Thus, the electron barrier layer and the hole barrier layer each may also have a function as an exciton barrier layer. The term "the electron barrier layer" or "the exciton barrier layer" referred herein is intended to include a layer that has both the functions of an electron barrier layer and an exciton barrier layer by one layer.

(Hole Barrier Layer)

The hole barrier layer has the function of an electron transport layer in a broad sense. The hole barrier layer has a function of inhibiting holes from reaching the electron transport layer while transporting electrons, and thereby enhances the recombination probability of electrons and holes in the light-emitting layer. As the material for the hole barrier layer, the materials for the electron transport layer described later may be used depending on necessity.

(Electron Barrier Layer)

The electron barrier layer has the function of transporting holes in a broad sense. The electron barrier layer has a function of inhibiting electrons from reaching the hole transport layer while transporting holes, and thereby enhances the recombination probability of electrons and holes in the light-emitting layer.

(Exciton Barrier Layer)

The exciton barrier layer is a layer for inhibiting excitons generated through recombination of holes and electrons in the light-emitting layer from being diffused to the charge transport layer, and the use of the layer inserted enables effective confinement of excitons in the light-emitting layer, and thereby enhances the light emission efficiency of the device. The exciton barrier layer may be inserted adjacent to the light-emitting layer on any of the side of the anode and the side of the cathode, and on both the sides. Specifically, in the case where the exciton barrier layer is present on the side of the anode, the layer may be inserted between the hole transport layer and the light-emitting layer and adjacent to the light-emitting layer, and in the case where the layer is inserted on the side of the cathode, the layer may be inserted between the light-emitting layer and the cathode and adjacent to the light-emitting layer. Between the anode and the exciton barrier layer that is adjacent to the light-emitting layer on the side of the anode, a hole injection layer, an electron barrier layer and the like may be provided, and between the cathode and the exciton barrier layer that is adjacent to the light-emitting layer on the side of the cathode, an electron injection layer, an electron transport layer, a hole barrier layer and the like may be provided. In the case where the barrier layer is provided, the material used for the barrier layer preferably has excited singlet energy and excited triplet energy, at least one of which is higher than the excited singlet energy and the excited triplet energy of the delayed fluorescent material, respectively.

(Hole Transport Layer)

The hole transport layer is formed of a hole transporting material having a function of transporting holes, and the hole transport layer may be provided as a single layer or plural layers.

The hole transporting material has one of injection or transporting property of holes and barrier property of electrons, and may be any of an organic material and an inorganic material. Examples of known hole transporting materials that may be used herein include a triazole derivative, an oxadiazole derivative, an imidazole derivative, a carbazole derivative, an indolocarbazole derivative, a pol-aryalkane derivative, a pyrazoline derivative, a pyrazolone derivative, a phenylenediamine derivative, an arylamine derivative, an amino-substituted chalcone derivative, an oxazole derivative, a styrylanthracene derivative, a fluorenone derivative, a hydrazone derivative, a stilbene derivative, a silazane derivative, an aniline copolymer and an electroconductive polymer oligomer, particularly a thiophene oligomer. Among these, a porphyrin compound, an aromatic tertiary amine compound and a styrylamine compound are preferably used, and an aromatic tertiary amine compound is more preferably used.

Electron Transport Layer

The electron transport layer is formed of a material having a function of transporting electrons, and the electron transport layer may be provided as a single layer or plural layers.

The electron transporting material (which may also function as a hole barrier material in some cases) needs only to have a function of transporting electrons, which are injected from the cathode, to the light-emitting layer. Examples of the electron transport layer that may be used herein include a nitro-substituted fluorene derivative, a diphenylquinone derivative, a thiopyran dioxide derivative, carbodiimide, a fluorenylidene methane derivative, anthraquinodimethane and anthrone derivatives, and an oxadiazole derivative. The electron transporting material used may be a thiadiazole derivative obtained by replacing the oxygen atom of the oxadiazole ring of the oxadiazole derivative by a sulfur

atom, or a quinoxaline derivative having a quinoxaline ring, which is known as an electron attracting group. Furthermore, polymer materials having these materials introduced to the polymer chain or having these materials used as the main chain of the polymer may also be used.

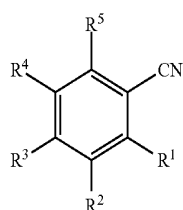
In the production of the organic electroluminescence device, the compound represented by the general formula (1) may be used not only in the light-emitting layer but also in the other layers than the light-emitting layer. In this case, the compound represented by the general formula (1) used in the light-emitting layer and the compound represented by the general formula (1) used in the other layers than the light-emitting layer may be the same as or different from each other. For example, the compound represented by the general formula (1) may be used in the injection layer, the barrier layer, the hole barrier layer, the electron barrier layer, the exciton barrier layer, the hole transport layer, the electron transport layer and the like described above. The film forming method of the layers are not particularly limited, and the layers may be produced by any of a dry process and a wet process.

Specific examples of preferred materials that may be used in the organic electroluminescence device are shown below, but the materials that may be used in the invention are not construed as being limited to the example compounds. The compound that is shown as a material having a particular function may also be used as a material having another function. In the structural formulae of the example compounds shown below, R, R' and R₁ to R₁₀ each independently represent a hydrogen atom or a substituent. X represents a carbon atom or a hetero atom to form a ring skeleton, n represents an integer of 3 to 5, Y represents a substituent, and m represents an integer of 0 or more.

The delayed fluorescent material to be combined with the host material for delayed fluorescent materials that contains the compound represented by the general formula (1) is a compound capable of radiating delayed fluorescence. Preferred examples of the delayed fluorescent material are shown below, however, the delayed fluorescent material to be employed in the present invention is not limited to those shown below.

As a preferred delayed fluorescent material, a compound represented by the following general formula can be mentioned. The entire description of WO 2013/154064 including the paragraphs 0008 to 0048 and 0095 to 0133 is incorporated herein by reference as a part of the description of the present application.

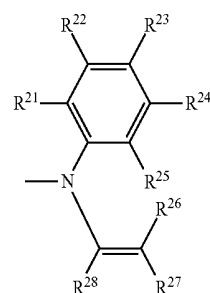
[Chem. 9]



General Formula (101)

[In the general formula (101), at least one of R¹ to R⁵ represents a cyano group, at least one of R¹ to R⁵ represents a group represented by the following general formula (111), and the balance of R¹ to R⁵ each represent a hydrogen atom or a substituent.]

[Chem. 10]



General Formula (111)

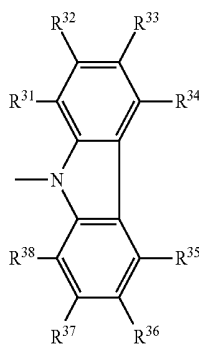
[In the general formula (111), R²¹ to R²⁸ each independently represent a hydrogen atom or a substituent, provided that at least one of the following conditions <A> and is satisfied:

<A> R²⁵ and R²⁶ together form a single bond, and

 R²⁷ and R²⁸ each represent an atomic group necessary for forming a substituted or unsubstituted benzene ring as combined together.]

Here, at least one of R¹ to R⁵ preferably represents a group represented by any one of the following general formulae (112) to (115).

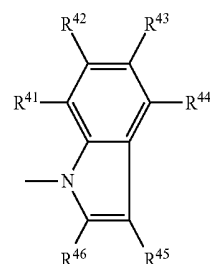
[Chem. 11]



General Formula (112)

[In the general formula (112), R³¹ to R³⁸ each independently represent a hydrogen atom or a substituent.]

[Chem. 12]

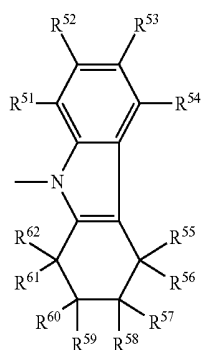


General Formula (113)

[In the general formula (113), R⁴¹ to R⁴⁶ each independently represent a hydrogen atom or a substituent.]

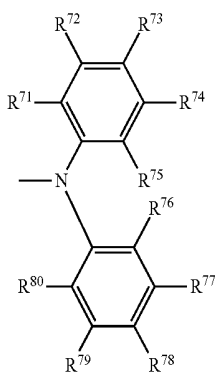
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[Chem. 13]



[In the general formula (114), R^{51} to R^{62} each independently represent a hydrogen atom or a substituent.]

[Chem. 14]



[In the general formula (115), R^{71} to R^{80} each independently represent a hydrogen atom or a substituent.]

Specific examples of the compounds include the compounds shown in the following tables. In the case where two or more groups represented by any one of the general formulae (112) to (115) are present in the molecule of the following example compounds, all the groups have the same

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structure. The formulae (121) to (124) in the tables represent the following formulae, respectively, and n represents the number of the repeating units.

General Formula (114)

5

[Chem. 15]

Formula (121)

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Formula (122)

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Formula (123)

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Formula (124)

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TABLE 1

Compound	General formula (101)					General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
1'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	H	H
2'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	CH ₃	H	H
3'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	CH ₃ O	H	H
4'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	CH ₃	H
5'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	CH ₃ O	H
6'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	t-C ₄ H ₉	H
7'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	Cl	H
8'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	F	H
9'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	H	CH ₃

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
10'		General formula (112)	General formula (112)	CN General formula (112)	General formula (112)	H	H	H	CH ₃ O
11'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	H	H
12'		General formula (112)	General formula (112)	CN General formula (112)	H	H	CH ₃	H	H
13'		General formula (112)	General formula (112)	CN General formula (112)	H	H	CH ₃ O	H	H
14'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	CH ₃	H
15'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	CH ₃ O	H
16'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	t-C ₄ H ₉	H
17'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	Cl	H
18'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	F	H
19'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	H	CH ₃
20'		General formula (112)	General formula (112)	CN General formula (112)	H	H	H	H	CH ₃ O
21'		General formula (112)	General formula (112)	CN H	H	H	H	H	H
22'		General formula (112)	General formula (112)	CN H	H	H	CH ₃	H	H
23'		General formula (112)	General formula (112)	CN H	H	H	CH ₃ O	H	H
24'		General formula (112)	General formula (112)	CN H	H	H	H	CH ₃	H
25'		General formula (112)	General formula (112)	CN H	H	H	H	CH ₃ O	H
26'		General formula (112)	General formula (112)	CN H	H	H	H	t-C ₄ H ₉	H
27'		General formula (112)	General formula (112)	CN H	H	H	H	Cl	H
28'		General formula (112)	General formula (112)	CN H	H	H	H	F	H
29'		General formula (112)	General formula (112)	CN H	H	H	H	H	CH ₃
30'		General formula (112)	General formula (112)	CN H	H	H	H	H	CH ₃ O
31'		General formula (112)	H	CN General formula (112)	H	H	H	H	H
32'		General formula (112)	H	CN General formula (112)	H	H	CH ₃	H	H
33'		General formula (112)	H	CN General formula (112)	H	H	CH ₃ O	H	H
34'		General formula (112)	H	CN General formula (112)	H	H	H	CH ₃	H
35'		General formula (112)	H	CN General formula (112)	H	H	H	CH ₃ O	H
36'		General formula (112)	H	CN General formula (112)	H	H	H	t-C ₄ H ₉	H
37'		General formula (112)	H	CN General formula (112)	H	H	H	Cl	H
38'		General formula (112)	H	CN General formula (112)	H	H	H	F	H
39'		General formula (112)	H	CN General formula (112)	H	H	H	H	CH ₃
40'		General formula (112)	H	CN General formula (112)	H	H	H	H	CH ₃ O
41'		General formula (112)	H	CN H	General formula (112)	H	H	H	H
42'		General formula (112)	H	CN H	General formula (112)	H	CH ₃	H	H
43'		General formula (112)	H	CN H	General formula (112)	H	CH ₃ O	H	H
44'		General formula (112)	H	CN H	General formula (112)	H	H	CH ₃	H
45'		General formula (112)	H	CN H	General formula (112)	H	H	CH ₃ O	H
46'		General formula (112)	H	CN H	General formula (112)	H	H	t-C ₄ H ₉	H
47'		General formula (112)	H	CN H	General formula (112)	H	H	Cl	H

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
48'	General formula (112)		H	CN H	General formula (112)	H	H	F	H
49'	General formula (112)		H	CN H	General formula (112)	H	H	H	CH ₃
50'	General formula (112)		H	CN H	General formula (112)	H	H	H	CH ₃ O
51'	General formula (112)		H	CN H	H	H	H	H	H
52'	General formula (112)		H	CN H	H	H	CH ₃	H	H
53'	General formula (112)		H	CN H	H	H	CH ₃ O	H	H
54'	General formula (112)		H	CN H	H	H	H	CH ₃	H
55'	General formula (112)		H	CN H	H	H	H	CH ₃ O	H
56'	General formula (112)		H	CN H	H	H	H	t-C ₄ H ₉	H
57'	General formula (112)		H	CN H	H	H	H	Cl	H
58'	General formula (112)		H	CN H	H	H	H	F	H
59'	General formula (112)		H	CN H	H	H	H	H	CH ₃
60'	General formula (112)		H	CN H	H	H	H	H	CH ₃ O
61'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	H	H
62'	General formula (112)	General formula (112)		CN General formula (112)	F	H	CH ₃	H	H
63'	General formula (112)	General formula (112)		CN General formula (112)	F	H	CH ₃ O	H	H
64'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	CH ₃	H
65'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	CH ₃ O	H
66'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	t-C ₄ H ₉	H
67'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	Cl	H
68'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	F	H
69'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	H	CH ₃
70'	General formula (112)	General formula (112)		CN General formula (112)	F	H	H	H	CH ₃ O
71'	General formula (112)	General formula (112)		CN F	F	H	H	H	H
72'	General formula (112)	General formula (112)		CN F	F	H	CH ₃	H	H
73'	General formula (112)	General formula (112)		CN F	F	H	CH ₃ O	H	H
74'	General formula (112)	General formula (112)		CN F	F	H	H	CH ₃	H
75'	General formula (112)	General formula (112)		CN F	F	H	H	CH ₃ O	H
76'	General formula (112)	General formula (112)		CN F	F	H	H	t-C ₄ H ₉	H
77'	General formula (112)	General formula (112)		CN F	F	H	H	Cl	H
78'	General formula (112)	General formula (112)		CN F	F	H	H	F	H
79'	General formula (112)	General formula (112)		CN F	F	H	H	H	CH ₃
80'	General formula (112)	General formula (112)		CN F	F	H	H	H	CH ₃ O
81'	General formula (112)	F		CN General formula (112)	F	H	H	H	H
82'	General formula (112)	F		CN General formula (112)	F	H	CH ₃	H	H
83'	General formula (112)	F		CN General formula (112)	F	H	CH ₃ O	H	H
84'	General formula (112)	F		CN General formula (112)	F	H	H	CH ₃	H
85'	General formula (112)	F		CN General formula (112)	F	H	H	CH ₃ O	H

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
	86'	General formula (112)	F	CN General formula (112)	F	H	H	t-C ₄ H ₉	H
	87'	General formula (112)	F	CN General formula (112)	F	H	H	Cl	H
	88'	General formula (112)	F	CN General formula (112)	F	H	H	F	H
	89'	General formula (112)	F	CN General formula (112)	F	H	H	H	CH ₃
	90'	General formula (112)	F	CN General formula (112)	F	H	H	H	CH ₃ O
	91'	General formula (112)	F	CN F	General formula (112)	H	H	H	H
	92'	General formula (112)	F	CN F	General formula (112)	H	CH ₃	H	H
	93'	General formula (112)	F	CN F	General formula (112)	H	CH ₃ O	H	H
	94'	General formula (112)	F	CN F	General formula (112)	H	H	CH ₃	H
	95'	General formula (112)	F	CN F	General formula (112)	H	H	CH ₃ O	H
	96'	General formula (112)	F	CN F	General formula (112)	H	H	t-C ₄ H ₉	H
	97'	General formula (112)	F	CN F	General formula (112)	H	H	Cl	H
	98'	General formula (112)	F	CN F	General formula (112)	H	H	F	H
	99'	General formula (112)	F	CN F	General formula (112)	H	H	H	CH ₃
	100'	General formula (112)	F	CN F	General formula (112)	H	H	H	CH ₃ O
	101'	General formula (112)	F	CN F	F	H	H	H	H
	102'	General formula (112)	F	CN F	F	H	CH ₃	H	H
	103'	General formula (112)	F	CN F	F	H	CH ₃ O	H	H
	104'	General formula (112)	F	CN F	F	H	H	CH ₃	H
	105'	General formula (112)	F	CN F	F	H	H	CH ₃ O	H
	106'	General formula (112)	F	CN F	F	H	H	t-C ₄ H ₉	H
	107'	General formula (112)	F	CN F	F	H	H	Cl	H
	108'	General formula (112)	F	CN F	F	H	H	F	H
	109'	General formula (112)	F	CN F	F	H	H	H	CH ₃
	110'	General formula (112)	F	CN F	F	H	H	H	CH ₃ O
	111'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	H	H
	112'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	CH ₃	H	H
	113'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	CH ₃ O	H	H
	114'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	CH ₃	H
	115'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	CH ₃ O	H
	116'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	t-C ₄ H ₉	H
	117'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	Cl	H
	118'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	F	H
	119'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	H	CH ₃
	120'	General formula (112)	General formula (112)	CN General formula (112)	OH	H	H	H	CH ₃ O
	121'	General formula (112)	General formula (112)	CN OH	OH	H	H	H	H
	122'	General formula (112)	General formula (112)	CN OH	OH	H	CH ₃	H	H
	123'	General formula (112)	General formula (112)	CN OH	OH	H	CH ₃ O	H	H

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
124'	General formula (112)	General formula (112)	CN	OH	OH	H	H	CH ₃	H
125'	General formula (112)	General formula (112)	CN	OH	OH	H	H	CH ₃ O	H
126'	General formula (112)	General formula (112)	CN	OH	OH	H	H	t-C ₄ H ₉	H
127'	General formula (112)	General formula (112)	CN	OH	OH	H	H	Cl	H
128'	General formula (112)	General formula (112)	CN	OH	OH	H	H	F	H
129'	General formula (112)	General formula (112)	CN	OH	OH	H	H	H	CH ₃
130'	General formula (112)	General formula (112)	CN	OH	OH	H	H	H	CH ₃ O
131'	General formula (112)	OH	CN	General formula (112)	OH	H	H	H	H
132'	General formula (112)	OH	CN	General formula (112)	OH	H	CH ₃	H	H
133'	General formula (112)	OH	CN	General formula (112)	OH	H	CH ₃ O	H	H
134'	General formula (112)	OH	CN	General formula (112)	OH	H	H	CH ₃	H
135'	General formula (112)	OH	CN	General formula (112)	OH	H	H	CH ₃ O	H
136'	General formula (112)	OH	CN	General formula (112)	OH	H	H	t-C ₄ H ₉	H
137'	General formula (112)	OH	CN	General formula (112)	OH	H	H	Cl	H
138'	General formula (112)	OH	CN	General formula (112)	OH	H	H	F	H
139'	General formula (112)	OH	CN	General formula (112)	OH	H	H	H	CH ₃
140'	General formula (112)	OH	CN	General formula (112)	OH	H	H	H	CH ₃ O
141'	General formula (112)	OH	CN	OH	General formula (112)	H	H	H	H
142'	General formula (112)	OH	CN	OH	General formula (112)	H	CH ₃	H	H
143'	General formula (112)	OH	CN	OH	General formula (112)	H	CH ₃ O	H	H
144'	General formula (112)	OH	CN	OH	General formula (112)	H	H	CH ₃	H
145'	General formula (112)	OH	CN	OH	General formula (112)	H	H	CH ₃ O	H
146'	General formula (112)	OH	CN	OH	General formula (112)	H	H	t-C ₄ H ₉	H
147'	General formula (112)	OH	CN	OH	General formula (112)	H	H	Cl	H
148'	General formula (112)	OH	CN	OH	General formula (112)	H	H	F	H
149'	General formula (112)	OH	CN	OH	General formula (112)	H	H	H	CH ₃
150'	General formula (112)	OH	CN	OH	General formula (112)	H	H	H	CH ₃ O
151'	General formula (112)	OH	CN	OH	OH	H	H	H	H
152'	General formula (112)	OH	CN	OH	OH	H	CH ₃	H	H
153'	General formula (112)	OH	CN	OH	OH	H	CH ₃ O	H	H
154'	General formula (112)	OH	CN	OH	OH	H	H	CH ₃	H
155'	General formula (112)	OH	CN	OH	OH	H	H	CH ₃ O	H
156'	General formula (112)	OH	CN	OH	OH	H	H	t-C ₄ H ₉	H
157'	General formula (112)	OH	CN	OH	OH	H	H	Cl	H
158'	General formula (112)	OH	CN	OH	OH	H	H	F	H
159'	General formula (112)	OH	CN	OH	OH	H	H	H	CH ₃
160'	General formula (112)	OH	CN	OH	OH	H	H	H	CH ₃ O
161'	General formula (112)	General formula (112)	CN	General formula (112)	Cl	H	H	H	H

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
162'	General	General	CN	General	Cl	H	CH ₃	H	H
163'	General	General	CN	General	Cl	H	CH ₃ O	H	H
164'	General	General	CN	General	Cl	H	H	CH ₃	H
165'	General	General	CN	General	Cl	H	H	CH ₃ O	H
166'	General	General	CN	General	Cl	H	H	t-C ₄ H ₉	H
167'	General	General	CN	General	Cl	H	H	Cl	H
168'	General	General	CN	General	Cl	H	H	F	H
169'	General	General	CN	General	Cl	H	H	H	CH ₃
170'	General	General	CN	General	Cl	H	H	H	CH ₃ O
171'	General	General	CN	General	F	H	H	H	H
172'	General	General	CN	General	F	H	CH ₃	H	H
173'	General	General	CN	General	F	H	CH ₃ O	H	H
174'	General	General	CN	General	F	H	H	CH ₃	H
175'	General	General	CN	General	F	H	H	CH ₃ O	H
176'	General	General	CN	General	F	H	H	t-C ₄ H ₉	H
177'	General	General	CN	General	F	H	H	Cl	H
178'	General	General	CN	General	F	H	H	F	H
179'	General	General	CN	General	F	H	H	H	CH ₃
180'	General	General	CN	General	F	H	H	H	CH ₃ O
181'	General	General	CN	General	CH ₃ O	H	H	H	H
182'	General	General	CN	General	CH ₃ O	H	CH ₃	H	H
183'	General	General	CN	General	CH ₃ O	H	CH ₃ O	H	H
184'	General	General	CN	General	CH ₃ O	H	H	CH ₃	H
185'	General	General	CN	General	CH ₃ O	H	H	CH ₃ O	H
186'	General	General	CN	General	CH ₃ O	H	H	t-C ₄ H ₉	H
187'	General	General	CN	General	CH ₃ O	H	H	Cl	H
188'	General	General	CN	General	CH ₃ O	H	H	F	H
189'	General	General	CN	General	C ₂ H ₅ O	H	H	H	CH ₃
190'	General	General	CN	General	C ₂ H ₅ O	H	H	H	CH ₃ O
191'	General	General	CN	General	C ₂ H ₅ O	H	H	H	H
192'	General	General	CN	General	C ₂ H ₅ O	H	CH ₃	H	H
193'	General	General	CN	General	C ₂ H ₅ O	H	CH ₃ O	H	H
194'	General	General	CN	General	C ₂ H ₅ O	H	H	CH ₃	H
195'	General	General	CN	General	C ₂ H ₅ O	H	H	CH ₃ O	H
196'	General	General	CN	General	C ₂ H ₅ O	H	H	t-C ₄ H ₉	H
197'	General	General	CN	General	C ₂ H ₅ O	H	H	Cl	H
198'	General	General	CN	General	C ₂ H ₅ O	H	H	F	H
199'	General	General	CN	General	C ₂ H ₅ O	H	H	H	CH ₃

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
200'	General	General	CN	General	C ₂ H ₅ O	H	H	H	CH ₃ O
201'	General	General	CN	General	C ₆ H ₅ O	H	H	H	H
202'	General	General	CN	General	C ₆ H ₅ O	H	CH ₃	H	H
203'	General	General	CN	General	C ₆ H ₅ O	H	CH ₃ O	H	H
204'	General	General	CN	General	C ₆ H ₅ O	H	H	CH ₃	H
205'	General	General	CN	General	C ₆ H ₅ O	H	H	CH ₃ O	H
206'	General	General	CN	General	C ₆ H ₅ O	H	H	t-C ₄ H ₉	H
207'	General	General	CN	General	C ₆ H ₅ O	H	H	Cl	H
208'	General	General	CN	General	C ₆ H ₅ O	H	H	F	H
209'	General	General	CN	General	C ₆ H ₅ O	H	H	H	CH ₃
210'	General	General	CN	General	C ₆ H ₅ O	H	H	H	CH ₃ O
211'	General	General	CN	General	Formula (121)	H	H	H	H
212'	General	General	CN	General	Formula (121)	H	CH ₃	H	H
213'	General	General	CN	General	Formula (121)	H	CH ₃ O	H	H
214'	General	General	CN	General	Formula (121)	H	H	CH ₃	H
215'	General	General	CN	General	Formula (121)	H	H	CH ₃ O	H
216'	General	General	CN	General	Formula (121)	H	H	t-C ₄ H ₉	H
217'	General	General	CN	General	Formula (121)	H	H	Cl	H
218'	General	General	CN	General	Formula (121)	H	H	F	H
219'	General	General	CN	General	Formula (121)	H	H	H	CH ₃
220'	General	General	CN	General	Formula (121)	H	H	H	CH ₃ O
221'	General	General	CN	General	Formula (122)	H	H	H	H
222'	General	General	CN	General	Formula (122)	H	CH ₃	H	H
223'	General	General	CN	General	Formula (122)	H	CH ₃ O	H	H
224'	General	General	CN	General	Formula (122)	H	H	CH ₃	H
225'	General	General	CN	General	Formula (122)	H	H	CH ₃ O	H
226'	General	General	CN	General	Formula (122)	H	H	t-C ₄ H ₉	H
227'	General	General	CN	General	Formula (122)	H	H	Cl	H
228'	General	General	CN	General	Formula (122)	H	H	F	H
229'	General	General	CN	General	Formula (122)	H	H	H	CH ₃
230'	General	General	CN	General	Formula (122)	H	H	H	CH ₃ O
231'	General	General	CN	General	Formula (123)	H	H	H	H
232'	General	General	CN	General	Formula (123)	H	CH ₃	H	H
233'	General	General	CN	General	Formula (123)	H	CH ₃ O	H	H
234'	General	General	CN	General	Formula (123)	H	H	CH ₃	H
235'	General	General	CN	General	Formula (123)	H	H	CH ₃ O	H
236'	General	General	CN	General	Formula (123)	H	H	t-C ₄ H ₉	H
237'	General	General	CN	General	Formula (123)	H	H	Cl	H

TABLE 1-continued

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³ R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
238'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (123)	H	H	F	H
239'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (123)	H	H	H	CH ₃
240'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (123)	H	H	H	CH ₃ O
241'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	H	H
242'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	CH ₃	H	H
243'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	CH ₃ O	H	H
244'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	CH ₃	H
245'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	CH ₃ O	H
246'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	t-C ₄ H ₉	H
247'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	Cl	H
248'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	F	H
249'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	H	CH ₃
250'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	H	CH ₃ O
251'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
252'	General formula (112)	General formula (112)	CN	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
253'	General formula (112)	General formula (112)	CN	General formula (112)	H	H	C ₆ H ₅	H	H
254'	General formula (112)	General formula (112)	CN	General formula (112)	H	H	H	C ₆ H ₅	H
255'	General formula (112)	General formula (112)	CN	H	H	H	C ₆ H ₅	H	H
256'	General formula (112)	General formula (112)	CN	H	H	H	H	C ₆ H ₅	H
257'	General formula (112)	H	CN	General formula (112)	H	H	C ₆ H ₅	H	H
258'	General formula (112)	H	CN	General formula (112)	H	H	H	C ₆ H ₅	H
259'	General formula (112)	H	CN	H	General formula (112)	H	C ₆ H ₅	H	H
260'	General formula (112)	H	CN	H	General formula (112)	H	H	C ₆ H ₅	H
261'	General formula (112)	H	CN	H	H	H	C ₆ H ₅	H	H
262'	General formula (112)	H	CN	H	H	H	H	C ₆ H ₅	H
263'	General formula (112)	General formula (112)	CN	General formula (112)	F	H	C ₆ H ₅	H	H
264'	General formula (112)	General formula (112)	CN	General formula (112)	F	H	H	C ₆ H ₅	H
265'	General formula (112)	General formula (112)	CN	F	F	H	C ₆ H ₅	H	H
266'	General formula (112)	General formula (112)	CN	F	F	H	H	C ₆ H ₅	H
267'	General formula (112)	F	CN	General formula (112)	F	H	C ₆ H ₅	H	H
268'	General formula (112)	F	CN	General formula (112)	F	H	H	C ₆ H ₅	H
269'	General formula (112)	F	CN	F	General formula (112)	H	C ₆ H ₅	H	H
270'	General formula (112)	F	CN	F	General formula (112)	H	H	C ₆ H ₅	H
271'	General formula (112)	F	CN	F	F	H	C ₆ H ₅	H	H
272'	General formula (112)	F	CN	F	F	H	H	C ₆ H ₅	H
273'	General formula (112)	General formula (112)	CN	General formula (112)	OH	H	C ₆ H ₅	H	H
274'	General formula (112)	General formula (112)	CN	General formula (112)	OH	H	H	C ₆ H ₅	H
275'	General formula (112)	General formula (112)	CN	OH	OH	H	C ₆ H ₅	H	H

TABLE 1-continued

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
276'	General formula (112)	General formula (112)	CN	OH	OH	H	H	C ₆ H ₅	H
277'	General formula (112)	OH	CN	General formula (112)	OH	H	C ₆ H ₅	H	H
278'	General formula (112)	OH	CN	General formula (112)	OH	H	H	C ₆ H ₅	H
279'	General formula (112)	OH	CN	OH	General formula (112)	H	C ₆ H ₅	H	H
280'	General formula (112)	OH	CN	OH	General formula (112)	H	H	C ₆ H ₅	H
281'	General formula (112)	OH	CN	OH	OH	H	C ₆ H ₅	H	H
282'	General formula (112)	OH	CN	OH	OH	H	H	C ₆ H ₅	H
283'	General formula (112)	General formula (112)	CN	General formula (112)	Cl	H	C ₆ H ₅	H	H
284'	General formula (112)	General formula (112)	CN	General formula (112)	Cl	H	H	C ₆ H ₅	H
285'	General formula (112)	General formula (112)	CN	General formula (112)	F	H	C ₆ H ₅	H	H
286'	General formula (112)	General formula (112)	CN	General formula (112)	F	H	H	C ₆ H ₅	H
287'	General formula (112)	General formula (112)	CN	General formula (112)	CH ₃ O	H	C ₆ H ₅	H	H
288'	General formula (112)	General formula (112)	CN	General formula (112)	CH ₃ O	H	H	C ₆ H ₅	H
289'	General formula (112)	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	H	C ₆ H ₅	H	H
290'	General formula (112)	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	H	H	C ₆ H ₅	H
291'	General formula (112)	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	H	C ₆ H ₅	H	H
292'	General formula (112)	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	H	H	C ₆ H ₅	H
293'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (121)	H	C ₆ H ₅	H	H
294'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (121)	H	H	C ₆ H ₅	H
295'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (122)	H	C ₆ H ₅	H	H
296'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (122)	H	H	C ₆ H ₅	H
297'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (123)	H	C ₆ H ₅	H	H
298'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (123)	H	H	C ₆ H ₅	H
299'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	C ₆ H ₅	H	H
300'	General formula (112)	General formula (112)	CN	General formula (112)	Formula (124)	H	H	C ₆ H ₅	H

TABLE 2

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
301	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	H
302	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	CH ₃	H	H
303	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	CH ₃ O	H	H
304	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃	H
305	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃ O	H
306	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	t-C ₄ H ₉	H
307	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	Cl	H
308	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	F	H

TABLE 2-continued

Compound No.	General formula (101)					General formula (112)			
	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
309	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	CH ₃
310	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	CH ₃ O
311	General formula (112)	CN	General formula (112)	General formula (112)	H	H	H	H	H
312	General formula (112)	CN	General formula (112)	General formula (112)	H	H	H	CH ₃	H
313	General formula (112)	CN	General formula (112)	General formula (112)	H	H	H	CH ₃ O	H
314	General formula (112)	CN	General formula (112)	H	General formula (112)	H	H	H	H
315	General formula (112)	CN	General formula (112)	H	General formula (112)	H	H	CH ₃	H
316	General formula (112)	CN	General formula (112)	H	General formula (112)	H	H	CH ₃ O	H
317	General formula (112)	CN	H	General formula (112)	General formula (112)	H	H	H	H
318	General formula (112)	CN	H	General formula (112)	General formula (112)	H	H	CH ₃	H
319	General formula (112)	CN	H	General formula (112)	General formula (112)	H	H	CH ₃ O	H
320	H	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	H
321	H	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃	H
322	H	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃ O	H
323	General formula (112)	CN	General formula (112)	H	H	H	H	H	H
324	General formula (112)	CN	General formula (112)	H	H	H	H	CH ₃	H
325	General formula (112)	CN	General formula (112)	H	H	H	H	CH ₃ O	H
326	General formula (112)	CN	H	General formula (112)	H	H	H	H	H
327	General formula (112)	CN	H	General formula (112)	H	H	H	CH ₃	H
328	General formula (112)	CN	H	General formula (112)	H	H	H	CH ₃ O	H
329	H	CN	General formula (112)	General formula (112)	H	H	H	H	H
330	H	CN	General formula (112)	General formula (112)	H	H	H	CH ₃	H
331	H	CN	General formula (112)	General formula (112)	H	H	H	CH ₃ O	H
332	General formula (112)	CN	H	H	General formula (112)	H	H	H	H
333	General formula (112)	CN	H	H	General formula (112)	H	H	CH ₃	H
334	General formula (112)	CN	H	H	General formula (112)	H	H	CH ₃ O	H
335	H	CN	General formula (112)	H	General formula (112)	H	H	H	H
336	H	CN	General formula (112)	H	General formula (112)	H	H	CH ₃	H
337	H	CN	General formula (112)	H	General formula (112)	H	H	CH ₃ O	H
338	H	CN	H	General formula (112)	General formula (112)	H	H	H	H
339	H	CN	H	General formula (112)	General formula (112)	H	H	CH ₃	H
340	H	CN	H	General formula (112)	General formula (112)	H	H	CH ₃ O	H
341	General formula (112)	CN	H	H	H	H	H	H	H
342	General formula (112)	CN	H	H	H	H	H	CH ₃	H
343	General formula (112)	CN	H	H	H	H	H	CH ₃ O	H
344	H	CN	General formula (112)	H	H	H	H	H	H
345	H	CN	General formula (112)	H	H	H	H	CH ₃	H
346	H	CN	General formula (112)	H	H	H	H	CH ₃ O	H

TABLE 2-continued

Compound No.	General formula (101)					General formula (112)			
	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
347	H	CN	H	General formula (112)	H	H	H	H	H
348	H	CN	H	General formula (112)	H	H	H	CH ₃	H
349	H	CN	H	General formula (112)	H	H	H	CH ₃ O	H
350	General formula (112)	CN	General formula (112)	General formula (112)	F	H	H	H	H
351	General formula (112)	CN	General formula (112)	General formula (112)	F	H	H	CH ₃	H
352	General formula (112)	CN	General formula (112)	General formula (112)	F	H	H	CH ₃ O	H
353	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	H	H
354	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	CH ₃	H
355	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	CH ₃ O	H
356	General formula (112)	CN	F	General formula (112)	General formula (112)	H	H	H	H
357	General formula (112)	CN	F	General formula (112)	General formula (112)	H	H	CH ₃	H
358	General formula (112)	CN	F	General formula (112)	General formula (112)	H	H	CH ₃ O	H
359	F	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	H
360	F	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃	H
361	F	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃ O	H
362	General formula (112)	CN	General formula (112)	F	F	H	H	H	H
363	General formula (112)	CN	General formula (112)	F	F	H	H	CH ₃	H
364	General formula (112)	CN	General formula (112)	F	F	H	H	CH ₃ O	H
365	General formula (112)	CN	F	General formula (112)	F	H	H	H	H
366	General formula (112)	CN	F	General formula (112)	F	H	H	CH ₃	H
367	General formula (112)	CN	F	General formula (112)	F	H	H	CH ₃ O	H
368	F	CN	General formula (112)	General formula (112)	F	H	H	H	H
369	F	CN	General formula (112)	General formula (112)	F	H	H	CH ₃	H
370	F	CN	General formula (112)	General formula (112)	F	H	H	CH ₃ O	H
371	General formula (112)	CN	F	F	General formula (112)	H	H	H	H
372	General formula (112)	CN	F	F	General formula (112)	H	H	CH ₃	H
373	General formula (112)	CN	F	F	General formula (112)	H	H	CH ₃ O	H
374	F	CN	General formula (112)	F	General formula (112)	H	H	H	H
375	F	CN	General formula (112)	F	General formula (112)	H	H	CH ₃	H
376	F	CN	General formula (112)	F	General formula (112)	H	H	CH ₃ O	H
377	F	CN	F	General formula (112)	General formula (112)	H	H	H	H
378	F	CN	F	General formula (112)	General formula (112)	H	H	CH ₃	H
379	F	CN	F	General formula (112)	General formula (112)	H	H	CH ₃ O	H
380	General formula (112)	CN	F	F	F	H	H	H	H
381	General formula (112)	CN	F	F	F	H	H	CH ₃	H
382	General formula (112)	CN	F	F	F	H	H	CH ₃ O	H
383	F	CN	General formula (112)	F	F	H	H	H	H
384	F	CN	General formula (112)	F	F	H	H	CH ₃	H

TABLE 2-continued

Compound No.	General formula (101)					General formula (112)			
	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
385	F	CN	General formula (112)	F	F	H	H	CH ₃ O	H
386	F	CN	F	General formula (112)	F	H	H	H	H
387	F	CN	F	General formula (112)	F	H	H	CH ₃	H
388	F	CN	F	General formula (112)	F	H	H	CH ₃ O	H
389	General formula (112)	CN	General formula (112)	General formula (112)	OH	H	H	H	H
390	General formula (112)	CN	General formula (112)	General formula (112)	OH	H	H	CH ₃	H
391	General formula (112)	CN	General formula (112)	General formula (112)	OH	H	H	CH ₃ O	H
392	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	H	H
393	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	CH	H
394	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	CH ₃ O	H
395	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	t-C ₄ H ₉	H
396	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	Cl	H
397	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	F	H
398	General formula (112)	CN	OH	General formula (112)	General formula (112)	H	H	H	H
399	General formula (112)	CN	OH	General formula (112)	General formula (112)	H	H	CH ₃	H
400	General formula (112)	CN	OH	General formula (112)	General formula (112)	H	H	CH ₃ O	H
401	OH	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	H
402	OH	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃	H
403	OH	CN	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃ O	H
404	General formula (112)	CN	General formula (112)	OH	OH	H	H	H	H
405	General formula (112)	CN	General formula (112)	OH	OH	H	H	CH ₃	H
406	General formula (112)	CN	General formula (112)	OH	OH	H	H	CH ₃ O	H
407	General formula (112)	CN	OH	General formula (112)	OH	H	H	H	H
408	General formula (112)	CN	OH	General formula (112)	OH	H	H	CH ₃	H
409	General formula (112)	CN	OH	General formula (112)	OH	H	H	CH ₃ O	H
410	OH	CN	General formula (112)	General formula (112)	OH	H	H	H	H
411	OH	CN	General formula (112)	General formula (112)	OH	H	H	CH ₃	H
412	OH	CN	General formula (112)	General formula (112)	OH	H	H	CH ₃ O	H
413	General formula (112)	CN	OH	OH	General formula (112)	H	H	H	H
414	General formula (112)	CN	OH	OH	General formula (112)	H	H	CH ₃	H
415	General formula (112)	CN	OH	OH	General formula (112)	H	H	CH ₃ O	H
416	OH	CN	General formula (112)	OH	General formula (112)	H	H	H	H
417	OH	CN	General formula (112)	OH	General formula (112)	H	H	CH ₃	H
418	OH	CN	General formula (112)	OH	General formula (112)	H	H	CH ₃ O	H
419	OH	CN	OH	General formula (112)	General formula (112)	H	H	H	H
420	OH	CN	OH	General formula (112)	General formula (112)	H	H	CH ₃	H
421	OH	CN	OH	General formula (112)	General formula (112)	H	H	CH ₃ O	H
422	General formula (112)	CN	OH	OH	OH	H	H	H	H

TABLE 2-continued

Compound No.	General formula (101)					General formula (112)			
	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
423	General formula (112)	CN	OH	OH	OH	H	H	CH ₃	H
424	General formula (112)	CN	OH	OH	OH	H	H	CH ₃ O	H
425	OH	CN	General formula (112)	OH	OH	H	H	H	H
426	OH	CN	General formula (112)	OH	OH	H	H	CH ₃	H
427	OH	CN	General formula (112)	OH	OH	H	H	CH ₃ O	H
428	OH	CN	OH	General formula (112)	OH	H	H	H	H
429	OH	CN	OH	General formula (112)	OH	H	H	CH ₃	H
430	OH	CN	OH	General formula (112)	OH	H	H	CH ₃ O	H
431	OH	CN	OH	OH	General formula (112)	H	H	H	H
432	OH	CN	OH	OH	General formula (112)	H	H	CH ₃	H
433	OH	CN	OH	OH	General formula (112)	H	H	CH ₃ O	H
434	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	H	H
435	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	CH ₃	H
436	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	CH ₃ O	H
437	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	t-C ₄ H ₉	H
438	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	Cl	H
439	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	F	H
440	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	H	H
441	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	CH ₃	H
442	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	CH ₃ O	H
443	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	t-C ₄ H ₉	H
444	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	Cl	H
445	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	F	H
446	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	H	H
447	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	CH ₃	H
448	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	CH ₃ O	H
449	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	t-C ₄ H ₉	H
450	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	Cl	H
451	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	F	H
452	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	H	H
453	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	CH ₃	H
454	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	CH ₃ O	H
455	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	t-C ₄ H ₉	H
456	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	Cl	H
457	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	F	H
458	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	H	H
459	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	CH ₃	H
460	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	CH ₃ O	H

TABLE 2-continued

Compound No.	General formula (101)					General formula (112)			
	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
461	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	t-C ₄ H ₉	H
462	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	Cl	H
463	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	F	H
464	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	H	H
465	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	CH ₃	H
466	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	CH ₃ O	H
467	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	t-C ₄ H ₉	H
468	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	Cl	H
469	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	F	H
470	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	H	H
471	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	CH ₃	H
472	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	CH ₃ O	H
473	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	t-C ₄ H ₉	H
474	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	Cl	H
475	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	F	H
476	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	H	H
477	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	CH ₃	H
478	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	CH ₃ O	H
479	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	t-C ₄ H ₉	H
480	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	Cl	H
481	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	F	H
482	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	H	H
483	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	CH ₃	H
484	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	CH ₃ O	H
485	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	t-C ₄ H ₉	H
486	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	Cl	H
487	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	F	H
488	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
489	General formula (112)	CN	General formula (112)	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
490	General formula (112)	CN	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H	H
491	General formula (112)	CN	General formula (112)	General formula (112)	H	H	H	C ₆ H ₅	H
492	General formula (112)	CN	General formula (112)	H	General formula (112)	H	C ₆ H ₅	H	H
493	General formula (112)	CN	General formula (112)	H	General formula (112)	H	H	C ₆ H ₅	H
494	General formula (112)	CN	H	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
495	General formula (112)	CN	H	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
496	H	CN	General formula (112)	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
497	H	CN	General formula (112)	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
498	General formula (112)	CN	General formula (112)	H	H	H	C ₆ H ₅	H	H

TABLE 2-continued

Compound No.	General formula (101)					General formula (112)			
	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
499	General formula (112)	CN	General formula (112)	H	H	H	H	C ₆ H ₅	H
500-1	General formula (112)	CN	H	General formula (112)	H	H	C ₆ H ₅	H	H
500-2	General formula (112)	CN	H	General formula (112)	H	H	H	C ₆ H ₅	H
500-3	H	CN	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H	H
500-4	H	CN	General formula (112)	General formula (112)	H	H	H	C ₆ H ₅	H
500-5	General formula (112)	CN	H	H	General formula (112)	H	C ₆ H ₅	H	H
500-6	General formula (112)	CN	H	H	General formula (112)	H	H	C ₆ H ₅	H
500-7	H	CN	General formula (112)	H	General formula (112)	H	C ₆ H ₅	H	H
500-8	H	CN	General formula (112)	H	General formula (112)	H	H	C ₆ H ₅	H
500-9	H	CN	H	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
500-10	H	CN	H	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-11	General formula (112)	CN	H	H	H	H	C ₆ H ₅	H	H
500-12	General formula (112)	CN	H	H	H	H	H	C ₆ H ₅	H
500-13	H	CN	General formula (112)	H	H	H	C ₆ H ₅	H	H
500-14	H	CN	General formula (112)	H	H	H	H	C ₆ H ₅	H
500-15	H	CN	H	General formula (112)	H	H	C ₆ H ₅	H	H
500-16	H	CN	H	General formula (112)	H	H	H	C ₆ H ₅	H
500-17	General formula (112)	CN	General formula (112)	General formula (112)	F	H	H	C ₆ H ₅	H
500-18	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	C ₆ H ₅	H
500-19	General formula (112)	CN	F	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-20	F	CN	General formula (112)	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-21	General formula (112)	CN	General formula (112)	F	F	H	H	C ₆ H ₅	H
500-22	General formula (112)	CN	F	General formula (112)	F	H	H	C ₆ H ₅	H
500-23	F	CN	General formula (112)	General formula (112)	F	H	H	C ₆ H ₅	H
500-24	General formula (112)	CN	F	F	General formula (112)	H	H	C ₆ H ₅	H
500-25	F	CN	General formula (112)	F	General formula (112)	H	H	C ₆ H ₅	H
500-26	F	CN	F	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-27	General formula (112)	CN	F	F	F	H	H	C ₆ H ₅	H
500-28	F	CN	General formula (112)	F	F	H	H	C ₆ H ₅	H
500-29	F	CN	F	General formula (112)	F	H	H	C ₆ H ₅	H
500-30	General formula (112)	CN	General formula (112)	General formula (112)	OH	H	H	C ₆ H ₅	H
500-31	General formula (112)	CN	General formula (112)	OH	General formula (112)	H	H	C ₆ H ₅	H
500-32	General formula (112)	CN	OH	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-33	OH	CN	General formula (112)	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-34	General formula (112)	CN	General formula (112)	OH	OH	H	H	C ₆ H ₅	H
500-35	General formula (112)	CN	OH	General formula (112)	OH	H	H	C ₆ H ₅	H
500-36	OH	CN	General formula (112)	General formula (112)	OH	H	H	C ₆ H ₅	H
500-37	General formula (112)	CN	OH	OH	General formula (112)	H	H	C ₆ H ₅	H

TABLE 2-continued

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
500-38	OH	CN	General formula (112)	OH	General formula (112)	H	H	C ₆ H ₅	H
500-39	OH	CN	OH	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
500-40	General formula (112)	CN	OH	OH	OH	H	H	C ₆ H ₅	H
500-41	OH	CN	General formula (112)	OH	OH	H	H	C ₆ H ₅	H
500-42	OH	CN	OH	General formula (112)	OH	H	H	C ₆ H ₅	H
500-43	OH	CN	OH	OH	General formula (112)	H	H	C ₆ H ₅	H
500-44	General formula (112)	CN	General formula (112)	Cl	General formula (112)	H	H	C ₆ H ₅	H
500-45	General formula (112)	CN	General formula (112)	F	General formula (112)	H	H	C ₆ H ₅	H
500-46	General formula (112)	CN	General formula (112)	CH ₃ O	General formula (112)	H	H	C ₆ H ₅	H
500-47	General formula (112)	CN	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	C ₆ H ₅	H
500-48	General formula (112)	CN	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	C ₆ H ₅	H
500-49	General formula (112)	CN	General formula (112)	Formula (121)	General formula (112)	H	H	C ₆ H ₅	H
500-50	General formula (112)	CN	General formula (112)	Formula (122)	General formula (112)	H	H	C ₆ H ₅	H
500-51	General formula (112)	CN	General formula (112)	Formula (123)	General formula (112)	H	H	C ₆ H ₅	H
500-52	General formula (112)	CN	General formula (112)	Formula (124)	General formula (112)	H	H	C ₆ H ₅	H

TABLE 3

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
501	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	H	H
502	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	CH ₃	H	H
503	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	CH ₃ O	H	H
504	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃	H
505	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	CH ₃ O	H
506	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	t-C ₄ H ₉	H
507	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	Cl	H
508	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	F	H
509	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	H	CH ₃
510	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	H	CH ₃ O
511	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	H	H
512	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	CH ₃	H
513	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	CH ₃ O	H
514	CN	General formula (112)	General formula (112)	H	General formula (112)	H	H	H	H
515	CN	General formula (112)	General formula (112)	H	General formula (112)	H	H	CH ₃	H
516	CN	General formula (112)	General formula (112)	H	General formula (112)	H	H	CH ₃ O	H
517	CN	General formula (112)	General formula (112)	H	H	H	H	H	H
518	CN	General formula (112)	General formula (112)	H	H	H	H	CH ₃	H

TABLE 3-continued

Compound	General formula (101)					General formula (112)				
	No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
519	CN	General formula (112)	General formula (112)	H	H	H	H	H	CH ₃ O	H
520	CN		H	General formula (112)	H	H	H	H	H	H
521	CN		H	General formula (112)	H	H	H	H	CH ₃	H
522	CN		H	General formula (112)	H	H	H	H	CH ₃ O	H
523	CN		H	General formula (112)	General formula (112)	H	H	H	H	H
524	CN		H	General formula (112)	General formula (112)	H	H	H	CH ₃	H
525	CN		H	General formula (112)	General formula (112)	H	H	H	CH ₃ O	H
526	CN		General formula (112)	H	H	General formula (112)	H	H	H	H
527	CN		General formula (112)	H	H	General formula (112)	H	H	CH ₃	H
528	CN		General formula (112)	H	H	General formula (112)	H	H	CH ₃ O	H
529	CN	General formula (112)	H	H	H	H	H	H	H	
530	CN	General formula (112)	H	H	H	H	H	CH ₃	H	
531	CN	General formula (112)	H	H	H	H	H	CH ₃ O	H	
532	CN	H	General formula (112)	H	H	H	H	H	H	H
533	CN	H	General formula (112)	H	H	H	H	H	CH ₃	H
534	CN	H	General formula (112)	H	H	H	H	H	CH ₃ O	H
535	CN	General formula (112)	General formula (112)	General formula (112)	F	H	H	H	H	H
536	CN	General formula (112)	General formula (112)	General formula (112)	F	H	H	H	CH ₃	H
537	CN	General formula (112)	General formula (112)	General formula (112)	F	H	H	H	CH ₃ O	H
538	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	H	H	H
539	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	H	CH ₃	H
540	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	H	CH ₃ O	H
541	CN	General formula (112)	General formula (112)	F	F	H	H	H	H	H
542	CN	General formula (112)	General formula (112)	F	F	H	H	H	CH ₃	H
543	CN	General formula (112)	General formula (112)	F	F	H	H	H	CH ₃ O	H
544	CN	General formula (112)	F	General formula (112)	F	H	H	H	H	H
545	CN	General formula (112)	F	General formula (112)	F	H	H	H	CH ₃	H
546	CN	General formula (112)	F	General formula (112)	F	H	H	H	CH ₃ O	H
547	CN	F	General formula (112)	General formula (112)	F	H	H	H	H	H
548	CN	F	General formula (112)	General formula (112)	F	H	H	H	CH ₃	H
549	CN	F	General formula (112)	General formula (112)	F	H	H	H	CH ₃ O	H
550	CN	General formula (112)	F	F	General formula (112)	H	H	H	H	H
551	CN	General formula (112)	F	F	General formula (112)	H	H	H	CH ₃	H
552	CN	General formula (112)	F	F	General formula (112)	H	H	H	CH ₃ O	H
553	CN	General formula (112)	F	F	F	H	H	H	H	H
554	CN	General formula (112)	F	F	F	H	H	H	CH ₃	H
555	CN	General formula (112)	F	F	F	H	H	H	CH ₃ O	H
556	CN	F	General formula (112)	F	F	H	H	H	H	H

TABLE 3-continued

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
557	CN	F	General formula (112)	F	F	H	H	CH ₃	H
558	CN	F	General formula (112)	F	F	H	H	CH ₃ O	H
559	CN	General formula (112)	General formula (112)	General formula (112)	OH	H	H	H	H
560	CN	General formula (112)	General formula (112)	General formula (112)	OH	H	H	CH ₃	H
561	CN	General formula (112)	General formula (112)	General formula (112)	OH	H	H	CH ₃ O	H
562	CN	General formula (112)	General formula (112)	OH	General formula (112)	H	H	H	H
563	CN	General formula (112)	General formula (112)	OH	General formula (112)	H	H	CH ₃	H
654	CN	General formula (112)	General formula (112)	OH	General formula (112)	H	H	CH ₃ O	H
565	CN	General formula (112)	General formula (112)	OH	General formula (112)	H	H	Cl	H
566	CN	General formula (112)	General formula (112)	OH	General formula (112)	H	H	F	H
567	CN	General formula (112)	General formula (112)	OH	OH	H	H	H	H
568	CN	General formula (112)	General formula (112)	OH	OH	H	H	CH ₃	H
569	CN	General formula (112)	General formula (112)	OH	OH	H	H	CH ₃ O	H
570	CN	General formula (112)	OH	General formula (112)	OH	H	H	H	H
571	CN	General formula (112)	OH	General formula (112)	OH	H	H	CH ₃	H
572	CN	General formula (112)	OH	General formula (112)	OH	H	H	CH ₃ O	H
573	CN	OH	General formula (112)	General formula (112)	OH	H	H	H	H
574	CN	OH	General formula (112)	General formula (112)	OH	H	H	CH ₃	H
575	CN	OH	General formula (112)	General formula (112)	OH	H	H	CH ₃ O	H
576	CN	General formula (112)	OH	OH	General formula (112)	H	H	H	H
577	CN	General formula (112)	OH	OH	General formula (112)	H	H	CH ₃	H
578	CN	General formula (112)	OH	OH	General formula (112)	H	H	CH ₃ O	H
579	CN	General formula (112)	OH	OH	OH	H	H	H	H
580	CN	General formula (112)	OH	OH	OH	H	H	CH ₃	H
581	CN	General formula (112)	OH	OH	OH	H	H	CH ₃ O	H
582	CN	OH	General formula (112)	OH	OH	H	H	H	H
583	CN	OH	General formula (112)	OH	OH	H	H	CH ₃	H
584	CN	OH	General formula (112)	OH	OH	H	H	CH ₃ O	H
585	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	H	H
586	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	CH ₃	H
587	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	CH ₃ O	H
588	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	t-C ₄ H ₉	H
589	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	Cl	H
590	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	F	H
591	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	H	H
592	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	CH ₃	H
593	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	CH ₃ O	H
594	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	t-C ₄ H ₉	H

TABLE 3-continued

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
595	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	Cl	H
596	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	F	H
597	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	H	H
598	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	CH ₃	H
599	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	CH ₃ O	H
600	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	t-C ₄ H ₉	H
601	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	Cl	H
602	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	F	H
603	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	H	H
604	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	CH ₃	H
605	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	CH ₃ O	H
606	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	t-C ₄ H ₉	H
607	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	Cl	H
608	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	F	H
609	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	H	H
610	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	CH ₃	H
611	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	CH ₃ O	H
612	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	t-C ₄ H ₉	H
613	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	Cl	H
614	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	F	H
615	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	H	H
616	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	CH ₃	H
617	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	CH ₃ O	H
618	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	t-C ₄ H ₉	H
619	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	Cl	H
620	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	F	H
621	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	H	H
622	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	CH ₃	H
623	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	CH ₃ O	H
624	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	t-C ₄ H ₉	H
625	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	Cl	H
626	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	F	H
627	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	H	H
628	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	CH ₃	H
629	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	CH ₃ O	H
630	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	t-C ₄ H ₉	H
631	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	Cl	H
632	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	F	H

TABLE 3-continued

Compound		General formula (101)				General formula (112)			
No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶	R ³⁴ , R ³⁵
633	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	H	H
634	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	CH ₃	H
635	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	CH ₃ O	H
636	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	t-C ₄ H ₉	H
637	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	Cl	H
638	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	F	H
639	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
640	CN	General formula (112)	General formula (112)	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
641	CN	General formula (112)	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H	H
642	CN	General formula (112)	General formula (112)	General formula (112)	H	H	H	C ₆ H ₅	H
643	CN	General formula (112)	General formula (112)	H	General formula (112)	H	C ₆ H ₅	H	H
644	CN	General formula (112)	General formula (112)	H	General formula (112)	H	H	C ₆ H ₅	H
645	CN	General formula (112)	General formula (112)	H	H	H	C ₆ H ₅	H	H
646	CN	General formula (112)	General formula (112)	H	H	H	H	C ₆ H ₅	H
647	CN	General formula (112)	H	General formula (112)	H	H	C ₆ H ₅	H	H
648	CN	General formula (112)	H	General formula (112)	H	H	H	C ₆ H ₅	H
649	CN	H	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H	H
650	CN	H	General formula (112)	General formula (112)	H	H	H	C ₆ H ₅	H
651	CN	H	H	General formula (112)	General formula (112)	H	C ₆ H ₅	H	H
652	CN	H	H	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
653	CN	General formula (112)	H	H	H	H	C ₆ H ₅	H	H
654	CN	General formula (112)	H	H	H	H	H	C ₆ H ₅	H
655	CN	H	General formula (112)	H	H	H	C ₆ H ₅	H	H
656	CN	H	General formula (112)	H	H	H	H	C ₆ H ₅	H
657	CN	General formula (112)	General formula (112)	General formula (112)	F	H	H	C ₆ H ₅	H
658	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	C ₆ H ₅	H
659	CN	General formula (112)	General formula (112)	F	F	H	H	C ₆ H ₅	H
660	CN	General formula (112)	F	General formula (112)	F	H	H	C ₆ H ₅	H
661	CN	F	General formula (112)	General formula (112)	F	H	H	C ₆ H ₅	H
662	CN	F	F	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H
663	CN	General formula (112)	F	F	F	H	H	C ₆ H ₅	H
664	CN	F	General formula (112)	F	F	H	H	C ₆ H ₅	H
665	CN	General formula (112)	General formula (112)	General formula (112)	OH	H	H	C ₆ H ₅	H
666	CN	General formula (112)	General formula (112)	OH	General formula (112)	H	H	C ₆ H ₅	H
667	CN	General formula (112)	General formula (112)	OH	OH	H	H	C ₆ H ₅	H
668	CN	General formula (112)	OH	General formula (112)	OH	H	H	C ₆ H ₅	H
669	CN	OH	General formula (112)	General formula (112)	OH	H	H	C ₆ H ₅	H
670	CN	OH	OH	General formula (112)	General formula (112)	H	H	C ₆ H ₅	H

Compound	General formula (101)					General formula (112)			
	No.	R ¹	R ²	R ³	R ⁴	R ⁵	R ³¹ , R ³⁸	R ³² , R ³⁷	R ³³ , R ³⁶
671	CN	General formula (112)	OH	OH	OH	H	H	C ₆ H ₅	H
672	CN		OH	General formula (112)	OH	OH	H	H	C ₆ H ₅
673	CN	General formula (112)	General formula (112)	Cl	General formula (112)	H	H	C ₆ H ₅	H
674	CN	General formula (112)	General formula (112)	F	General formula (112)	H	H	C ₆ H ₅	H
675	CN	General formula (112)	General formula (112)	CH ₃ O	General formula (112)	H	H	C ₆ H ₅	H
676	CN	General formula (112)	General formula (112)	C ₂ H ₅ O	General formula (112)	H	H	C ₆ H ₅	H
677	CN	General formula (112)	General formula (112)	C ₆ H ₅ O	General formula (112)	H	H	C ₆ H ₅	H
678	CN	General formula (112)	General formula (112)	Formula (121)	General formula (112)	H	H	C ₆ H ₅	H
679	CN	General formula (112)	General formula (112)	Formula (122)	General formula (112)	H	H	C ₆ H ₅	H
680	CN	General formula (112)	General formula (112)	Formula (123)	General formula (112)	H	H	C ₆ H ₅	H
681	CN	General formula (112)	General formula (112)	Formula (124)	General formula (112)	H	H	C ₆ H ₅	H

[illegible]

[illegible]

Compound	General formula (113)						
	No.	R ⁴¹	R ⁴²	R ⁴³	R ⁴⁴	R ⁴⁵	R ⁴⁶
701	H	H	H	H	H	H	H
702	H	CH ₃	H	H	H	H	H
703	H	CH ₃ O	H	H	H	H	H
704	H	H	CH ₃	H	H	H	H
705	H	H	CH ₃ O	H	H	H	H
706	H	H	t-C ₄ H ₉	H	H	H	H
707	H	H	Cl	H	H	H	H
708	H	H	F	H	H	H	H
709	H	H	H	CH ₃	H	H	H
710	H	H	H	CH ₃ O	H	H	H
711	H	H	H	H	CH ₃	H	H
712	H	H	H	H	CH ₃ O	H	H
713	H	H	H	H	t-C ₄ H ₉	H	H

TABLE 4-continued

714	H	H	H	H	Cl	H
715	H	H	H	H	F	H
716	H	H	H	H	C ₆ H ₅	H
717	H	H	H	H	p-CH ₃ C ₆ H ₄	H
718	H	H	H	H	2,4,6-(CH ₃) ₃ C ₆ H ₂	H
719	H	H	H	H	p-CH ₃ OC ₆ H ₄	H
720	H	H	H	H	p-(CH ₃) ₂ NC ₆ H ₄	H
721	H	H	H	H	p-FC ₆ H ₄	H
722	H	H	H	H	p-CNC ₆ H ₄	H
723	H	H	H	H	H	CH ₃
724	H	H	H	H	H	CH ₃ O
725	H	H	H	H	H	t-C ₄ H ₉
726	H	H	H	H	H	Cl
727	H	H	H	H	H	F
728	H	H	H	H	H	C ₆ H ₅
729	H	H	H	H	H	p-CH ₃ C ₆ H ₄
730	H	H	H	H	H	2,4,6-(CH ₃) ₃ C ₆ H ₂
731	H	H	H	H	H	p-CH ₃ OC ₆ H ₄
732	H	H	H	H	H	p-(CH ₃) ₂ NC ₆ H ₄
733	H	H	H	H	H	p-FC ₆ H ₄
734	H	H	H	H	H	p-CNC ₆ H ₄
735	H	H	H	H	H	H
736	H	H	H	H	H	H
737	H	H	H	H	H	H
738	H	H	H	H	H	H
739	H	H	H	H	H	H
740	H	H	H	H	H	H
741	H	H	H	H	H	H
742	H	H	H	H	H	H
743	H	H	H	H	H	H
744	H	H	H	H	H	H
745	H	H	H	H	H	H
746	H	H	H	H	H	H
747	H	H	H	H	H	H
748	H	H	H	H	H	H
749	H	H	H	H	H	H
750	H	H	H	H	H	H
751	H	H	H	H	H	H
752	H	H	H	H	H	H
753	H	H	H	H	H	H
754	H	H	CH ₃	H	H	H
755	H	H	CH ₃ O	H	H	H
756	H	H	t-C ₄ H ₉	H	H	H
757	H	H	Cl	H	H	H
758	H	H	F	H	H	H
759	H	H	H	H	H	H
760	H	H	CH ₃	H	H	H
761	H	H	CH ₃ O	H	H	H
762	H	H	t-C ₄ H ₉	H	H	H
763	H	H	Cl	H	H	H
764	H	H	F	H	H	H
765	H	H	H	H	H	H
766	H	H	CH ₃	H	H	H
767	H	H	CH ₃ O	H	H	H
768	H	H	t-C ₄ H ₉	H	H	H
769	H	H	Cl	H	H	H
770	H	H	F	H	H	H
771	H	H	H	H	H	H
772	H	H	CH ₃	H	H	H
773	H	H	CH ₃ O	H	H	H
774	H	H	t-C ₄ H ₉	H	H	H
775	H	H	Cl	H	H	H
776	H	H	F	H	H	H
777	H	H	H	H	H	H
778	H	H	CH ₃	H	H	H
779	H	H	CH ₃ O	H	H	H
780	H	H	t-C ₄ H ₉	H	H	H
781	H	H	Cl	H	H	H
782	H	H	F	H	H	H
783	H	H	H	H	H	H
784	H	H	CH ₃	H	H	H
785	H	H	CH ₃ O	H	H	H
786	H	H	t-C ₄ H ₉	H	H	H
787	H	H	Cl	H	H	H
788	H	H	F	H	H	H
789	H	H	H	H	H	H
790	H	H	CH ₃	H	H	H
791	H	H	CH ₃ O	H	H	H
792	H	H	t-C ₄ H ₉	H	H	H
793	H	H	Cl	H	H	H

794	H	H	F	H	H	H
795	H	H	H	H	H	H
796	H	H	CH ₃	H	H	H
797	H	H	CH ₃ O	H	H	H
798	H	H	t-C ₄ H ₉	H	H	H
799	H	H	Cl	H	H	H
800	H	H	F	H	H	H
801	H	H	H	H	H	H
802	H	H	CH ₃	H	H	H
803	H	H	CH ₃ O	H	H	H
804	H	H	t-C ₄ H ₉	H	H	H
805	H	H	Cl	H	H	H
806	H	H	F	H	H	H

[illegible]

TABLE 5-continued

958	General formula (114)	General formula (114)	CN C ₂ H ₅ O	General formula (114)
959	General formula (114)	General formula (114)	CN C ₂ H ₅ O	General formula (114)
960	General formula (114)	General formula (114)	CN C ₂ H ₅ O	General formula (114)
961	General formula (114)	General formula (114)	CN C ₆ H ₅ O	General formula (114)
962	General formula (114)	General formula (114)	CN C ₆ H ₅ O	General formula (114)
963	General formula (114)	General formula (114)	CN C ₆ H ₅ O	General formula (114)
964	General formula (114)	General formula (114)	CN C ₆ H ₅ O	General formula (114)
965	General formula (114)	General formula (114)	CN C ₆ H ₅ O	General formula (114)
966	General formula (114)	General formula (114)	CN C ₆ H ₅ O	General formula (114)
967	General formula (114)	General formula (114)	CN Formula (121)	General formula (114)
968	General formula (114)	General formula (114)	CN Formula (121)	General formula (114)
969	General formula (114)	General formula (114)	CN Formula (121)	General formula (114)
970	General formula (114)	General formula (114)	CN Formula (121)	General formula (114)
971	General formula (114)	General formula (114)	CN Formula (121)	General formula (114)
972	General formula (114)	General formula (114)	CN Formula (121)	General formula (114)
973	General formula (114)	General formula (114)	CN Formula (122)	General formula (114)
974	General formula (114)	General formula (114)	CN Formula (122)	General formula (114)
975	General formula (114)	General formula (114)	CN Formula (122)	General formula (114)
976	General formula (114)	General formula (114)	CN Formula (122)	General formula (114)
977	General formula (114)	General formula (114)	CN Formula (122)	General formula (114)
978	General formula (114)	General formula (114)	CN Formula (122)	General formula (114)
989	General formula (114)	General formula (114)	CN Formula (123)	General formula (114)
980	General formula (114)	General formula (114)	CN Formula (123)	General formula (114)
981	General formula (114)	General formula (114)	CN Formula (123)	General formula (114)
982	General formula (114)	General formula (114)	CN Formula (123)	General formula (114)
983	General formula (114)	General formula (114)	CN Formula (123)	General formula (114)
984	General formula (114)	General formula (114)	CN Formula (123)	General formula (114)
985	General formula (114)	General formula (114)	CN Formula (124)	General formula (114)
986	General formula (114)	General formula (114)	CN Formula (124)	General formula (114)
987	General formula (114)	General formula (114)	CN Formula (124)	General formula (114)
988	General formula (114)	General formula (114)	CN Formula (124)	General formula (114)
989	General formula (114)	General formula (114)	CN Formula (124)	General formula (114)
990	General formula (114)	General formula (114)	CN Formula (124)	General formula (114)

General formula (113)

Compound No.	R ⁵²	R ⁵³	R ⁵⁴	R ⁵⁵	R ⁵⁷	R ⁵⁹	R ⁶¹	R ⁵¹ , R ⁵⁶ , R ⁵⁸ , R ⁶⁰ , R ⁶²
901	H	H	H	H	H	H	H	H
902	CH ₃	H	H	H	H	H	H	H
903	CH ₃ O	H	H	H	H	H	H	H
904	H	CH ₃	H	H	H	H	H	H
905	H	CH ₃ O	H	H	H	H	H	H
906	H	t-C ₄ H ₉	H	H	H	H	H	H
907	H	Cl	H	H	H	H	H	H
908	H	F	H	H	H	H	H	H
909	H	H	CH ₃	H	H	H	H	H
910	H	H	CH ₃ O	H	H	H	H	H
911	H	H	H	CH ₃	H	H	H	H
912	H	H	H	CH ₃ O	H	H	H	H
913	H	H	H	H	CH ₃	H	H	H
914	H	H	H	H	CH ₃ O	H	H	H
915	H	H	H	H	H	CH ₃	H	H
916	H	H	H	H	H	CH ₃ O	H	H
917	H	H	H	H	H	H	CH ₃	H
918	H	H	H	H	H	H	CH ₃ O	H
919	H	H	H	H	H	H	H	H
920	H	H	H	H	H	H	H	H
921	H	H	H	H	H	H	H	H
922	H	H	H	H	H	H	H	H
923	H	H	H	H	H	H	H	H
924	H	H	H	H	H	H	H	H
925	H	H	H	H	H	H	H	H
926	H	H	H	H	H	H	H	H
927	H	H	H	H	H	H	H	H
928	H	H	H	H	H	H	H	H
929	H	H	H	H	H	H	H	H
930	H	H	H	H	H	H	H	H
931	H	H	H	H	H	H	H	H
932	H	H	H	H	H	H	H	H
933	H	H	H	H	H	H	H	H
934	H	H	H	H	H	H	H	H
935	H	H	H	H	H	H	H	H
936	H	H	H	H	H	H	H	H
937	H	H	H	H	H	H	H	H
938	H	CH ₃	H	H	H	H	H	H
939	H	CH ₃ O	H	H	H	H	H	H
940	H	t-C ₄ H ₉	H	H	H	H	H	H
941	H	Cl	H	H	H	H	H	H

TABLE 5-continued

942	H	F	H	H	H	H	H	H
943	H	H	H	H	H	H	H	H
944	H	CH ₃	H	H	H	H	H	H
945	H	CH ₃ O	H	H	H	H	H	H
946	H	t-C ₄ H ₉	H	H	H	H	H	H
947	H	Cl	H	H	H	H	H	H
948	H	F	H	H	H	H	H	H
949	H	H	H	H	H	H	H	H
950	H	CH ₃	H	H	H	H	H	H
951	H	CH ₃ O	H	H	H	H	H	H
952	H	t-C ₄ H ₉	H	H	H	H	H	H
953	H	Cl	H	H	H	H	H	H
954	H	F	H	H	H	H	H	H
955	H	H	H	H	H	H	H	H
956	H	CH ₃	H	H	H	H	H	H
957	H	CH ₃ O	H	H	H	H	H	H
958	H	t-C ₄ H ₉	H	H	H	H	H	H
959	H	Cl	H	H	H	H	H	H
960	H	F	H	H	H	H	H	H
961	H	H	H	H	H	H	H	H
962	H	CH ₃	H	H	H	H	H	H
963	H	CH ₃ O	H	H	H	H	H	H
964	H	t-C ₄ H ₉	H	H	H	H	H	H
965	H	Cl	H	H	H	H	H	H
966	H	F	H	H	H	H	H	H
967	H	H	H	H	H	H	H	H
968	H	CH ₃	H	H	H	H	H	H
969	H	CH ₃ O	H	H	H	H	H	H
970	H	t-C ₄ H ₉	H	H	H	H	H	H
971	H	Cl	H	H	H	H	H	H
972	H	F	H	H	H	H	H	H
973	H	H	H	H	H	H	H	H
974	H	CH ₃	H	H	H	H	H	H
975	H	CH ₃ O	H	H	H	H	H	H
976	H	t-C ₄ H ₉	H	H	H	H	H	H
977	H	Cl	H	H	H	H	H	H
978	H	F	H	H	H	H	H	H
989	H	H	H	H	H	H	H	H
980	H	CH ₃	H	H	H	H	H	H
981	H	CH ₃ O	H	H	H	H	H	H
982	H	t-C ₄ H ₉	H	H	H	H	H	H
983	H	Cl	H	H	H	H	H	H
984	H	F	H	H	H	H	H	H
985	H	H	H	H	H	H	H	H
986	H	CH ₃	H	H	H	H	H	H
987	H	CH ₃ O	H	H	H	H	H	H
988	H	t-C ₄ H ₉	H	H	H	H	H	H
989	H	Cl	H	H	H	H	H	H
990	H	F	H	H	H	H	H	H

TABLE 6

Compound	General formula (101)				
No.	R ¹	R ²	R ³	R ⁴	R ⁵
1001	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1002	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1003	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1004	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1005	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1006	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1007	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1008	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1009	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1010	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1011	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1012	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1013	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1014	General formula (115)	General formula (115)	CN	General formula (115)	General formula (115)
1015	General formula (115)	General formula (115)	CN	General formula (115)	H
1016	General formula (115)	General formula (115)	CN	H	General formula (115)
1017	General formula (115)	General formula (115)	CN	H	H
1018	General formula (115)	H	CN	General formula (115)	H
1019	H	General formula (115)	CN	General formula (115)	H
1020	General formula (115)	H	CN	H	H
1021	General formula (115)	General formula (115)	CN	General formula (115)	F

[illegible]

	Compound	General formula (115)				
		No.	R ⁷¹ , R ⁸⁰	R ⁷² , R ⁷⁹	R ⁷³ , R ⁷⁸	R ⁷⁴ , R ⁷⁷
	1001	H	H	H	H	H
	1002	H	CH ₃	H	H	H
	1003	H	CH ₃ O	H	H	H
	1004	H	C ₆ H ₅	H	H	H
	1005	H	CH ₃	H	CH ₃	H
	1006	H	CH ₃ O	H	CH ₃ O	H
	1007	H	C ₆ H ₅	H	C ₆ H ₅	H
	1008	H	H	CH ₃	H	H
	1009	H	H	CH ₃ O	H	H
	1010	H	H	t-C ₄ H ₉	H	H

TABLE 6-continued

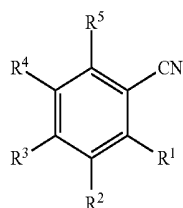
1011	H	H	Cl	H	H
1012	H	H	F	H	H
1013	H	H	C ₆ H ₅	H	H
1014	H	H	p-C ₆ H ₅ —C ₆ H ₄	H	H
1015	H	H	H	H	H
1016	H	H	H	H	H
1017	H	H	H	H	H
1018	H	H	H	H	H
1019	H	H	H	H	H
1020	H	H	H	H	H
1021	H	H	H	H	H
1022	H	H	H	H	H
1023	H	H	H	H	H
1024	H	H	H	H	H
1025	H	H	H	H	H
1026	H	H	H	H	H
1027	H	H	H	H	H
1028	H	H	H	H	H
1029	H	H	H	H	H
1030	H	H	H	H	H
1031	H	H	H	H	H
1032	H	H	H	H	H
1033	H	H	H	H	H
1034	H	H	CH ₃	H	H
1035	H	H	CH ₃ O	H	H
1036	H	H	t-C ₄ H ₉	H	H
1037	H	H	Cl	H	H
1038	H	H	F	H	H
1039	H	H	H	H	H
1040	H	H	CH ₃	H	H
1041	H	H	CH ₃ O	H	H
1042	H	H	t-C ₄ H ₉	H	H
1043	H	H	Cl	H	H
1044	H	H	F	H	H
1045	H	H	H	H	H
1046	H	H	CH ₃	H	H
1047	H	H	CH ₃ O	H	H
1048	H	H	t-C ₄ H ₉	H	H
1049	H	H	Cl	H	H
1050	H	H	F	H	H
1051	H	H	H	H	H
1052	H	H	CH ₃	H	H
1053	H	H	CH ₃ O	H	H
1054	H	H	t-C ₄ H ₉	H	H
1055	H	H	Cl	H	H
1056	H	H	F	H	H
1057	H	H	H	H	H
1058	H	H	CH ₃	H	H
1059	H	H	CH ₃ O	H	H
1060	H	H	t-C ₄ H ₉	H	H
1061	H	H	Cl	H	H
1062	H	H	F	H	H
1063	H	H	H	H	H
1064	H	H	CH ₃	H	H
1065	H	H	CH ₃ O	H	H
1066	H	H	t-C ₄ H ₉	H	H
1067	H	H	Cl	H	H
1068	H	H	F	H	H
1069	H	H	H	H	H
1070	H	H	CH ₃	H	H
1071	H	H	CH ₃ O	H	H
1072	H	H	t-C ₄ H ₉	H	H
1073	H	H	Cl	H	H
1074	H	H	F	H	H
1075	H	H	H	H	H
1076	H	H	CH ₃	H	H
1077	H	H	CH ₃ O	H	H
1078	H	H	t-C ₄ H ₉	H	H
1079	H	H	Cl	H	H
1080	H	H	F	H	H
1081	H	H	H	H	H
1082	H	H	CH ₃	H	H
1083	H	H	CH ₃ O	H	H
1084	H	H	t-C ₄ H ₉	H	H
1085	H	H	Cl	H	H
1086	H	H	F	H	H

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Preferred delayed fluorescent materials include the following compounds.

[1] A compound represented by the following general formula (131):

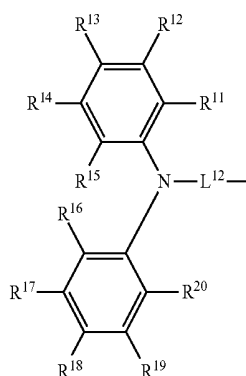
[Chem. 16]



General Formula (131)

[In the general formula (131), from 0 to 1 of R^1 to R^5 represents a cyano group, from 1 to 5 of R^1 to R^5 each represent a group represented by the following general formula (132), and the balance of R^1 to R^5 each represent a hydrogen atom or a substituent other than the above.]

[Chem. 17]

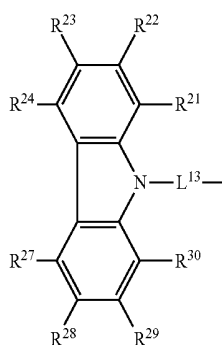


General Formula (132)

[In the general formula (132), R^{11} to R^{20} each independently represent a hydrogen atom or a substituent. R^{11} and R^{12} , R^{13} and R^{14} , R^{15} and R^{16} , R^{17} and R^{18} , R^{19} and R^{20} each may be bonded to each other to form a cyclic structure. L^{12} represents a substituted or unsubstituted arylene group or a substituted or unsubstituted heteroarylene group.]

[2] The compound according to [1], wherein the group represented by the general formula (132) is a group represented by any one of the following general formulae (133) to (138):

[Chem. 18]

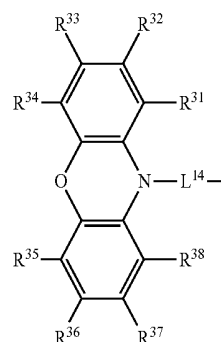


General Formula (133)

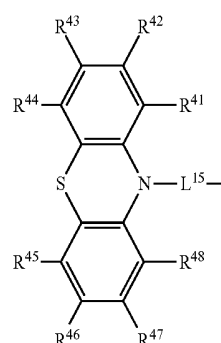
82

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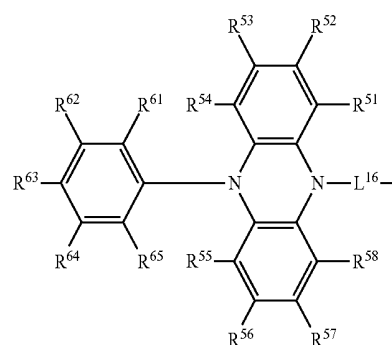
General Formula (134)



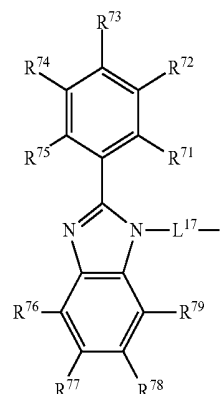
General Formula (135)



General Formula (136)

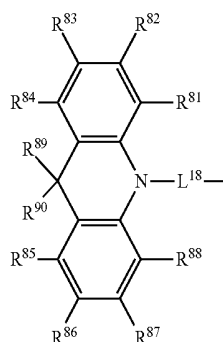


General Formula (137)



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[In the general formulae (133) to (138), R^{21} to R^{24} , R^{27} to R^{38} , R^{41} to R^{48} , R^{51} to R^{58} , R^{61} to R^{65} , R^{71} to R^{79} , R^{81} to R^{90} each independently represent a hydrogen atom or a substituent. R^{21} and R^{22} , R^{22} and R^{23} , R^{23} and R^{24} , R^{27} and R^{28} , R^{28} and R^{29} , R^{29} and R^{30} , R^{31} and R^{32} , R^{32} and R^{33} , R^{33} and R^{34} , R^{35} and R^{36} , R^{36} and R^{37} , R^{37} and R^{38} , R^{41} and R^{42} , R^{42} and R^{43} , R^{43} and R^{44} , R^{45} and R^{46} , R^{46} and R^{47} , R^{47} and R^{48} , R^{51} and R^{52} , R^{52} and R^{53} , R^{53} and R^{54} , R^{54} and R^{55} , R^{55} and R^{56} , R^{56} and R^{57} , R^{57} and R^{58} , R^{61} and R^{62} , R^{62} and R^{63} , R^{63} and R^{64} , R^{64} and R^{65} , R^{54} and R^{61} , R^{55} and R^{65} , R^{71} and R^{72} , R^{72} and R^{73} , R^{73} and R^{74} , R^{74} and R^{75} , R^{76} and R^{77} , R^{77} and R^{78} , R^{78} and R^{79} , R^{81} and R^{82} , R^{82} and R^{83} , R^{83} and R^{84} , R^{85} and R^{86} , R^{86} and R^{87} , R^{87} and R^{88} , and R^{89} and R^{90} each may be bonded to

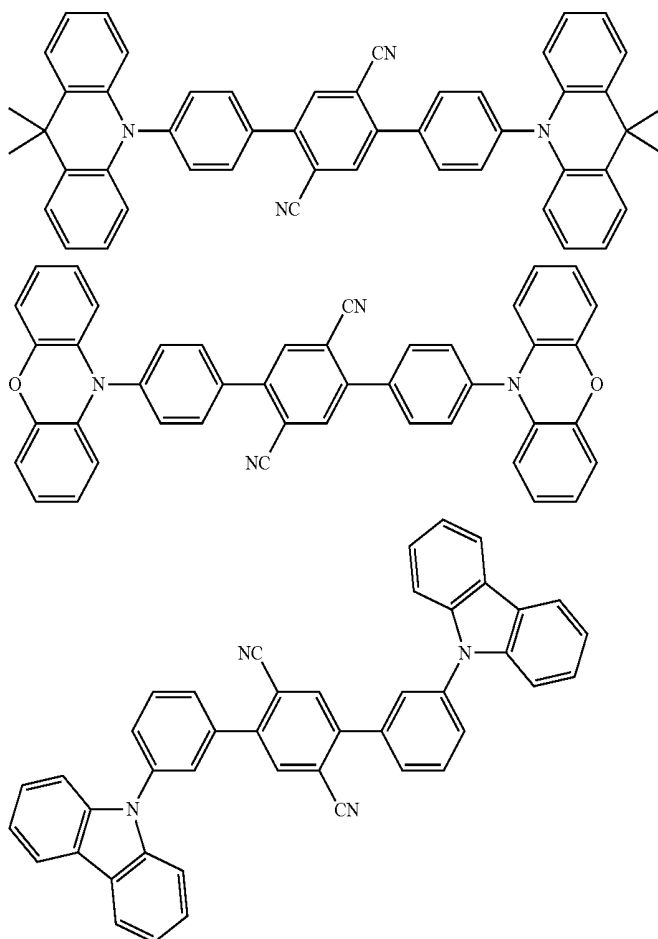
84

each other to form a cyclic structure. L^{13} to L^{18} each independently represent a substituted or unsubstituted arylene group or a substituted or unsubstituted heteroarylene group.]

- 5 [3] The compound according to [1] or [2], wherein in the general formula (131), R^3 represents a cyano group.
- [4] The compound according to any one of [1] to [3], wherein in the general formula (131), R^1 and R^4 each represent a group represented by the general formula (132).
- 10 [5] The compound according to any one of [1] to [4], wherein in the general formula (132), L^{12} represents a phenylene group.
- [6] The compound according to any one of [1] to [5], wherein the group represented by the general formula (132)
- 15 is a group represented by the general formula (133).
- [7] The compound according to [6], wherein in the general formula (133), L^{13} represents a 1,3-phenylene group.
- [8] The compound according to any one of [1] to [5], wherein the group represented by the general formula (132)
- 20 is a group represented by the general formula (134).
- [9] The compound according to [8], wherein in the general formula (134), L^{14} represents a 1,4-phenylene group.
- [10] The compound according to any one of [1] to [5], wherein the group represented by the general formula (132)
- 25 is a group represented by the general formula (138).
- [11] The compound according to [10], wherein in the general formula (132), L^{18} represents a 1,4-phenylene group.

Examples of the compound include the following compounds.

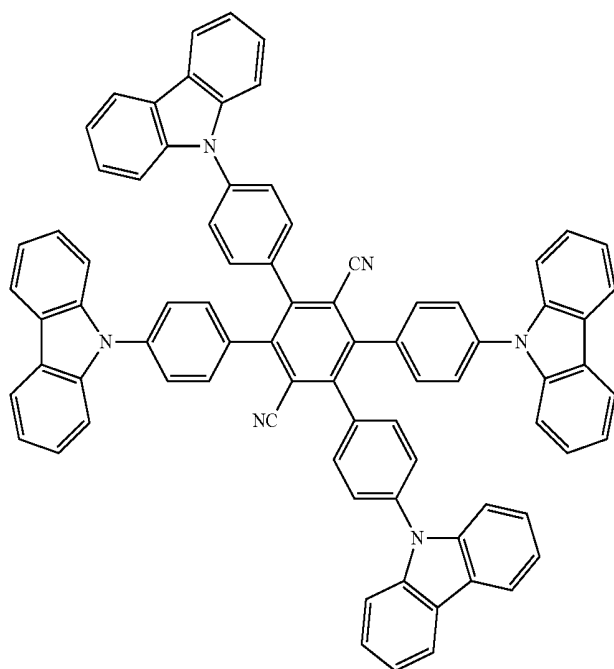
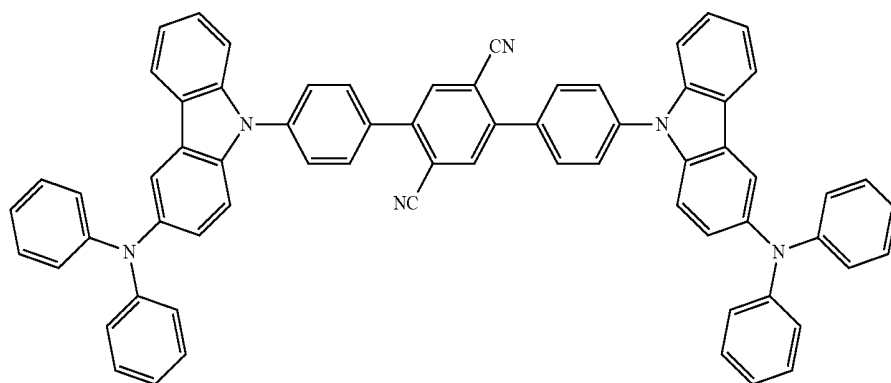
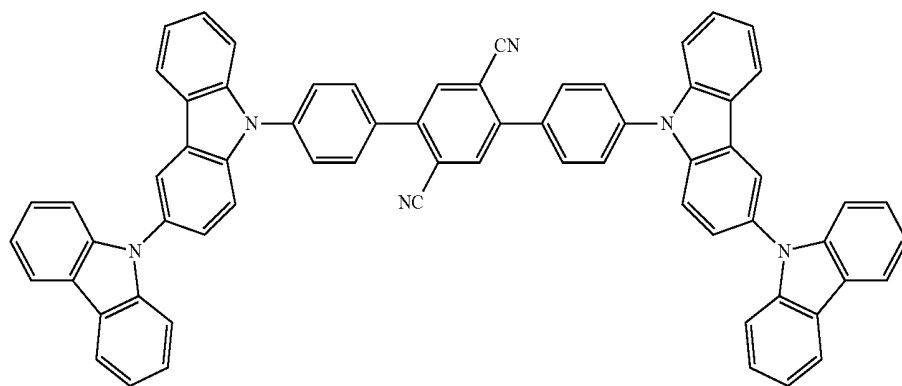
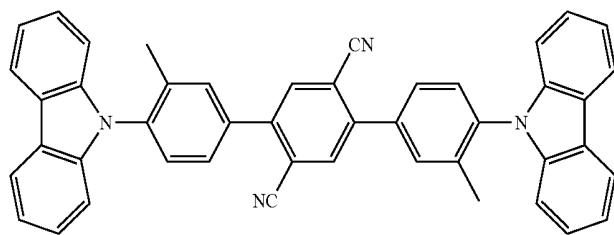
[Chem. 19]



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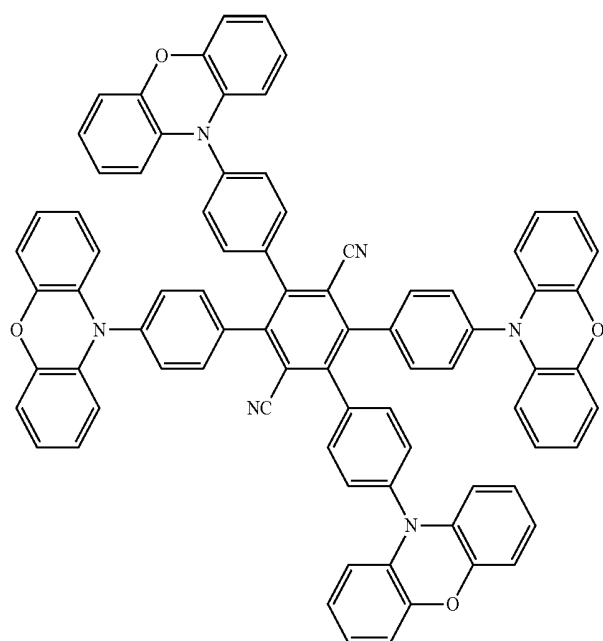
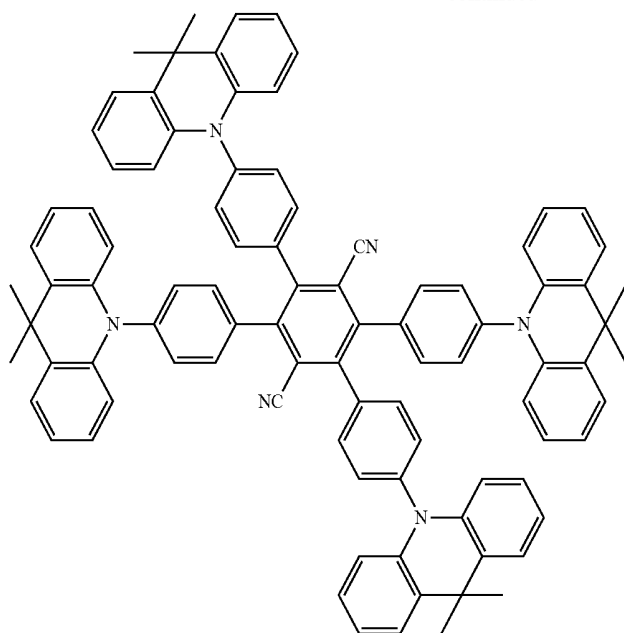
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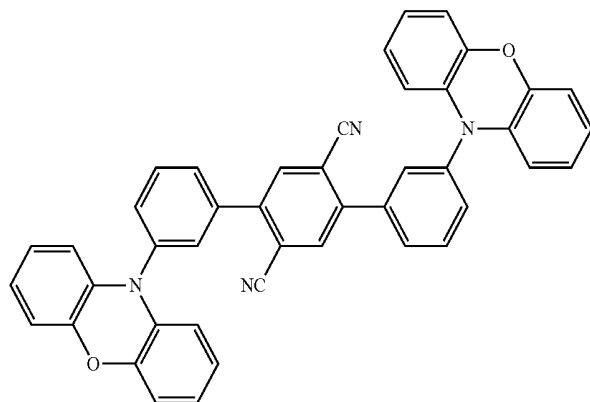
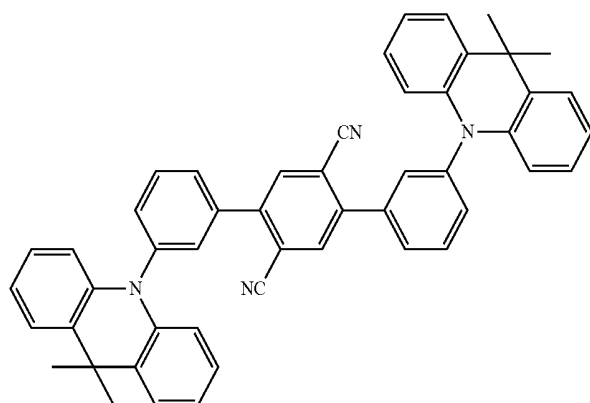
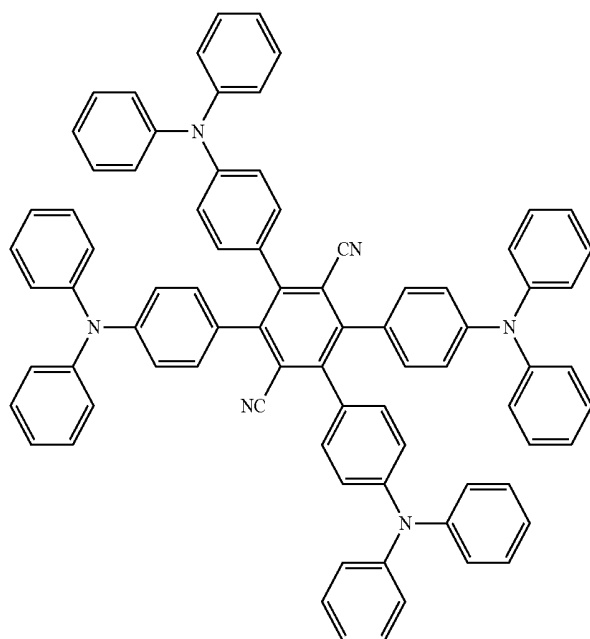
88



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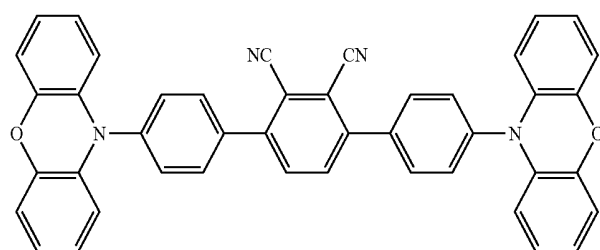
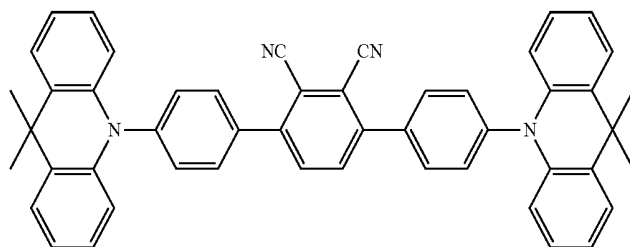
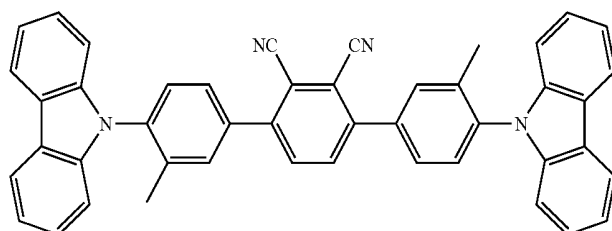
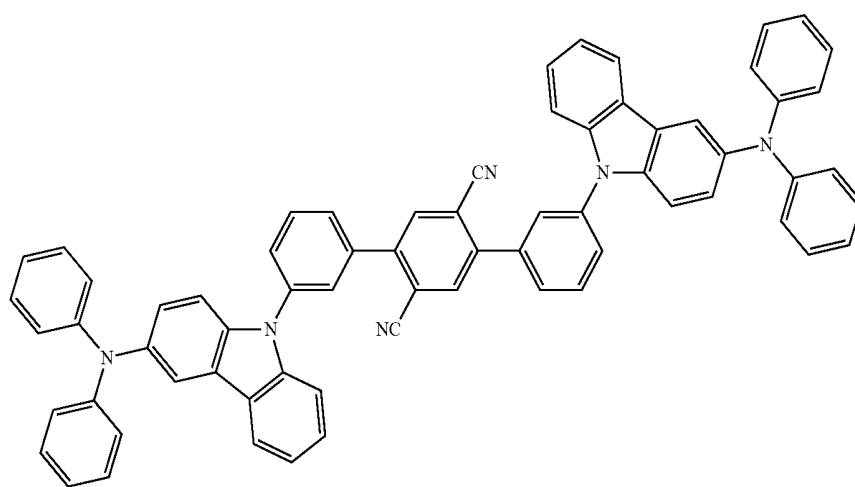
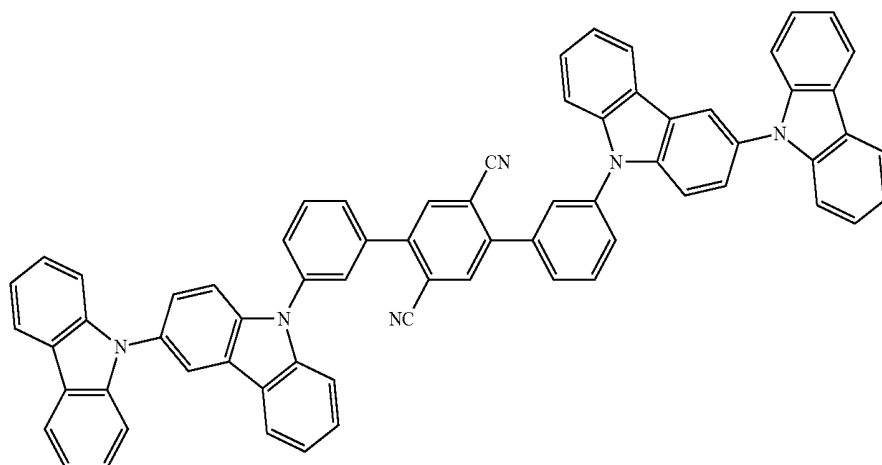
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91

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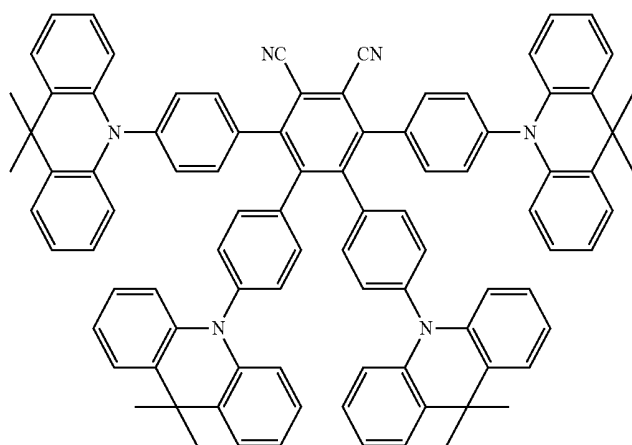
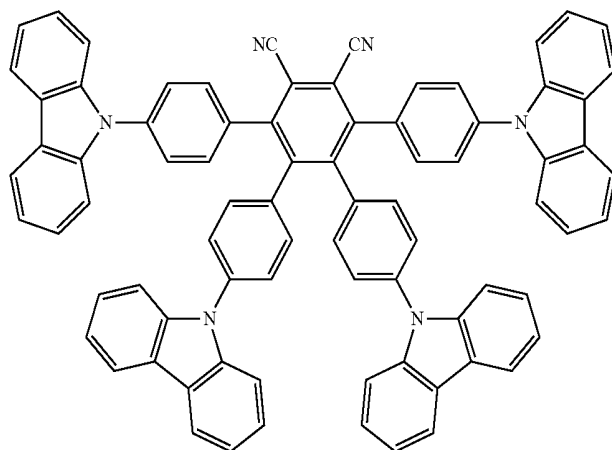
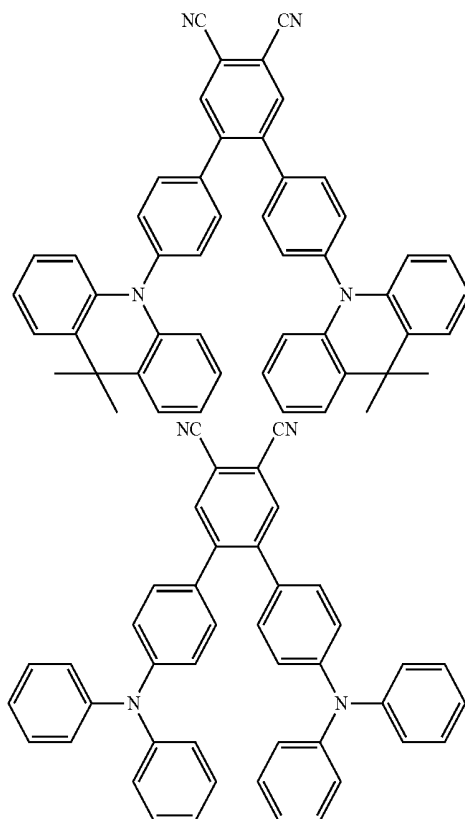
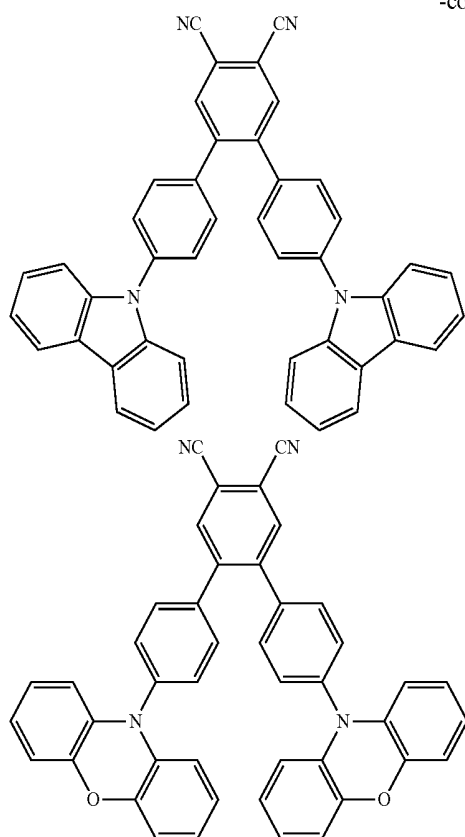
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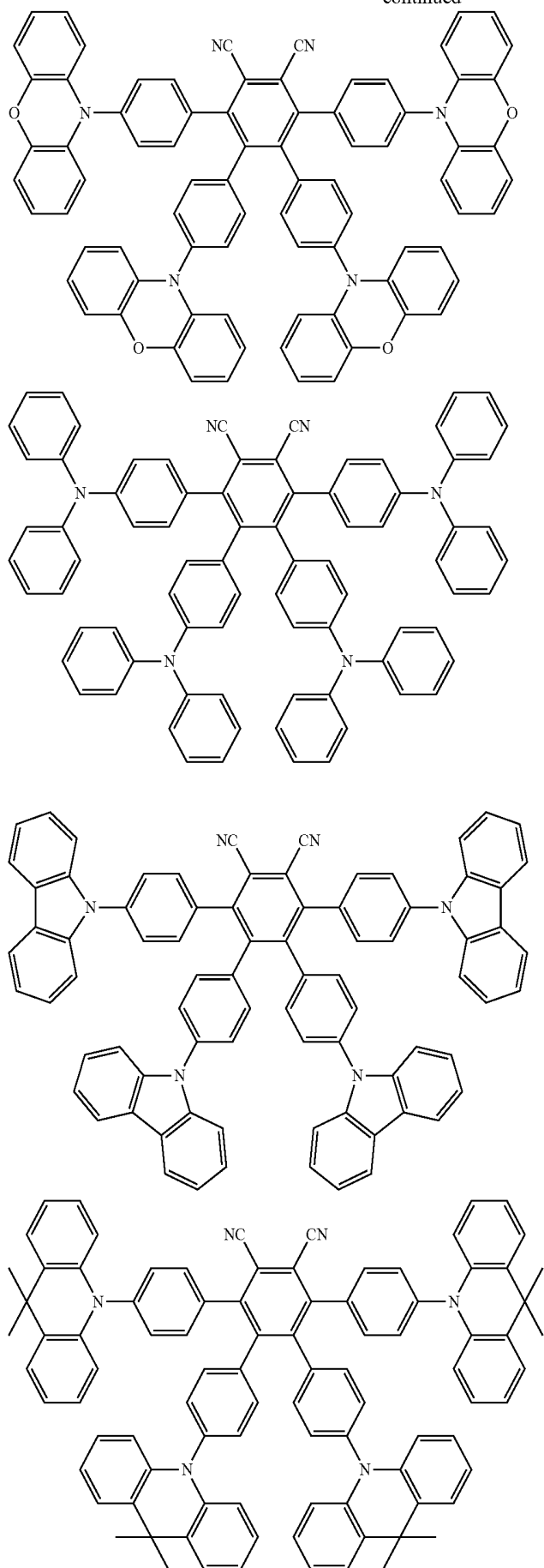
94



95

96

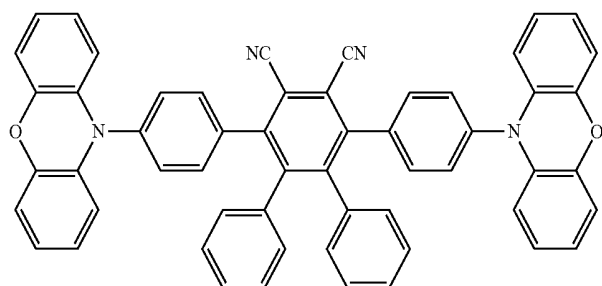
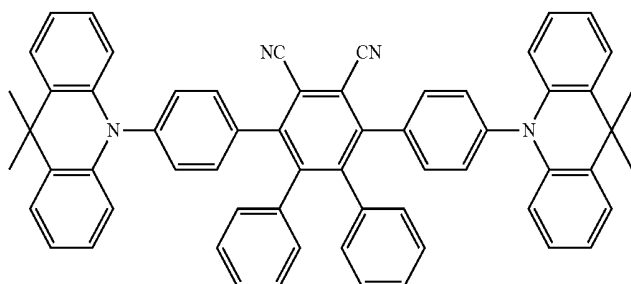
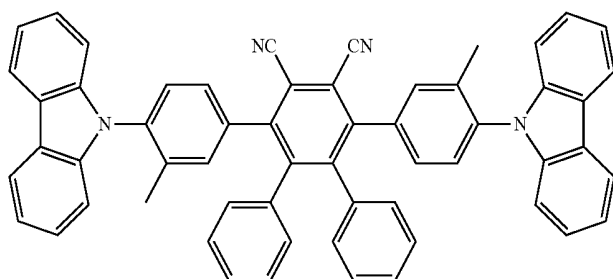
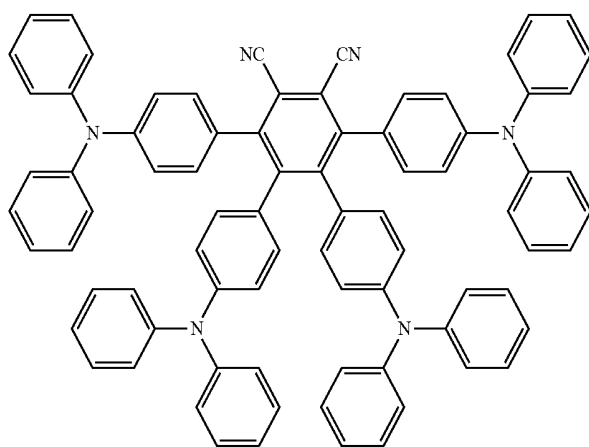
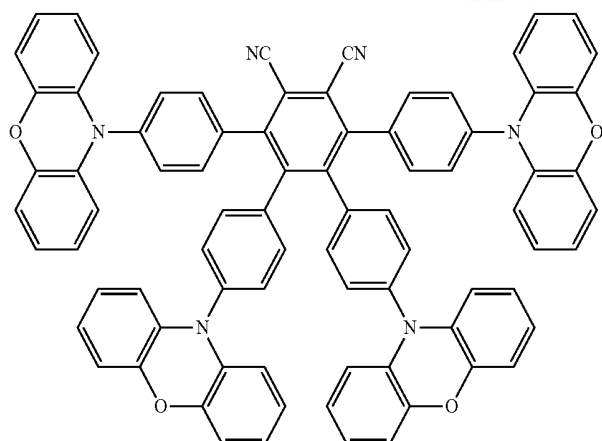
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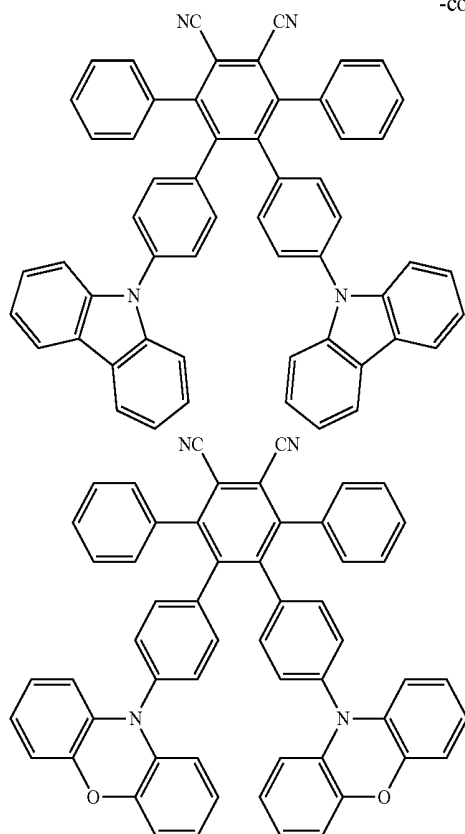
98

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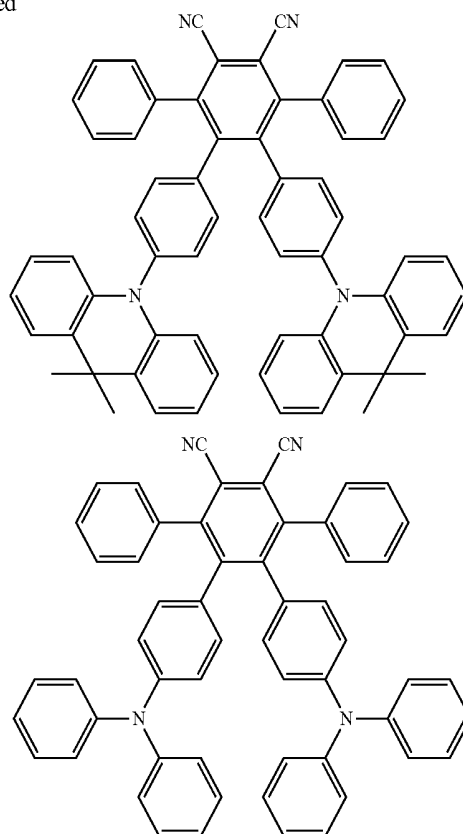


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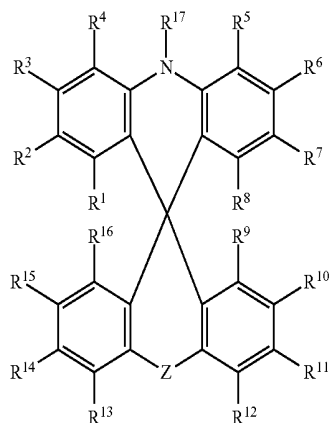
100



Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of WO 2013/011954 including the paragraphs 0007 to 0047 and 0073 to 0085 is incorporated herein by reference as a part of the description of the present application.

[Chem. 20]

General Formula (141)

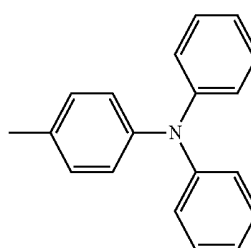


[In the general formula (141), R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 , R^8 and R^{17} each independently represent a hydrogen atom or an electron donating group, provided that at least one thereof represents an electron donating group. R^9 , R^{10} , R^{11} , R^{12} , R^{13} , R^{14} , R^{15} and R^{16} each independently represent a hydro-

gen atom or an electron withdrawing group having no unshared electron pair at the α -position. Z represents a single bond or $>C=Y$, wherein Y represents O, S, $C(CN)_2$ or $C(COOH)_2$, provided that when Z represents a single bond, at least one of R^9 , R^{10} , R^{11} , R^{12} , R^{13} , R^{14} , R^{15} and R^{16} represents an electron withdrawing group having no unshared electron pair at the α -position.

Specific examples of the compounds include the compounds shown in the following Table 7 to Table 16. In the Tables, D1 to D3 represent the following aryl groups substituted by an electron donating group, respectively; A1 to A5 represent the following electron withdrawing groups, respectively; H represents a hydrogen atom; and Ph represents a phenyl group.

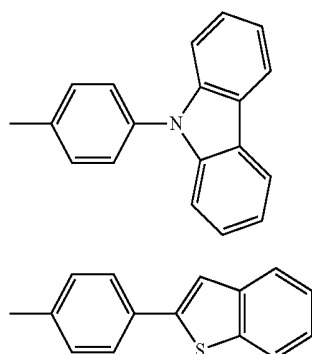
[Chem. 21]



D1

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-continued



—CN

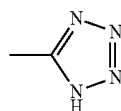
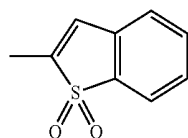
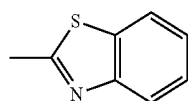
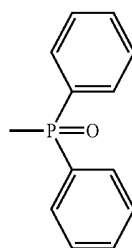


TABLE 7

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2001	H	H	A1	A1	Ph	single bond	H
2002	H	D1	A1	A1	Ph	single bond	H
2003	H	D2	A1	A1	Ph	single bond	H
2004	H	D3	A1	A1	Ph	single bond	H
2005	H	H	A2	A2	Ph	single bond	H
2006	H	D1	A2	A2	Ph	single bond	H
2007	H	D2	A2	A2	Ph	single bond	H
2008	H	D3	A2	A2	Ph	single bond	H
2009	H	H	A3	A3	Ph	single bond	H
2010	H	D1	A3	A3	Ph	single bond	H
2011	H	D2	A3	A3	Ph	single bond	H
2012	H	D3	A3	A3	Ph	single bond	H
2013	H	H	A4	A4	Ph	single bond	H
2014	H	D1	A4	A4	Ph	single bond	H
2015	H	D2	A4	A4	Ph	single bond	H
2016	H	D3	A4	A4	Ph	single bond	H
2017	H	H	A5	A5	Ph	single bond	H
2018	H	D1	A5	A5	Ph	single bond	H
2019	H	D2	A5	A5	Ph	single bond	H
2020	H	D3	A5	A5	Ph	single bond	H
2021	D1	D1	A1	A1	Ph	single bond	H
2022	D2	D2	A1	A1	Ph	single bond	H
2023	D3	D3	A1	A1	Ph	single bond	H
2024	D1	D1	A2	A2	Ph	single bond	H

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TABLE 7-continued

D2	Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
5	2025	D2	D2	A2	A2	Ph	single bond	H
	2026	D3	D3	A2	A2	Ph	single bond	H
	2027	D1	D1	A3	A3	Ph	single bond	H
	2028	D2	D2	A3	A3	Ph	single bond	H
	2029	D3	D3	A3	A3	Ph	single bond	H
	2030	D1	D1	A4	A4	Ph	single bond	H
10	2031	D2	D2	A4	A4	Ph	single bond	H
	2032	D3	D3	A4	A4	Ph	single bond	H
D3	2033	D1	D1	A5	A5	Ph	single bond	H
	2034	D2	D2	A5	A5	Ph	single bond	H
	2035	D3	D3	A5	A5	Ph	single bond	H

TABLE 8

A1	A2	Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
20		2036	H	H	H	A1	Ph	single bond	H
		2037	H	D1	H	A1	Ph	single bond	H
		2038	H	D2	H	A1	Ph	single bond	H
		2039	H	D3	H	A1	Ph	single bond	H
		2040	H	H	H	A2	Ph	single bond	H
		2041	H	D1	H	A2	Ph	single bond	H
25		2042	H	D2	H	A2	Ph	single bond	H
		2043	H	D3	H	A2	Ph	single bond	H
		2044	H	H	H	A3	Ph	single bond	H
A3		2045	H	D1	H	A3	Ph	single bond	H
		2046	H	D2	H	A3	Ph	single bond	H
		2047	H	D3	H	A3	Ph	single bond	H
		2048	H	H	H	A4	Ph	single bond	H
30		2049	H	D1	H	A4	Ph	single bond	H
		2050	H	D2	H	A4	Ph	single bond	H
A4		2051	H	D3	H	A4	Ph	single bond	H
		2052	H	H	H	A5	Ph	single bond	H
		2053	H	D1	H	A5	Ph	single bond	H
		2054	H	D2	H	A5	Ph	single bond	H
35		2055	H	D3	H	A5	Ph	single bond	H
		2056	D1	D1	H	A1	Ph	single bond	H
A5		2057	D2	D2	H	A1	Ph	single bond	H
		2058	D3	D3	H	A1	Ph	single bond	H
		2059	D1	D1	H	A2	Ph	single bond	H
		2060	D2	D2	H	A2	Ph	single bond	H
40		2061	D3	D3	H	A2	Ph	single bond	H
		2062	D1	D1	H	A3	Ph	single bond	H
		2063	D2	D2	H	A3	Ph	single bond	H
		2064	D3	D3	H	A3	Ph	single bond	H
		2065	D1	D1	H	A4	Ph	single bond	H
		2066	D2	D2	H	A4	Ph	single bond	H
		2067	D3	D3	H	A4	Ph	single bond	H
		2068	D1	D1	H	A5	Ph	single bond	H
45		2069	D2	D2	H	A5	Ph	single bond	H
		2070	D3	D3	H	A5	Ph	single bond	H

TABLE 9

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2071	H	H	A1	A1	Ph	C=O	H
2072	H	D1	A1	A1	Ph	C=O	H
2073	H	D2	A1	A1	Ph	C=O	H
2074	H	D3	A1	A1	Ph	C=O	H
2075	H	H	A2	A2	Ph	C=O	H
2076	H	D1	A2	A2	Ph	C=O	H
2077	H	D2	A2	A2	Ph	C=O	H
2078	H	D3	A2	A2	Ph	C=O	H
2079	H	H	A3	A3	Ph	C=O	H
2080	H	D1	A3	A3	Ph	C=O	H
2081	H	D2	A3	A3	Ph	C=O	H
2082	H	D3	A3	A3	Ph	C=O	H
2083	H	H	A4	A4	Ph	C=O	H
2084	H	D1	A4	A4	Ph	C=O	H
2085	H	D2	A4	A4	Ph	C=O	H
2086	H	D3	A4	A4	Ph	C=O	H
2087	H	H	A5	A5	Ph	C=O	H

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TABLE 9-continued

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2088	H	D1	A5	A5	Ph	C=O	H
2089	H	D2	A5	A5	Ph	C=O	H
2090	H	D3	A5	A5	Ph	C=O	H
2091	D1	D1	A1	A1	Ph	C=O	H
2092	D2	D2	A1	A1	Ph	C=O	H
2093	D3	D3	A1	A1	Ph	C=O	H
2094	D1	D1	A2	A2	Ph	C=O	H
2095	D2	D2	A2	A2	Ph	C=O	H
2096	D3	D3	A2	A2	Ph	C=O	H
2097	D1	D1	A3	A3	Ph	C=O	H
2098	D2	D2	A3	A3	Ph	C=O	H
2099	D3	D3	A3	A3	Ph	C=O	H
2100	D1	D1	A4	A4	Ph	C=O	H
2101	D2	D2	A4	A4	Ph	C=O	H
2102	D3	D3	A4	A4	Ph	C=O	H
2103	D1	D1	A5	A5	Ph	C=O	H
2104	D2	D2	A5	A5	Ph	C=O	H
2105	D3	D3	A5	A5	Ph	C=O	H

TABLE 10

Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
2106	H	H	H	A1	Ph	C=O	H
2107	H	D1	H	A1	Ph	C=O	H
2108	H	D2	H	A1	Ph	C=O	H
2109	H	D3	H	A1	Ph	C=O	H
2110	H	H	H	A2	Ph	C=O	H
2111	H	D1	H	A2	Ph	C=O	H
2112	H	D2	H	A2	Ph	C=O	H
2113	H	D3	H	A2	Ph	C=O	H
2114	H	H	H	A3	Ph	C=O	H
2115	H	D1	H	A3	Ph	C=O	H
2116	H	D2	H	A3	Ph	C=O	H
2117	H	D3	H	A3	Ph	C=O	H
2118	H	H	H	A4	Ph	C=O	H
2119	H	D1	H	A4	Ph	C=O	H
2120	H	D2	H	A4	Ph	C=O	H
2121	H	D3	H	A4	Ph	C=O	H
2122	H	H	H	A5	Ph	C=O	H
2123	H	D1	H	A5	Ph	C=O	H
2124	H	D2	H	A5	Ph	C=O	H
2125	H	D3	H	A5	Ph	C=O	H
2126	D1	D1	H	A1	Ph	C=O	H
2127	D2	D2	H	A1	Ph	C=O	H
2128	D3	D3	H	A1	Ph	C=O	H
2129	D1	D1	H	A2	Ph	C=O	H
2130	D2	D2	H	A2	Ph	C=O	H
2131	D3	D3	H	A2	Ph	C=O	H
2132	D1	D1	H	A3	Ph	C=O	H
2133	D2	D2	H	A3	Ph	C=O	H
2134	D3	D3	H	A3	Ph	C=O	H
2135	D1	D1	H	A4	Ph	C=O	H
2136	D2	D2	H	A4	Ph	C=O	H
2137	D3	D3	H	A4	Ph	C=O	H
2138	D1	D1	H	A5	Ph	C=O	H
2139	D2	D2	H	A5	Ph	C=O	H
2140	D3	D3	H	A5	Ph	C=O	H
2141	H	H	H	H	Ph	C=O	H

TABLE 11

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2142	H	H	A1	A1	Ph	C=S	H
2143	H	D1	A1	A1	Ph	C=S	H
2144	H	D2	A1	A1	Ph	C=S	H
2145	H	D3	A1	A1	Ph	C=S	H
2146	H	H	A2	A2	Ph	C=S	H
2147	H	D1	A2	A2	Ph	C=S	H
2148	H	D2	A2	A2	Ph	C=S	H
2149	H	D3	A2	A2	Ph	C=S	H
2150	H	H	A3	A3	Ph	C=S	H

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TABLE 11-continued

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2151	H	D1	A3	A3	Ph	C=S	H
2152	H	D2	A3	A3	Ph	C=S	H
2153	H	D3	A3	A3	Ph	C=S	H
2154	H	H	A4	A4	Ph	C=S	H
2155	H	D1	A4	A4	Ph	C=S	H
2156	H	D2	A4	A4	Ph	C=S	H
2157	H	D3	A4	A4	Ph	C=S	H
2158	H	H	A5	A5	Ph	C=S	H
2159	H	D1	A5	A5	Ph	C=S	H
2160	H	D2	A5	A5	Ph	C=S	H
2161	H	D3	A5	A5	Ph	C=S	H
2162	D1	D1	A1	A1	Ph	C=S	H
2163	D2	D2	A1	A1	Ph	C=S	H
2164	D3	D3	A1	A1	Ph	C=S	H
2165	D1	D1	A2	A2	Ph	C=S	H
2166	D2	D2	A2	A2	Ph	C=S	H
2167	D3	D3	A2	A2	Ph	C=S	H
2168	D1	D1	A3	A3	Ph	C=S	H
2169	D2	D2	A3	A3	Ph	C=S	H
2170	D3	D3	A3	A3	Ph	C=S	H
2171	D1	D1	A4	A4	Ph	C=S	H
2172	D2	D2	A4	A4	Ph	C=S	H
2173	D3	D3	A4	A4	Ph	C=S	H
2174	D1	D1	A5	A5	Ph	C=S	H
2175	D2	D2	A5	A5	Ph	C=S	H
2176	D3	D3	A5	A5	Ph	C=S	H

TABLE 12

Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
2177	H	H	H	A1	Ph	C=S	H
2178	H	D1	H	A1	Ph	C=S	H
2179	H	D2	H	A1	Ph	C=S	H
2180	H	D3	H	A1	Ph	C=S	H
2181	H	H	H	A2	Ph	C=S	H
2182	H	D1	H	A2	Ph	C=S	H
2183	H	D2	H	A2	Ph	C=S	H
2184	H	D3	H	A2	Ph	C=S	H
2185	H	H	H	A3	Ph	C=S	H
2186	H	D1	H	A3	Ph	C=S	H
2187	H	D2	H	A3	Ph	C=S	H
2188	H	D3	H	A3	Ph	C=S	H
2189	H	H	H	A4	Ph	C=S	H
2190	H	D1	H	A4	Ph	C=S	H
2191	H	D2	H	A4	Ph	C=S	H
2192	H	D3	H	A4	Ph	C=S	H
2193	H	H	H	A5	Ph	C=S	H
2194	H	D1	H	A5	Ph	C=S	H
2195	H	D2	H	A5	Ph	C=S	H
2196	H	D3	H	A5	Ph	C=S	H
2197	D1	D1	H	A1	Ph	C=S	H
2198	D2	D2	H	A1	Ph	C=S	H
2199	D3	D3	H	A1	Ph	C=S	H
2200	D1	D1	H	A2	Ph	C=S	H
2201	D2	D2	H	A2	Ph	C=S	H
2202	D3	D3	H	A2	Ph	C=S	H
2203	D1	D1	H	A3	Ph	C=S	H
2204	D2	D2	H	A3	Ph	C=S	H
2205	D3	D3	H	A3	Ph	C=S	H
2206	D1	D1	H	A4	Ph	C=S	H
2207	D2	D2	H	A4	Ph	C=S	H
2208	D3	D3	H	A4	Ph	C=S	H
2209	D1	D1	H	A5	Ph	C=S	H
2210	D2	D2	H	A5	Ph	C=S	H
2211	D3	D3	H	A5	Ph	C=S	H
2212	H	H	H	H	Ph	C=S	H

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TABLE 13

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2213	H	H	A1	A1	Ph	C=C(CN) ₂	H
2214	H	D1	A1	A1	Ph	C=C(CN) ₂	H
2215	H	D2	A1	A1	Ph	C=C(CN) ₂	H
2216	H	D3	A1	A1	Ph	C=C(CN) ₂	H
2217	H	H	A2	A2	Ph	C=C(CN) ₂	H
2218	H	D1	A2	A2	Ph	C=C(CN) ₂	H
2219	H	D2	A2	A2	Ph	C=C(CN) ₂	H
2220	H	D3	A2	A2	Ph	C=C(CN) ₂	H
2221	H	H	A3	A3	Ph	C=C(CN) ₂	H
2222	H	D1	A3	A3	Ph	C=C(CN) ₂	H
2223	H	D2	A3	A3	Ph	C=C(CN) ₂	H
2224	H	D3	A3	A3	Ph	C=C(CN) ₂	H
2225	H	H	A4	A4	Ph	C=C(CN) ₂	H
2226	H	D1	A4	A4	Ph	C=C(CN) ₂	H
2227	H	D2	A4	A4	Ph	C=C(CN) ₂	H
2228	H	D3	A4	A4	Ph	C=C(CN) ₂	H
2229	H	H	A5	A5	Ph	C=C(CN) ₂	H
2230	H	D1	A5	A5	Ph	C=C(CN) ₂	H
2231	H	D2	A5	A5	Ph	C=C(CN) ₂	H
2232	H	D3	A5	A5	Ph	C=C(CN) ₂	H
2233	D1	D1	A1	A1	Ph	C=C(CN) ₂	H
2234	D2	D2	A1	A1	Ph	C=C(CN) ₂	H
2235	D3	D3	A1	A1	Ph	C=C(CN) ₂	H
2236	D1	D1	A2	A2	Ph	C=C(CN) ₂	H
2237	D2	D2	A2	A2	Ph	C=C(CN) ₂	H
2238	D3	D3	A2	A2	Ph	C=C(CN) ₂	H
2239	D1	D1	A3	A3	Ph	C=C(CN) ₂	H
2240	D2	D2	A3	A3	Ph	C=C(CN) ₂	H
2241	D3	D3	A3	A3	Ph	C=C(CN) ₂	H
2242	D1	D1	A4	A4	Ph	C=C(CN) ₂	H
2243	D2	D2	A4	A4	Ph	C=C(CN) ₂	H
2244	D3	D3	A4	A4	Ph	C=C(CN) ₂	H
2245	D1	D1	A5	A5	Ph	C=C(CN) ₂	H
2246	D2	D2	A5	A5	Ph	C=C(CN) ₂	H
2247	D3	D3	A5	A5	Ph	C=C(CN) ₂	H

TABLE 14

Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
2248	H	H	H	A1	Ph	C=C(CN) ₂	H
2249	H	D1	H	A1	Ph	C=C(CN) ₂	H
2250	H	D2	H	A1	Ph	C=C(CN) ₂	H
2251	H	D3	H	A1	Ph	C=C(CN) ₂	H
2252	H	H	H	A2	Ph	C=C(CN) ₂	H
2253	H	D1	H	A2	Ph	C=C(CN) ₂	H
2254	H	D2	H	A2	Ph	C=C(CN) ₂	H
2255	H	D3	H	A2	Ph	C=C(CN) ₂	H
2256	H	H	H	A3	Ph	C=C(CN) ₂	H
2257	H	D1	H	A3	Ph	C=C(CN) ₂	H
2258	H	D2	H	A3	Ph	C=C(CN) ₂	H
2259	H	D3	H	A3	Ph	C=C(CN) ₂	H
2260	H	H	H	A4	Ph	C=C(CN) ₂	H
2261	H	D1	H	A4	Ph	C=C(CN) ₂	H
2262	H	D2	H	A4	Ph	C=C(CN) ₂	H
2263	H	D3	H	A4	Ph	C=C(CN) ₂	H
2264	H	H	H	A5	Ph	C=C(CN) ₂	H
2265	H	D1	H	A5	Ph	C=C(CN) ₂	H
2266	H	D2	H	A5	Ph	C=C(CN) ₂	H
2267	H	D3	H	A5	Ph	C=C(CN) ₂	H
2268	D1	D1	H	A1	Ph	C=C(CN) ₂	H
2269	D2	D2	H	A1	Ph	C=C(CN) ₂	H
2270	D3	D3	H	A1	Ph	C=C(CN) ₂	H
2271	D1	D1	H	A2	Ph	C=C(CN) ₂	H
2272	D2	D2	H	A2	Ph	C=C(CN) ₂	H
2273	D3	D3	H	A2	Ph	C=C(CN) ₂	H
2274	D1	D1	H	A3	Ph	C=C(CN) ₂	H
2275	D2	D2	H	A3	Ph	C=C(CN) ₂	H
2276	D3	D3	H	A3	Ph	C=C(CN) ₂	H
2277	D1	D1	H	A4	Ph	C=C(CN) ₂	H
2278	D2	D2	H	A4	Ph	C=C(CN) ₂	H
2279	D3	D3	H	A4	Ph	C=C(CN) ₂	H
2280	D1	D1	H	A5	Ph	C=C(CN) ₂	H

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TABLE 14-continued

Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
2281	D2	D2	H	A5	Ph	C=C(CN) ₂	H
2282	D3	D3	H	A5	Ph	C=C(CN) ₂	H
2283	H	H	H	H	Ph	C=C(CN) ₂	H

TABLE 15

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	R ¹⁷	Z	Other Rs
2284	H	H	A1	A1	Ph	C=C(COOH) ₂	H
2285	H	D1	A1	A1	Ph	C=C(COOH) ₂	H
2286	H	D2	A1	A1	Ph	C=C(COOH) ₂	H
2287	H	D3	A1	A1	Ph	C=C(COOH) ₂	H
2288	H	H	A2	A2	Ph	C=C(COOH) ₂	H
2289	H	D1	A2	A2	Ph	C=C(COOH) ₂	H
2290	H	D2	A2	A2	Ph	C=C(COOH) ₂	H
2291	H	D3	A2	A2	Ph	C=C(COOH) ₂	H
2292	H	H	A3	A3	Ph	C=C(COOH) ₂	H
2293	H	D1	A3	A3	Ph	C=C(COOH) ₂	H
2294	H	D2	A3	A3	Ph	C=C(COOH) ₂	H
2295	H	D3	A3	A3	Ph	C=C(COOH) ₂	H
2296	H	H	A4	A4	Ph	C=C(COOH) ₂	H
2297	H	D1	A4	A4	Ph	C=C(COOH) ₂	H
2298	H	D2	A4	A4	Ph	C=C(COOH) ₂	H
2299	H	D3	A4	A4	Ph	C=C(COOH) ₂	H
2300	H	H	A5	A5	Ph	C=C(COOH) ₂	H
2301	H	D1	A5	A5	Ph	C=C(COOH) ₂	H
2302	H	D2	A5	A5	Ph	C=C(COOH) ₂	H
2303	H	D3	A5	A5	Ph	C=C(COOH) ₂	H
2304	D1	D1	A1	A1	Ph	C=C(COOH) ₂	H
2305	D2	D2	A1	A1	Ph	C=C(COOH) ₂	H
2306	D3	D3	A1	A1	Ph	C=C(COOH) ₂	H
2307	D1	D1	A2	A2	Ph	C=C(COOH) ₂	H
2308	D2	D2	A2	A2	Ph	C=C(COOH) ₂	H
2309	D3	D3	A2	A2	Ph	C=C(COOH) ₂	H
2310	D1	D1	A3	A3	Ph	C=C(COOH) ₂	H
2311	D2	D2	A3	A3	Ph	C=C(COOH) ₂	H
2312	D3	D3	A3	A3	Ph	C=C(COOH) ₂	H
2313	D1	D1	A4	A4	Ph	C=C(COOH) ₂	H
2314	D2	D2	A4	A4	Ph	C=C(COOH) ₂	H
2315	D3	D3	A4	A4	Ph	C=C(COOH) ₂	H
2316	D1	D1	A5	A5	Ph	C=C(COOH) ₂	H
2317	D2	D2	A5	A5	Ph	C=C(COOH) ₂	H
2318	D3	D3	A5	A5	Ph	C=C(COOH) ₂	H

TABLE 16

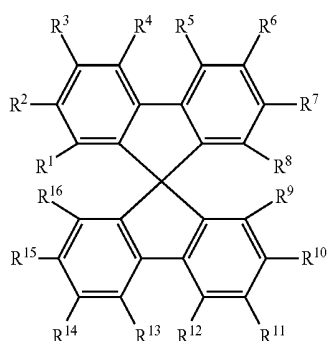
Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
2319	H	H	H	A1	Ph	C=C(COOH) ₂	H
2320	H	D1	H	A1	Ph	C=C(COOH) ₂	H
2321	H	D2	H	A1	Ph	C=C(COOH) ₂	H
2322	H	D3	H	A1	Ph	C=C(COOH) ₂	H
2323	H	H	H	A2	Ph	C=C(COOH) ₂	H
2324	H	D1	H	A2	Ph	C=C(COOH) ₂	H
2325	H	D2	H	A2	Ph	C=C(COOH) ₂	H
2326	H	D3	H	A2	Ph	C=C(COOH) ₂	H
2327	H	H	H	A3	Ph	C=C(COOH) ₂	H
2328	H	D1	H	A3	Ph	C=C(COOH) ₂	H
2329	H	D2	H	A3	Ph	C=C(COOH) ₂	H
2330	H	D3	H	A3	Ph	C=C(COOH) ₂	H
2331	H	H	H	A4	Ph	C=C(COOH) ₂	H
2332	H	D1	H	A4	Ph	C=C(COOH) ₂	H
2333	H	D2	H	A4	Ph	C=C(COOH) ₂	H
2334	H	D3	H	A4	Ph	C=C(COOH) ₂	H
2335	H	H	H	A5	Ph	C=C(COOH) ₂	H
2336	H	D1	H	A5	Ph	C=C(COOH) ₂	H
2337	H	D2	H	A5	Ph	C=C(COOH) ₂	H
2338	H	D3	H	A5	Ph	C=C(COOH) ₂	H
2339	D1	D1	H	A1	Ph	C=C(COOH) ₂	H
2340	D2	D2	H	A1	Ph	C=C(COOH) ₂	H
2341	D3	D3	H	A1	Ph	C=C(COOH) ₂	H

TABLE 16-continued

Compound							
No.	R ³	R ⁶	R ¹¹	R ¹⁴	R ¹⁷	Z	Other Rs
2342	D1	D1	H	A2	Ph	C=C(COOH) ₂	H
2343	D2	D2	H	A2	Ph	C=C(COOH) ₂	H
2344	D3	D3	H	A2	Ph	C=C(COOH) ₂	H
2345	D1	D1	H	A3	Ph	C=C(COOH) ₂	H
2346	D2	D2	H	A3	Ph	C=C(COOH) ₂	H
2347	D3	D3	H	A3	Ph	C=C(COOH) ₂	H
2348	D1	D1	H	A4	Ph	C=C(COOH) ₂	H
2349	D2	D2	H	A4	Ph	C=C(COOH) ₂	H
2350	D3	D3	H	A4	Ph	C=C(COOH) ₂	H
2351	D1	D1	H	A5	Ph	C=C(COOH) ₂	H
2352	D2	D2	H	A5	Ph	C=C(COOH) ₂	H
2353	D3	D3	H	A5	Ph	C=C(COOH) ₂	H
2354	H	H	H	H	Ph	C=C(COOH) ₂	H

Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of WO 2013/011955 including the paragraphs 0007 to 0033 and 0059 to 0066 is incorporated herein by reference as a part of the description of the present application.

[Chem. 22]

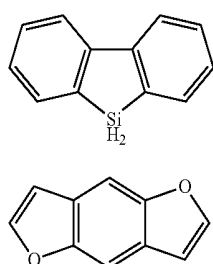


General Formula (151)

[In the general formula (151), R¹, R², R³, R⁴, R⁵, R⁶, R⁷ and R⁸ each independently represent a hydrogen atom or an electron donating group, provided that at least one thereof represents an electron donating group. R⁹, R¹⁰, R¹¹, R¹², R¹³, R¹⁴, R¹⁵ and R¹⁶ each independently represent a hydrogen atom or an electron withdrawing group, provided that at least one thereof represents an electron withdrawing group.]

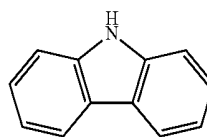
Specific examples of the compounds include the compounds shown in the following Table 17 to Table 20. In the Tables, D11 to D20 represent the unsubstituted electron donating groups having the following structures, respectively.

[Chem. 23]

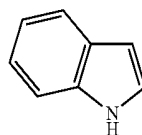


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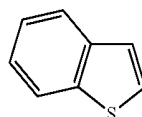
D13



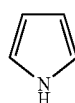
D14



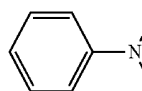
D15



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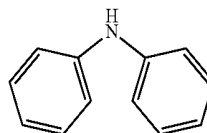
D16



D17

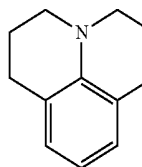
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D18



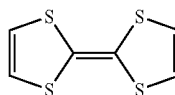
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D19



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D20

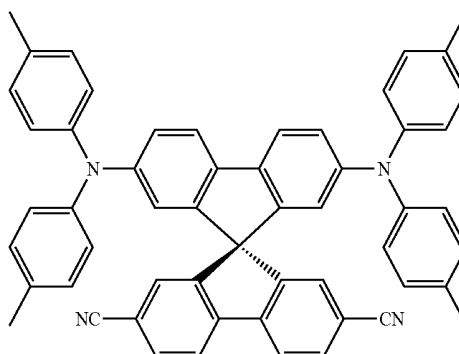


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[Chem. 24]

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Compound 3001



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D11

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D12

TABLE 17

Compound		R ²	R ⁷	R ¹⁰	R ¹⁵	Other Rs
	No.					
65	3002	D11	D11	CN	CN	H
	3003	D12	D12	CN	CN	H

TABLE 17-continued

Compound No.	R ²	R ⁷	R ¹⁰	R ¹⁵	Other Rs
3004	D13	D13	CN	CN	H
3005	D14	D14	CN	CN	H
3006	D15	D15	CN	CN	H
3007	D16	D16	CN	CN	H
3008	D17	D17	CN	CN	H
3009	D18	D18	CN	CN	H
3010	D19	D19	CN	CN	H
3011	D20	D20	CN	CN	H
3012	H	D11	H	CN	H
3013	H	D12	H	CN	H
3014	H	D13	H	CN	H
3015	H	D14	H	CN	H
3016	H	D15	H	CN	H
3017	H	D16	H	CN	H
3018	H	D17	H	CN	H
3019	H	D18	H	CN	H
3020	H	D19	H	CN	H
3021	H	D20	H	CN	H

TABLE 18

Compound No.	R ³	R ⁶	R ¹¹	R ¹⁴	Other Rs
3022	D11	D11	CN	CN	H
3023	D12	D12	CN	CN	H
3024	D13	D13	CN	CN	H
3025	D14	D14	CN	CN	H
3026	D15	D15	CN	CN	H
3027	D16	D16	CN	CN	H
3028	D17	D17	CN	CN	H
3029	D18	D18	CN	CN	H
3030	D19	D19	CN	CN	H
3031	D20	D20	CN	CN	H
3032	H	D11	H	CN	H
3033	H	D12	H	CN	H
3034	H	D13	H	CN	H
3035	H	D14	H	CN	H
3036	H	D15	H	CN	H
3037	H	D16	H	CN	H
3038	H	D17	H	CN	H
3039	H	D18	H	CN	H
3040	H	D19	H	CN	H
3041	H	D20	H	CN	H

TABLE 19

Compound No.	R ² , R ⁷	R ³ , R ⁶	R ¹⁰ , R ¹⁵	R ¹¹ , R ¹⁴	Other Rs
3042	diphenylamino group	H	CN	H	H
3043	bis(2-methylphenyl)amino group	H	CN	H	H
3044	bis(3-methylphenyl)amino group	H	CN	H	H
3045	bis(2,4-dimethylphenyl)amino group	H	CN	H	H
3046	bis(2,6-dimethylphenyl)amino group	H	CN	H	H
3047	bis(3,5-dimethylphenyl)amino group	H	CN	H	H
3048	bis(2,4,6-trimethylphenyl)amino group	H	CN	H	H
3049	bis(4-ethylphenyl)amino group	H	CN	H	H
3050	bis(4-propylphenyl)amino group	H	CN	H	H
3051	diphenylamino group	H	H	CN	H
3052	bis(2-methylphenyl)amino group	H	H	CN	H
3053	bis(3-methylphenyl)amino group	H	H	CN	H
3054	bis(4-methylphenyl)amino group	H	H	CN	H
3055	bis(2,4-dimethylphenyl)amino group	H	H	CN	H
3056	bis(2,6-dimethylphenyl)amino group	H	H	CN	H
3057	bis(3,5-dimethylphenyl)amino group	H	H	CN	H
3058	bis(2,4,6-trimethylphenyl)amino group	H	H	CN	H
3059	bis(4-ethylphenyl)amino group	H	H	CN	H
3060	bis(4-propylphenyl)amino group	H	H	CN	H

TABLE 20

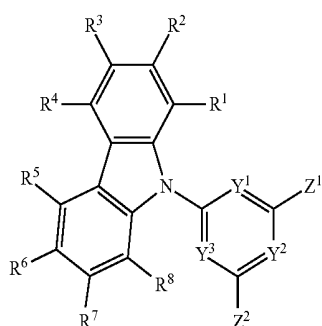
Compound No.	R ² , R ⁷	R ³ , R ⁶	R ¹⁰ , R ¹⁵	R ¹¹ , R ¹⁴	Other Rs
3061	H	diphenylamino group	CN	H	H
3062	H	bis(2-methylphenyl)amino group	CN	H	H
3063	H	bis(3-methylphenyl)amino group	CN	H	H
3064	H	bis(4-methylphenyl)amino group	CN	H	H
3065	H	bis(2,4-dimethylphenyl)amino group	CN	H	H
3066	H	bis(2,6-dimethylphenyl)amino group	CN	H	H
3067	H	bis(3,5-dimethylphenyl)amino group	CN	H	H
3068	H	bis(2,4,6-trimethylphenyl)amino group	CN	H	H
3069	H	bis(4-ethylphenyl)amino group	CN	H	H
3070	H	bis(4-propylphenyl)amino group	CN	H	H
3071	H	diphenylamino group	H	CN	H
3072	H	bis(2-methylphenyl)amino group	H	CN	H
3073	H	bis(3-methylphenyl)amino group	H	CN	H
3074	H	bis(4-methylphenyl)amino group	H	CN	H
3075	H	bis(2,4-dimethylphenyl)amino group	H	CN	H
3076	H	bis(2,6-dimethylphenyl)amino group	H	CN	H
3077	H	bis(3,5-dimethylphenyl)amino group	H	CN	H

TABLE 20-continued

Compound No.	R ² , R ⁷	R ³ , R ⁶	R ¹⁰ , R ¹⁵	R ¹¹ , R ¹⁴	Other Rs
3078	H	bis(2,4,6-trimethylphenyl)amino group	H	CN	H
3079	H	bis(4-ethylphenyl)amino group	H	CN	H
3080	H	bis(4-propylphenyl)amino group	H	CN	H

Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of WO 2013/081088 including the paragraphs 0008 to 0071 and 0118 to 0133 is incorporated herein by reference as a part of the description of the present application.

[Chem. 25]

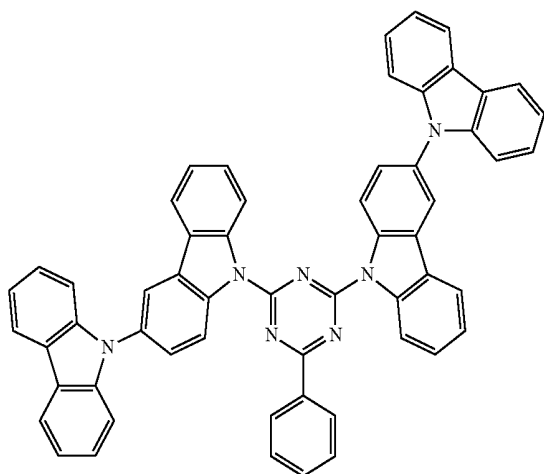


General Formula (161)

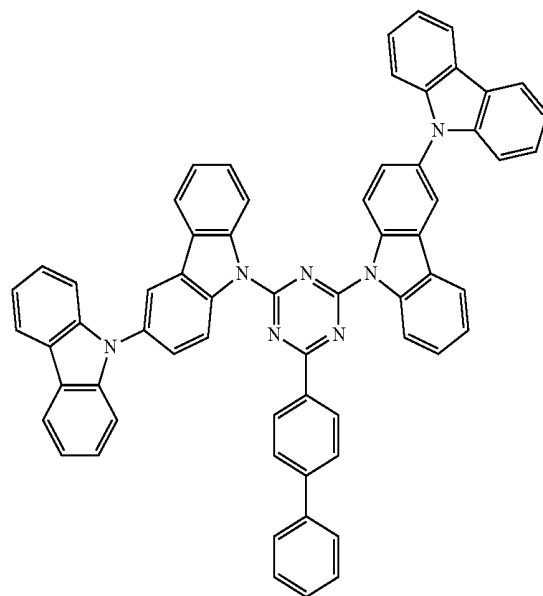
[In the general formula (161), any two of Y¹, Y² and Y³ each represent a nitrogen atom, and the balance thereof represents a methine group, of all Y¹, Y² and Y³ each represent a nitrogen atom. Z¹ and Z² each independently represent a hydrogen atom or a substituent. R¹ to R⁸ each independently represent a hydrogen atom or a substituent, provided that at least one of R¹ to R⁸ represents a substituted or unsubstituted diarylamino group or a substituted or unsubstituted carbazolyl group. The compound represented by the general formula (161) has at least two carbazole structures in the molecule thereof.

Examples of the compound include the following compounds.

[Chem. 26]



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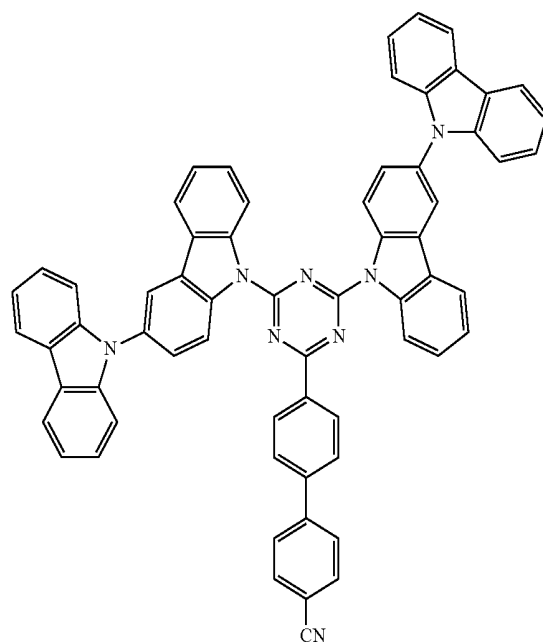
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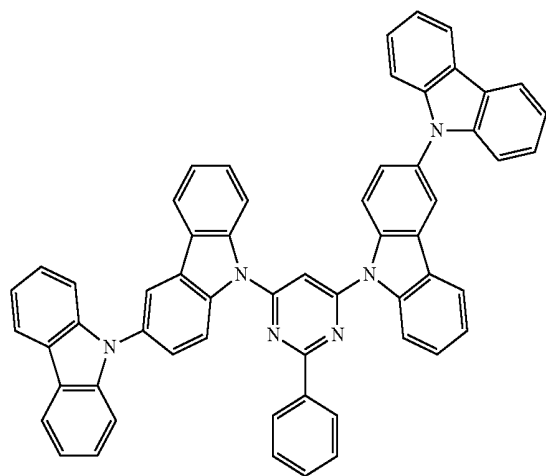
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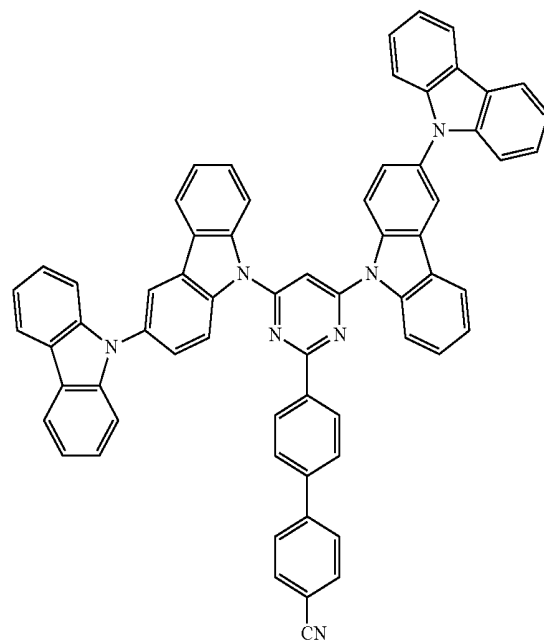
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[Chem. 27]

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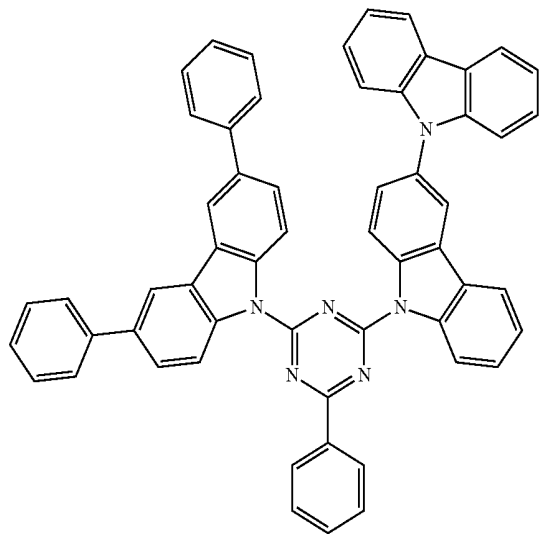
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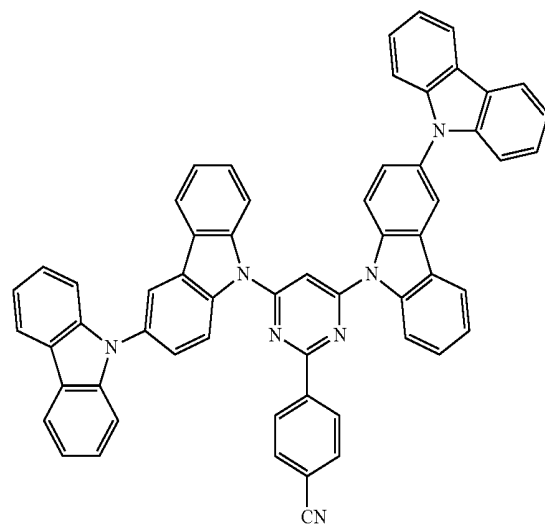
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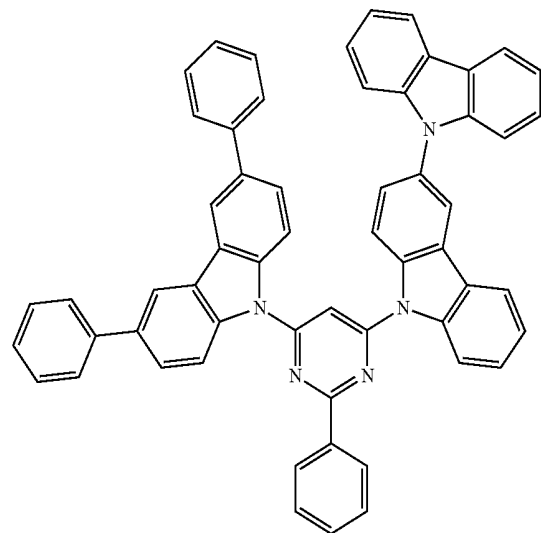
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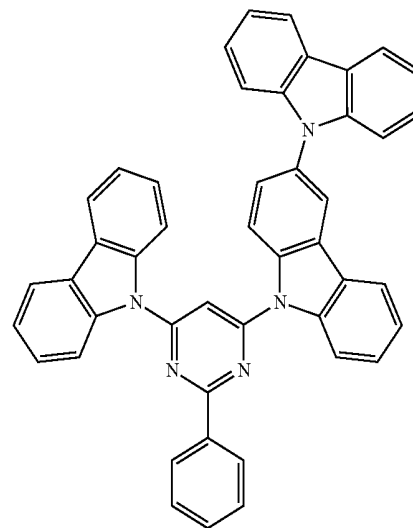
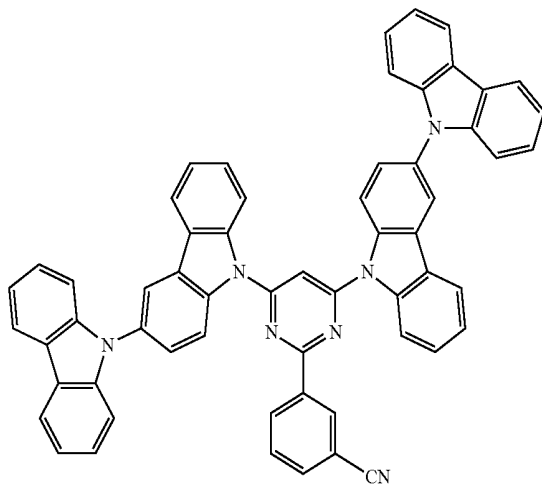
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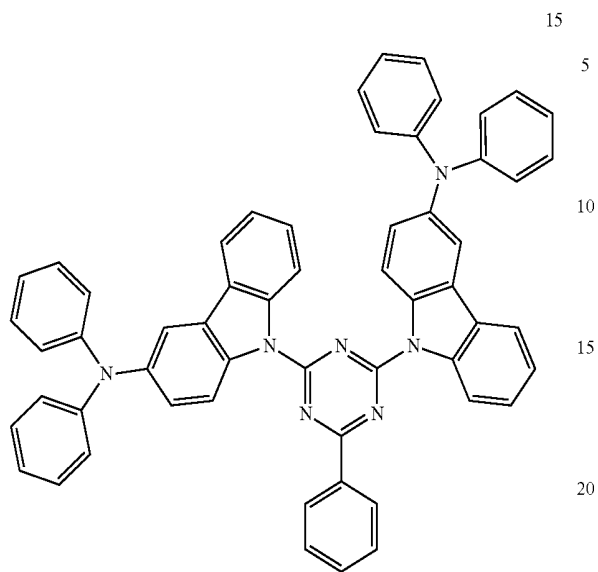
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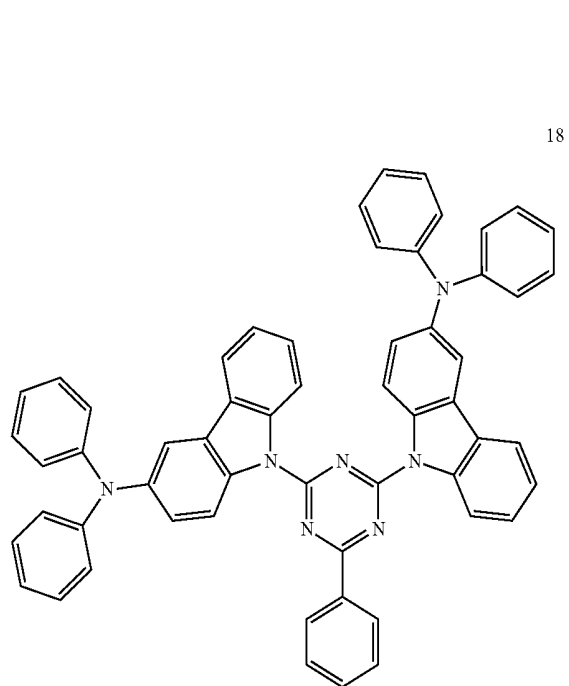
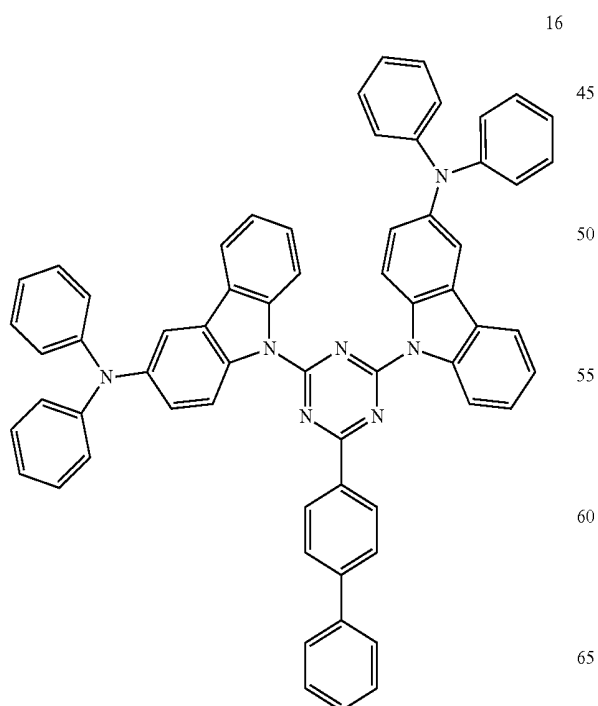
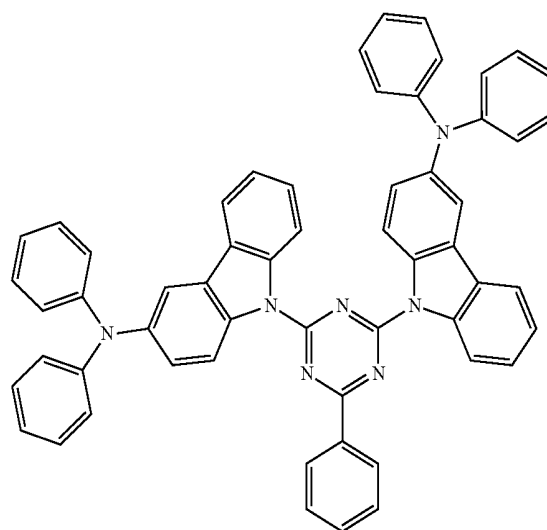
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[Chem. 28]

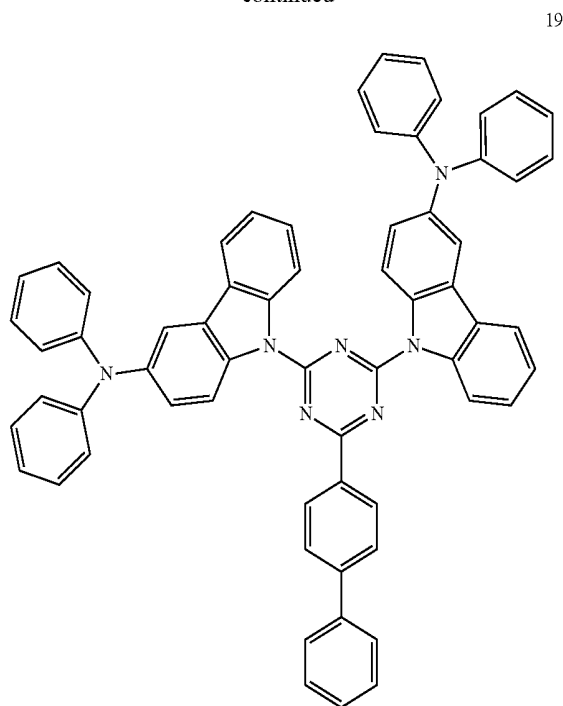
**118**

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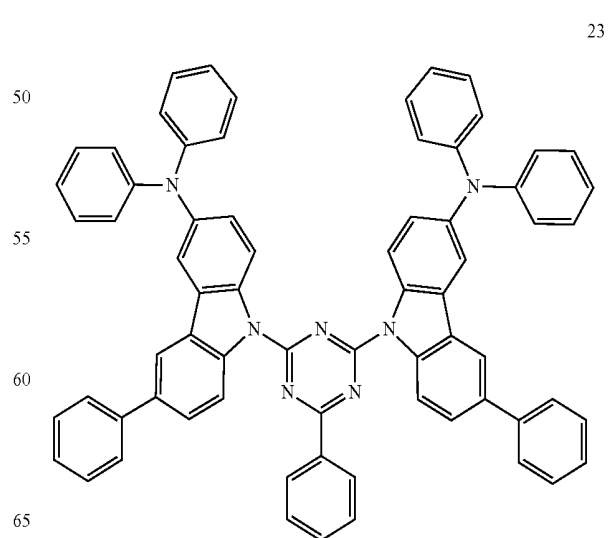
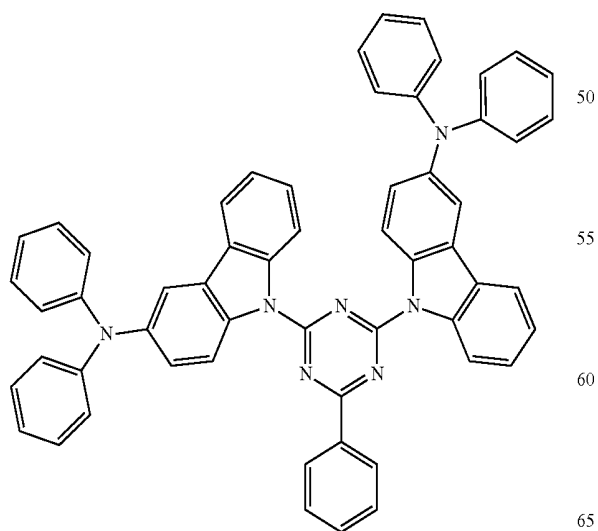
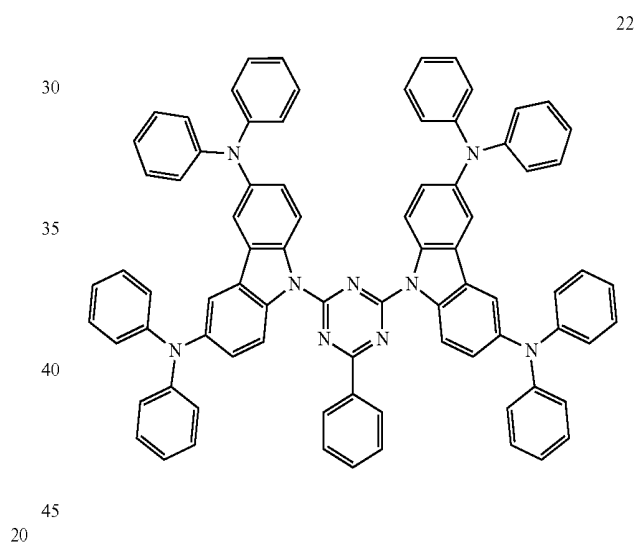
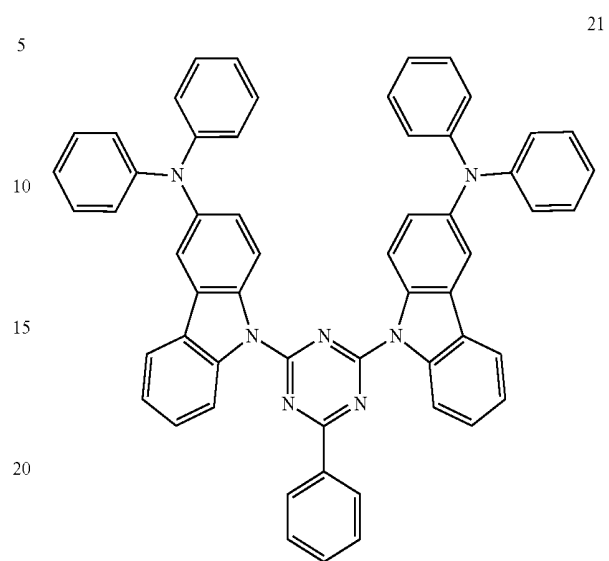


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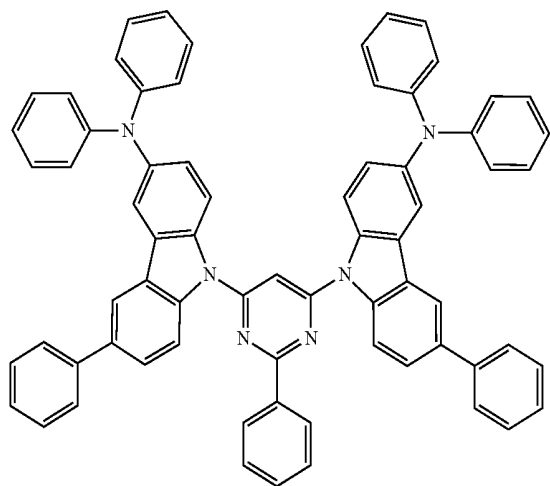
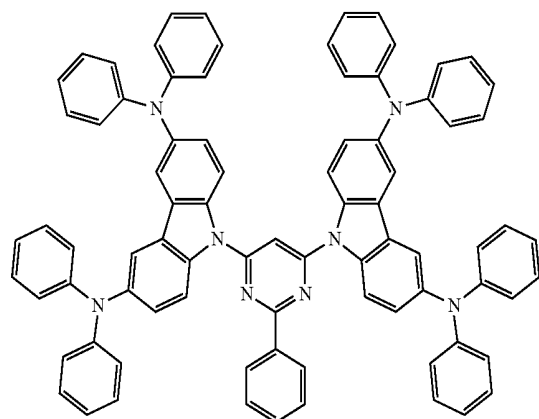
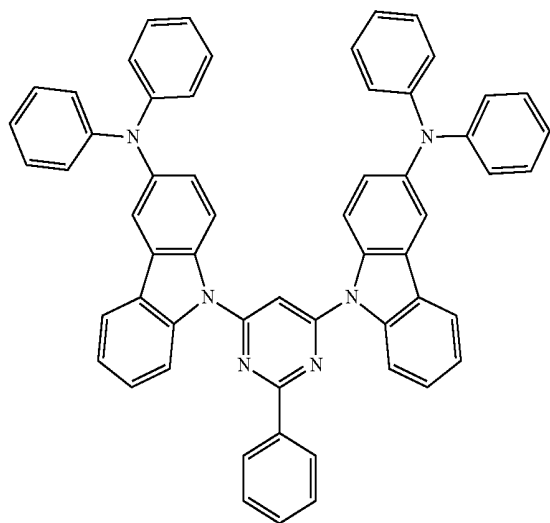
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[Chem. 29]



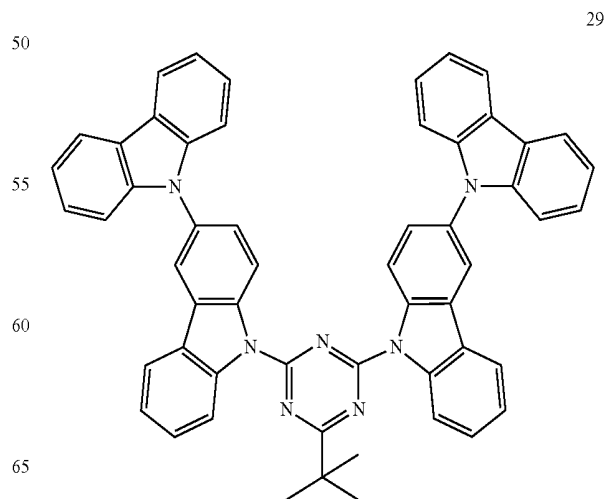
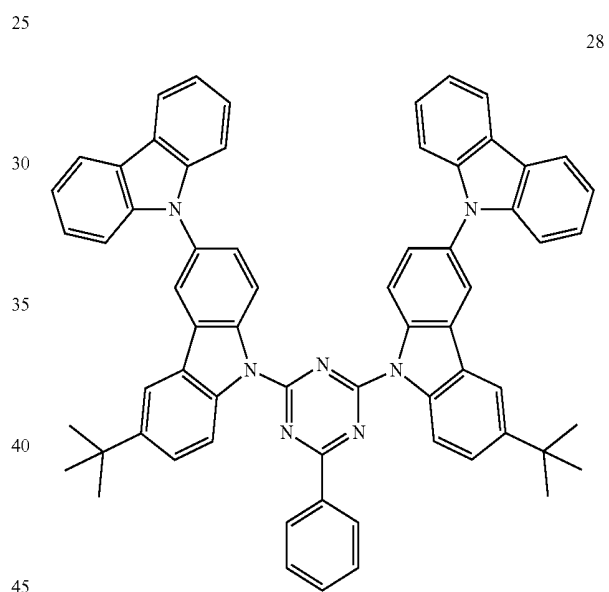
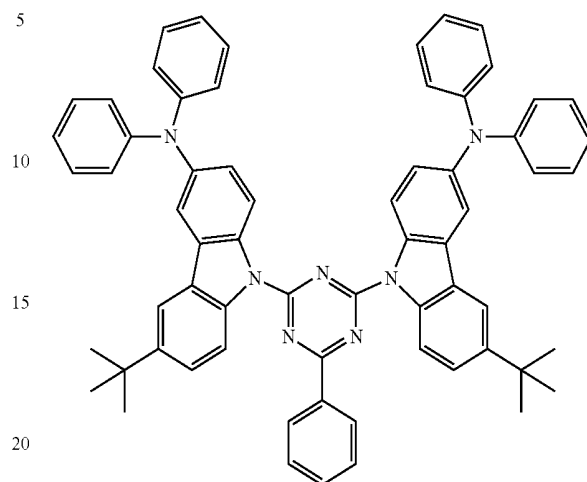
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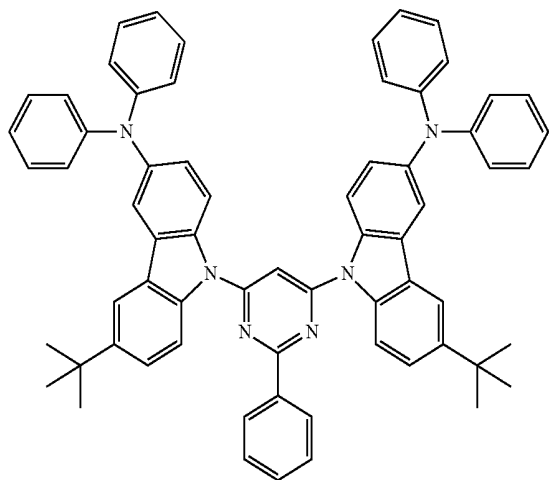
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**122**

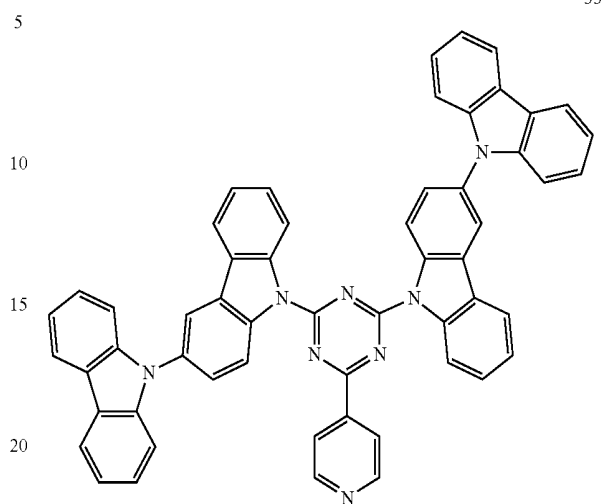
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[Chem. 30]

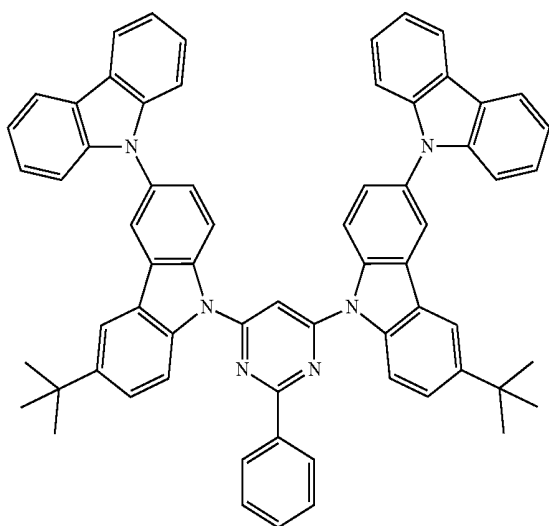


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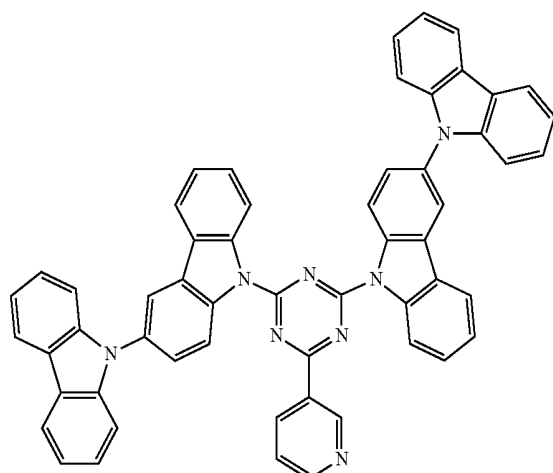
30 [Chem. 31]

124
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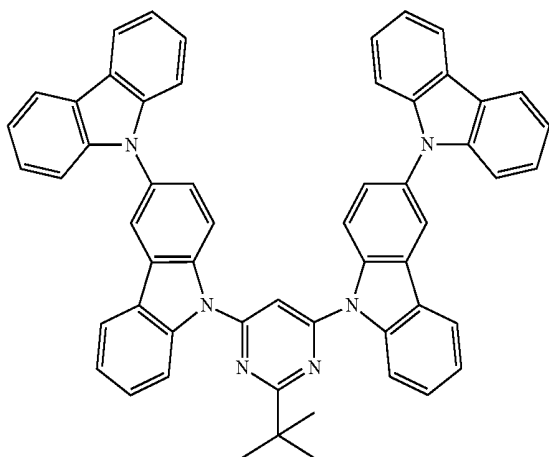
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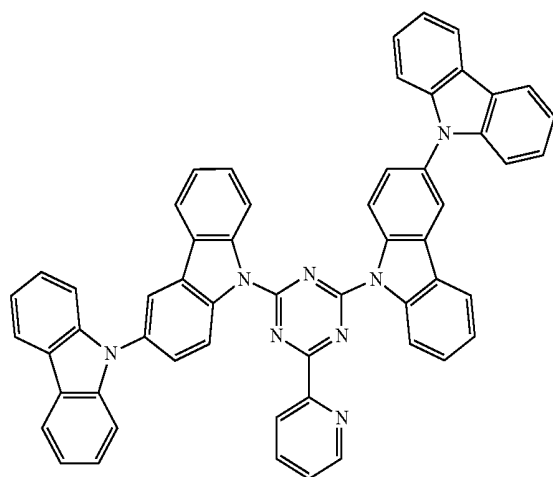
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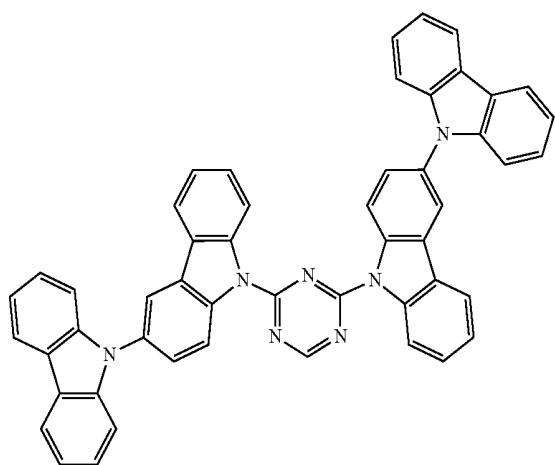


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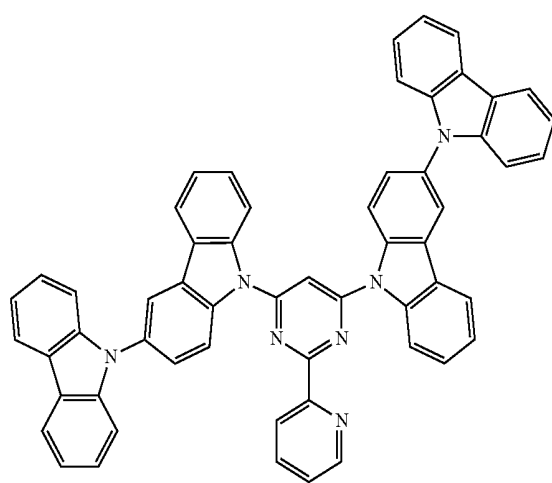
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[Chem. 32]

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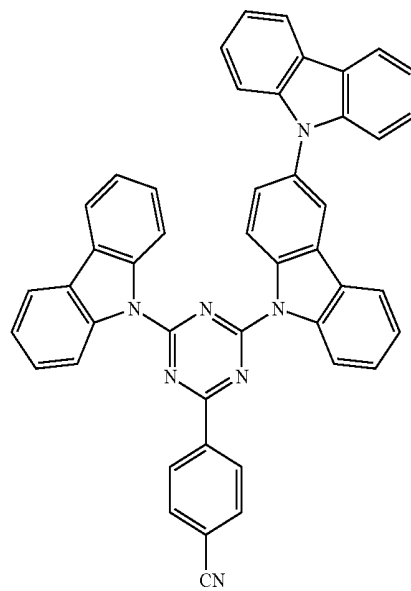
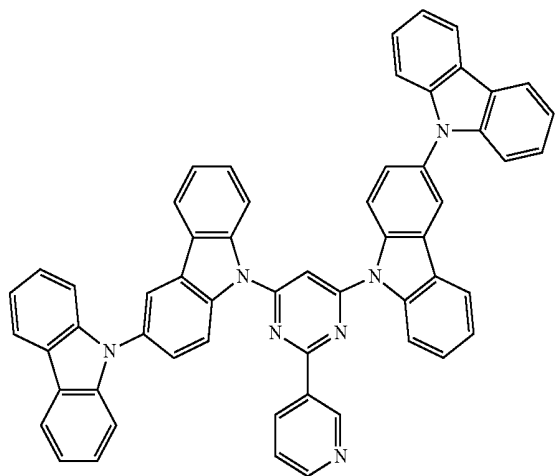
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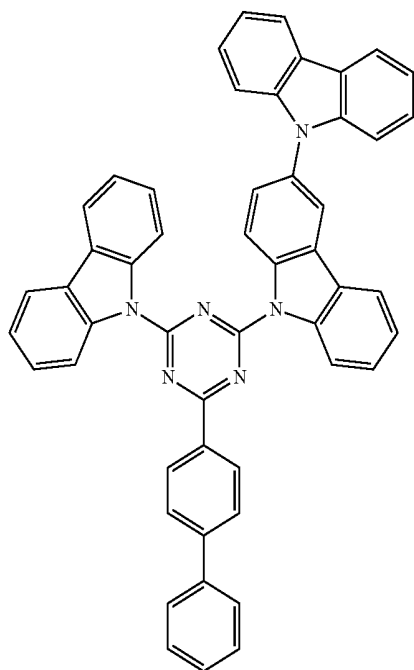
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**128**

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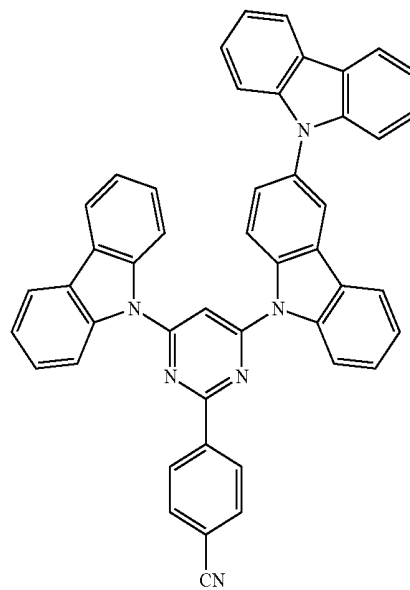
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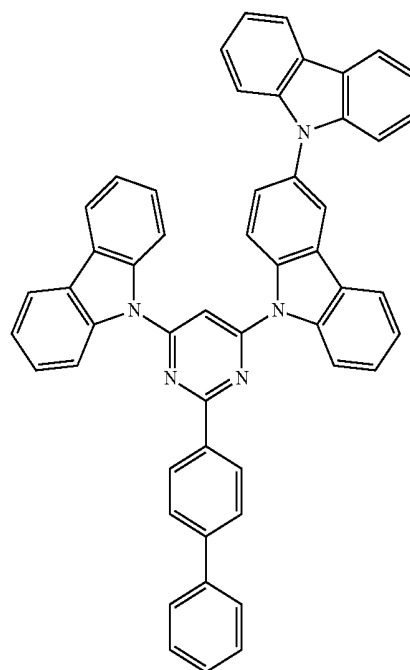
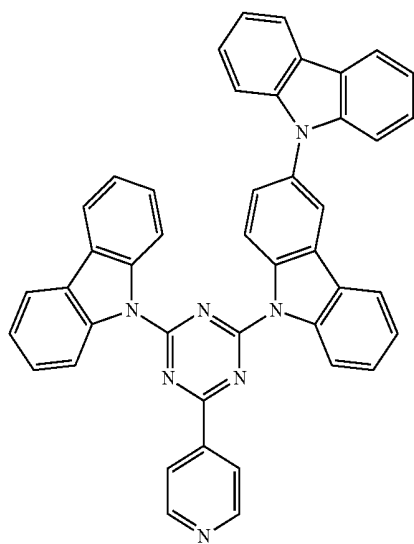
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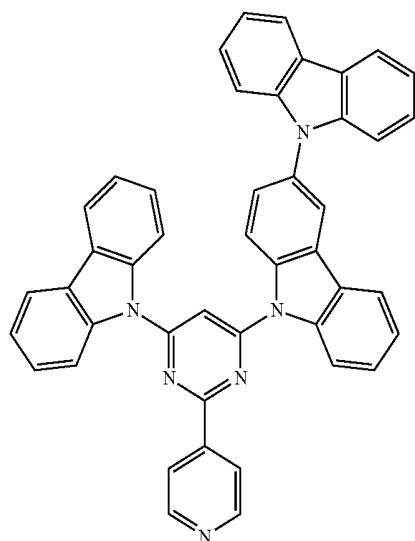


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[Chem. 33]

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[Chem. 34]

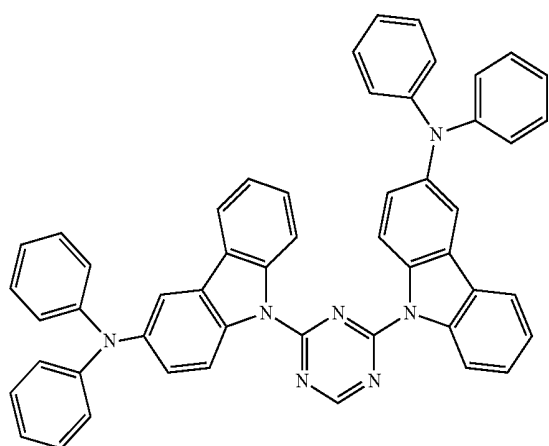
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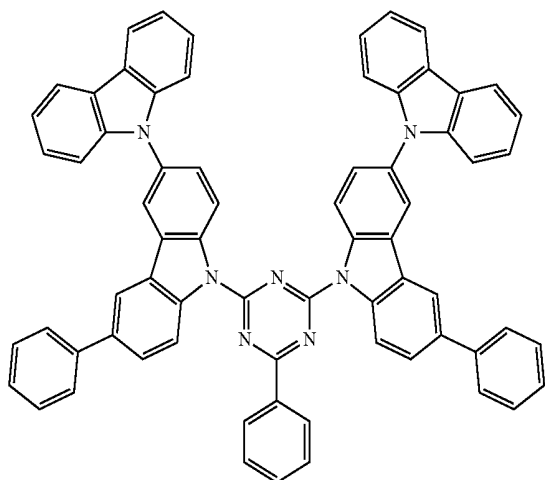
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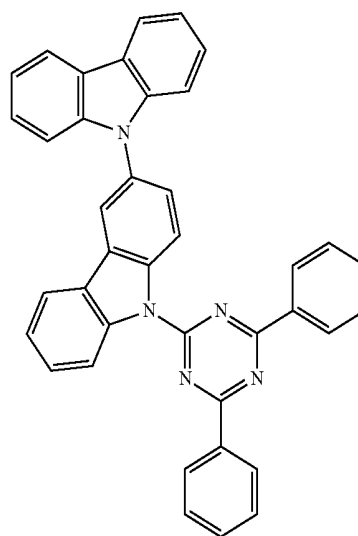
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[Chem. 35]

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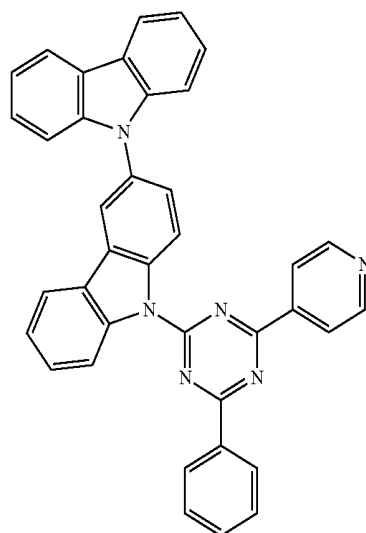
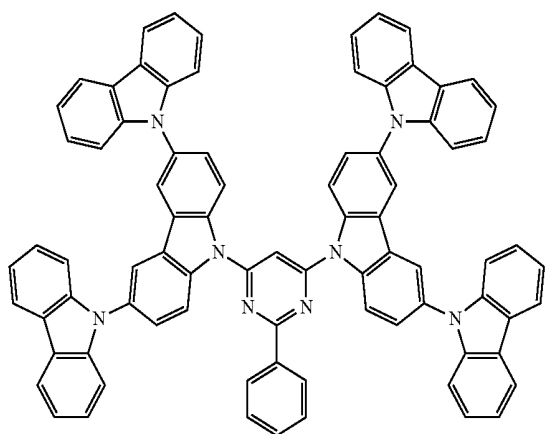
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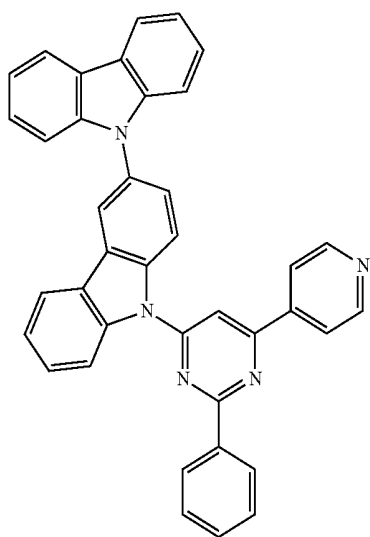
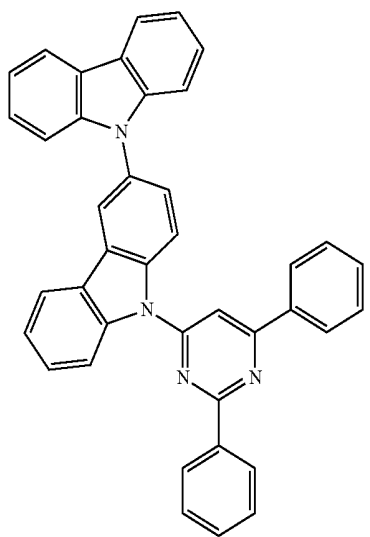
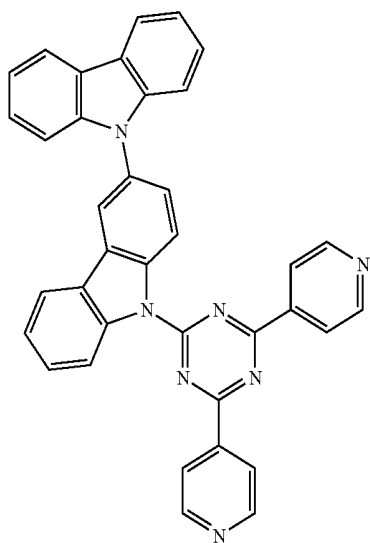


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**134**

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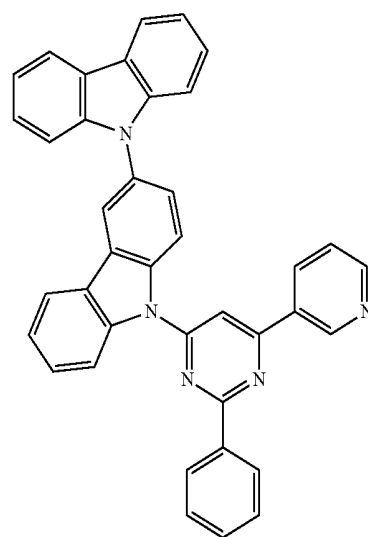
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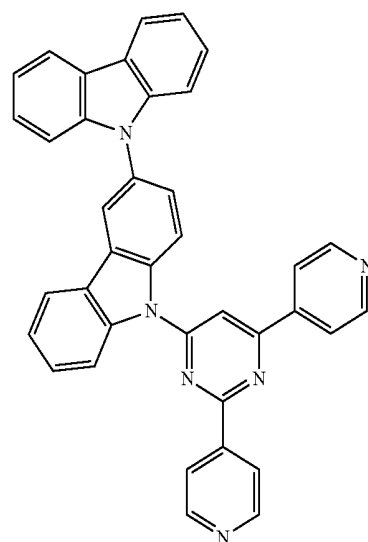
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[Chem. 36]

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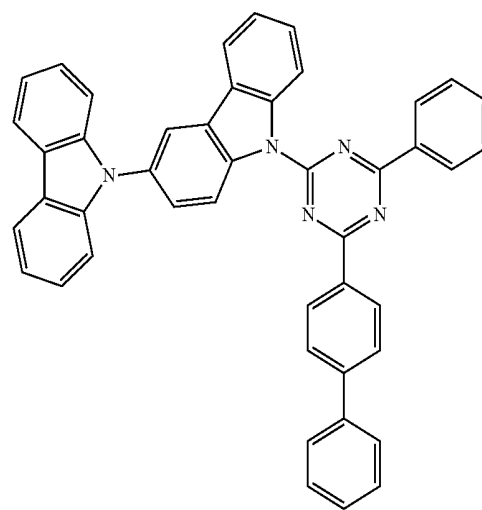
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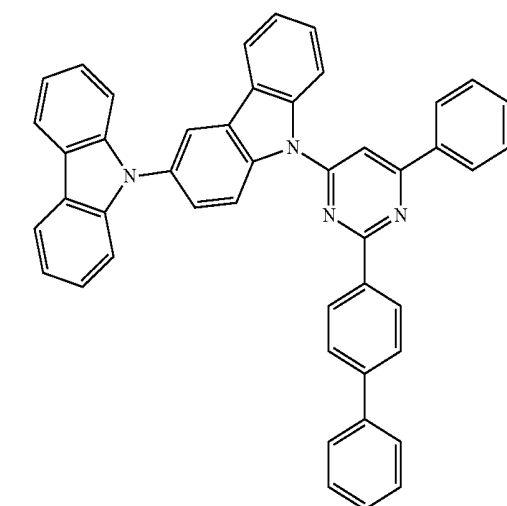
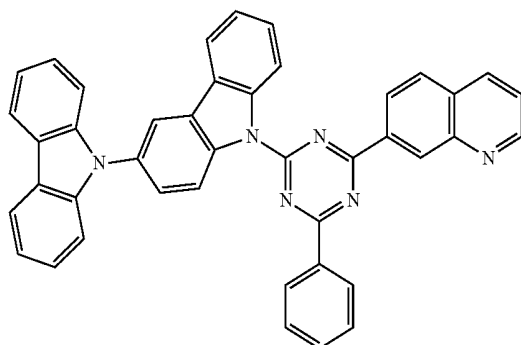
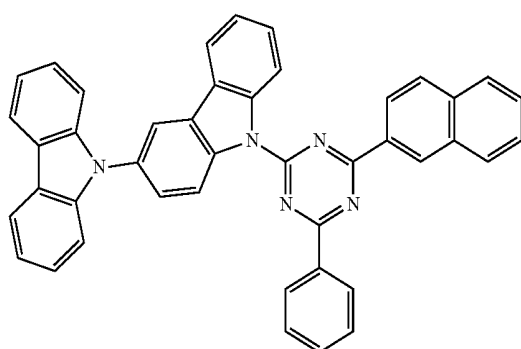
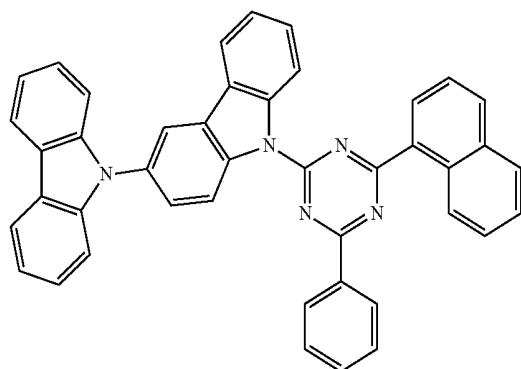
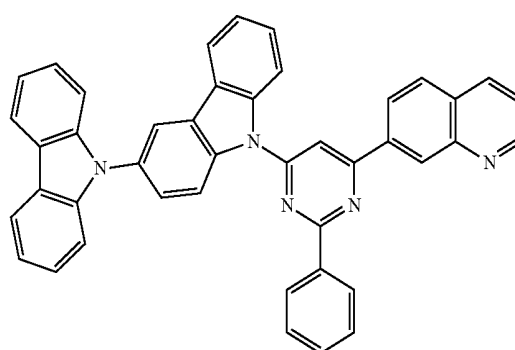
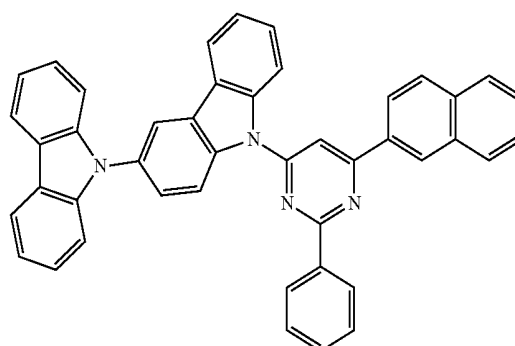
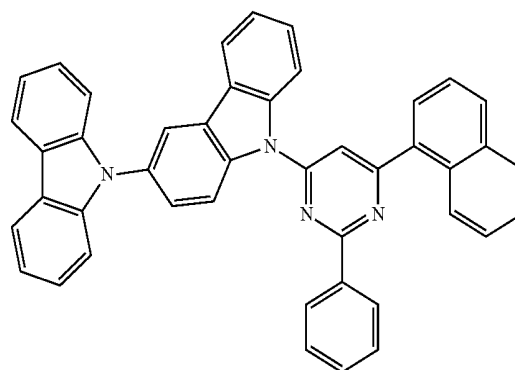
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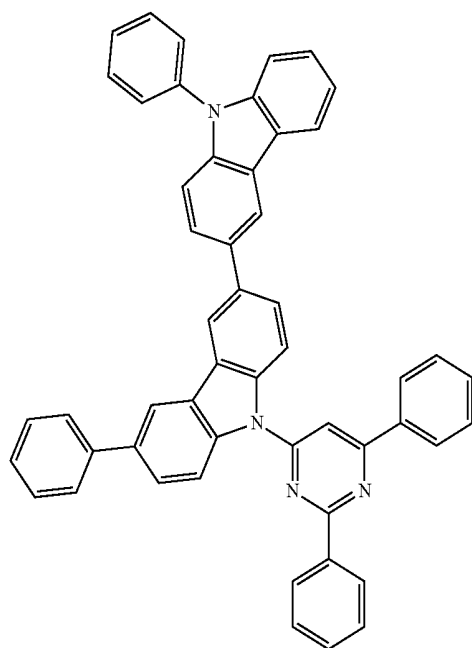


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[Chem. 37]

**138**

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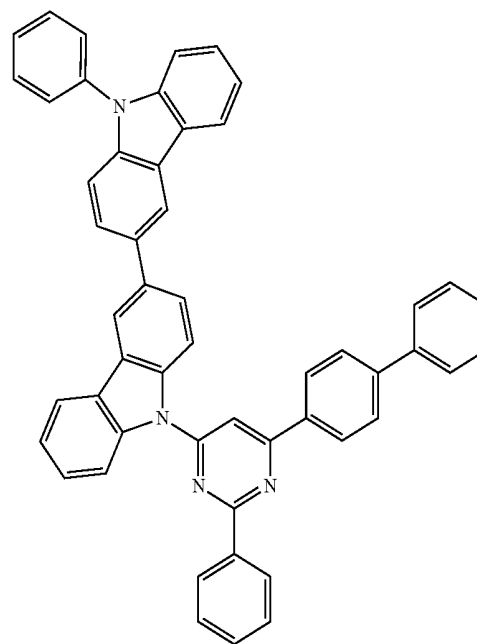
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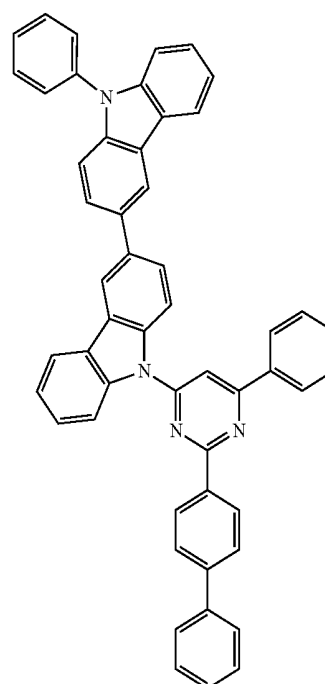
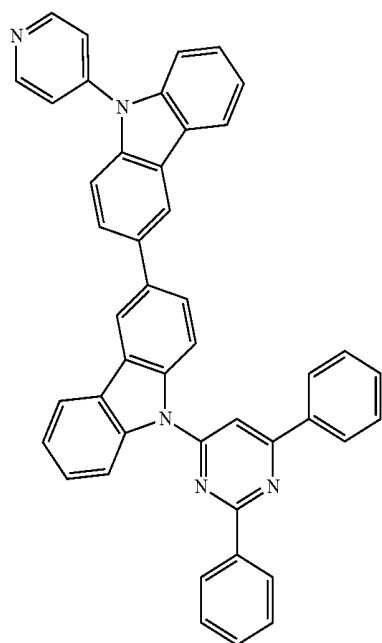
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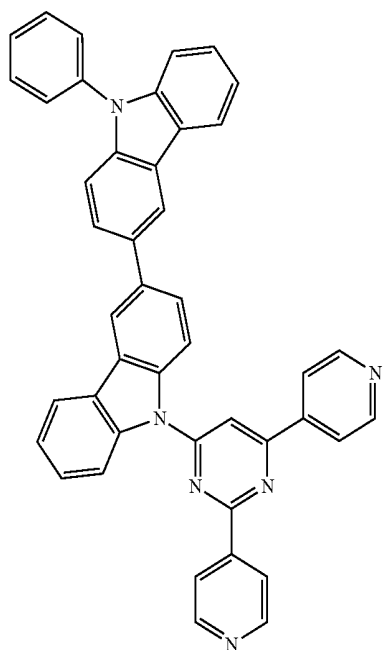


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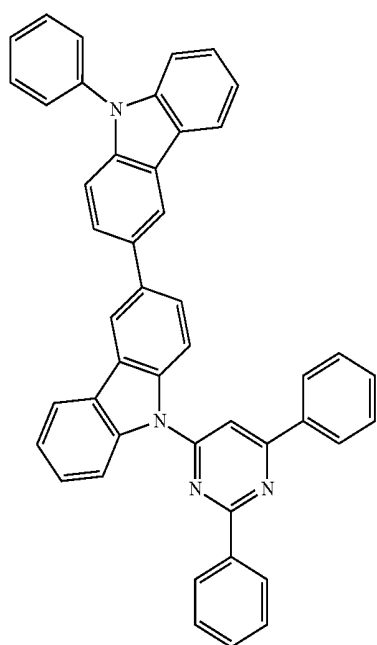


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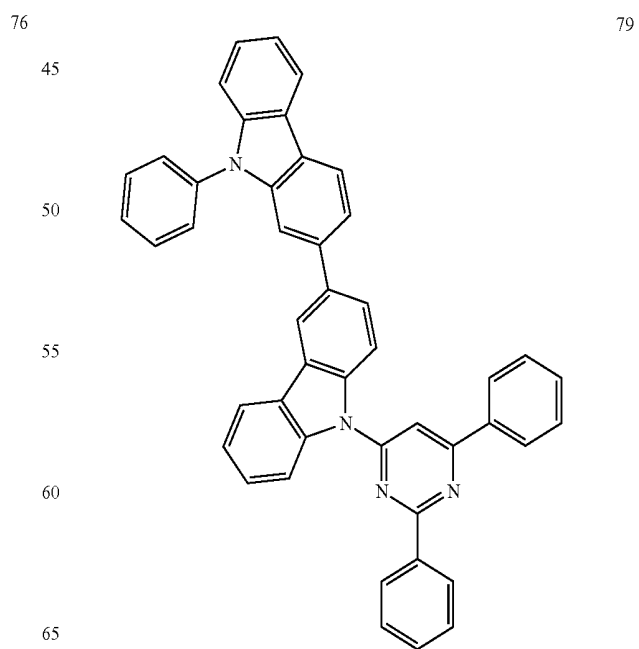
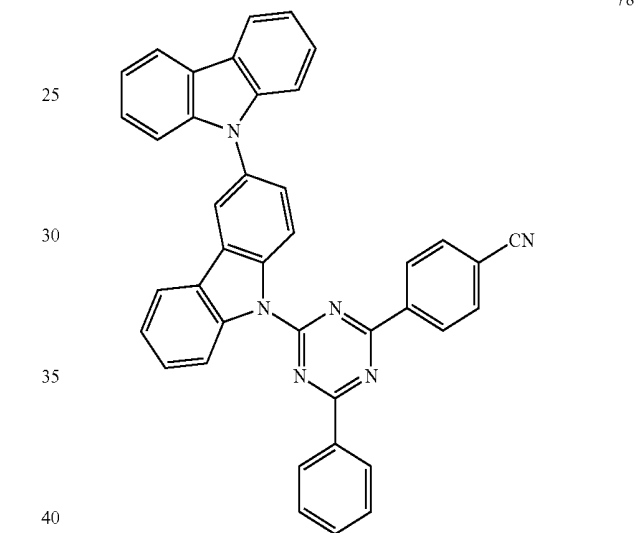
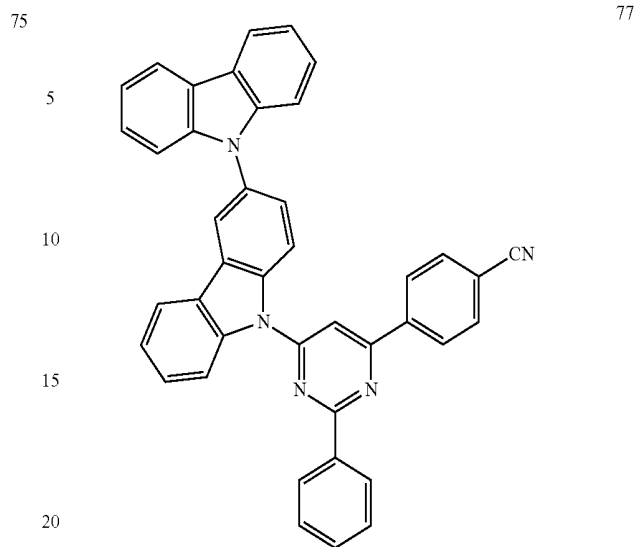


[Chem. 38]



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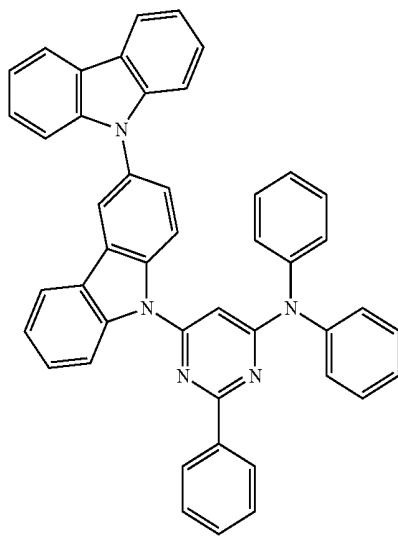
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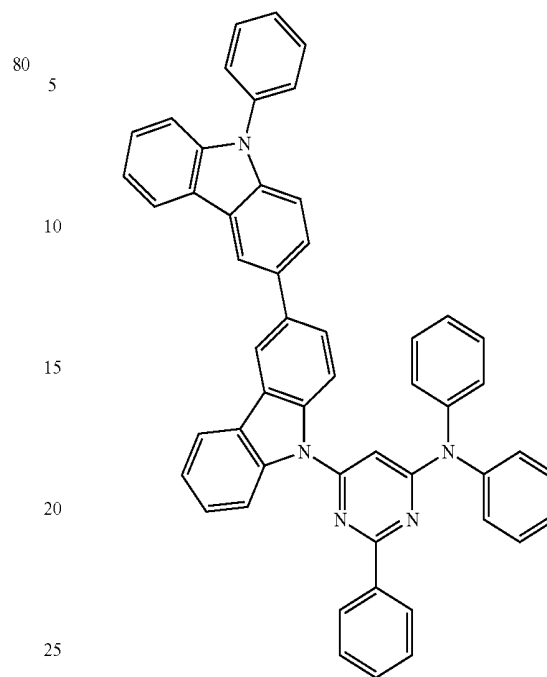
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[Chem. 39]

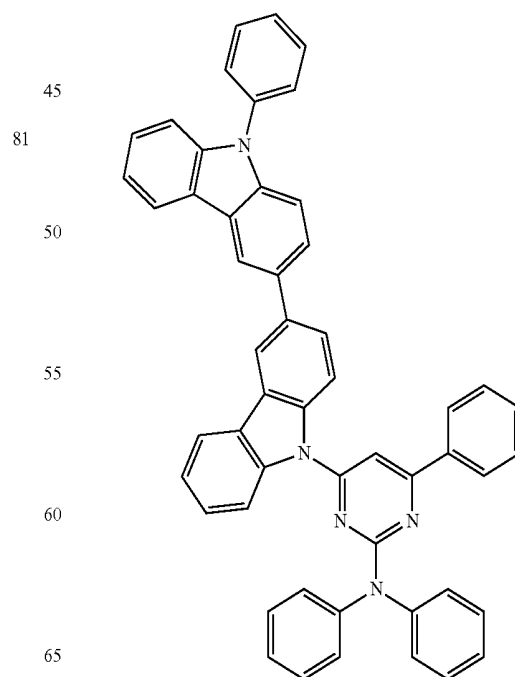
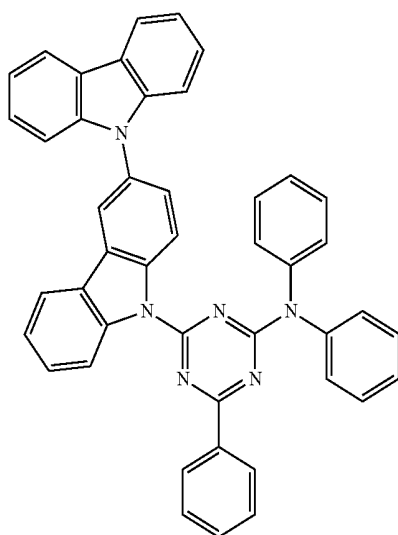
**142**

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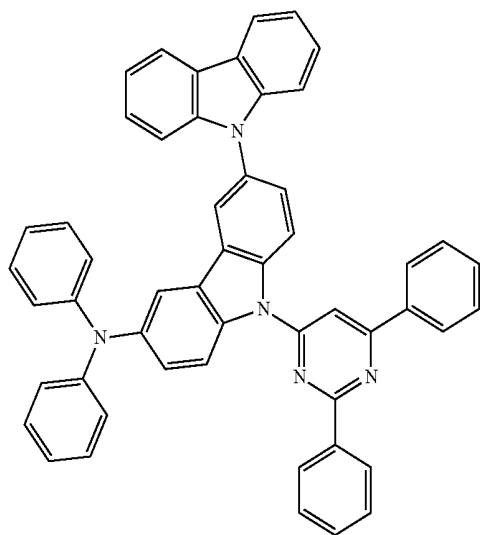
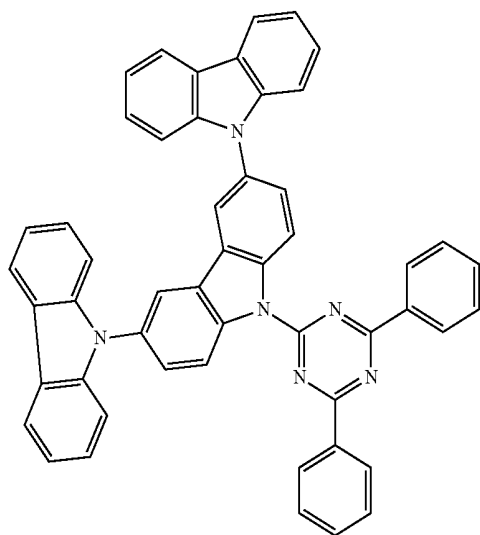
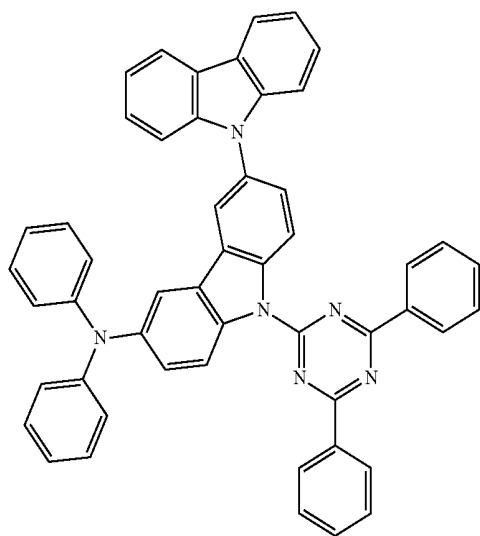
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[Chem. 40]

**144**

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[Chem. 41]

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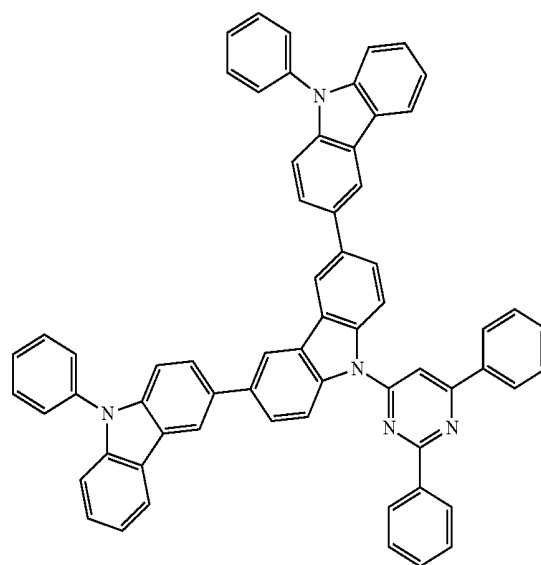
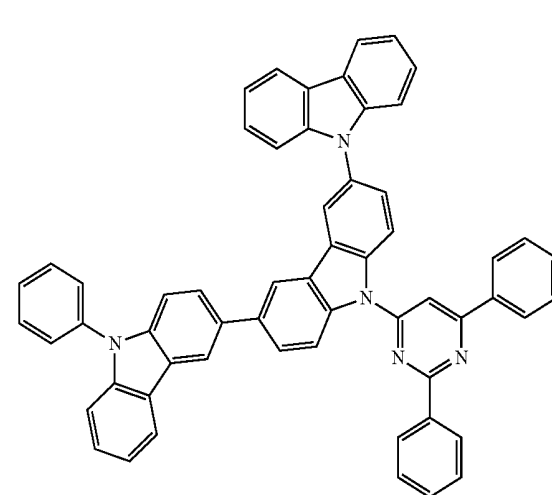
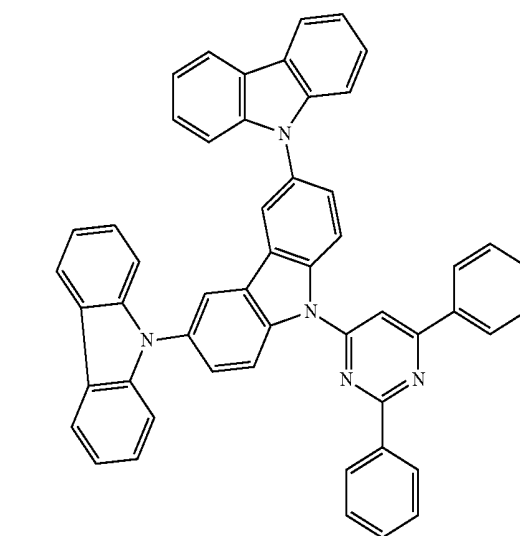
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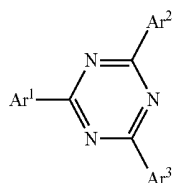
89

Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of JP-A-2013-256490

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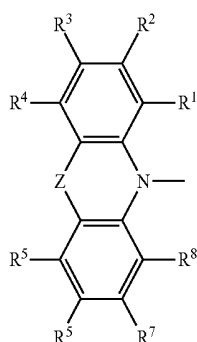
including the paragraphs 0009 to 0046 and 0093 to 0134 is incorporated herein by reference as a part of the description of the present application.

[Chem. 42]



[In the general formula (171), Ar¹ to Ar³ each independently represent a substituted or unsubstituted aryl group, and at least one of them represents a substituted aryl group represented by the following general formula (172).]

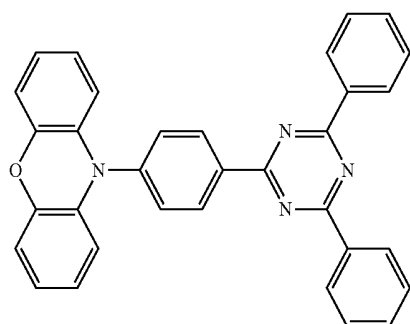
[Chem. 43]



[In the general formula (172), R¹ to R⁸ each independently represent a hydrogen atom or a substituent. Z represents O, S, O=C or Ar⁴—N, Ar⁴ represents a substituted or unsubstituted aryl group. R¹ and R², R² and R³, R³ and R⁴, R⁵ and R⁶, R⁶ and R⁷, and R⁷ and R⁸ each independently may be bonded to each other to form a cyclic structure.]

Examples of the compound include the following compounds.

[Chem. 44]



146

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General Formula (171)

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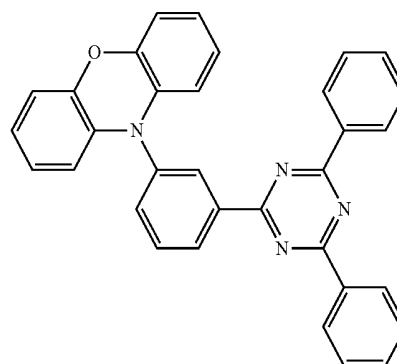
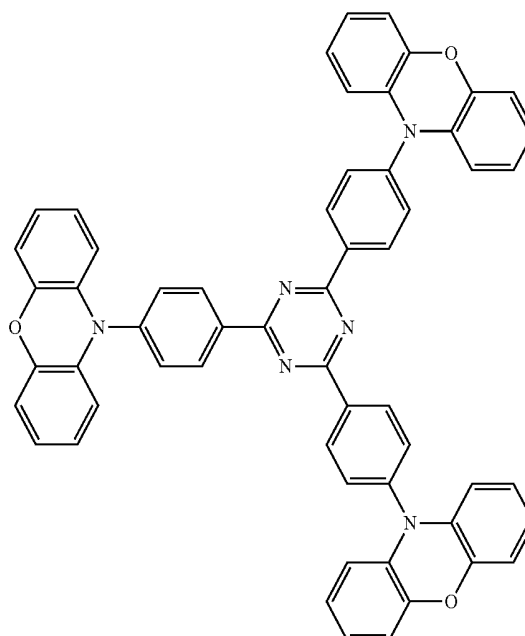
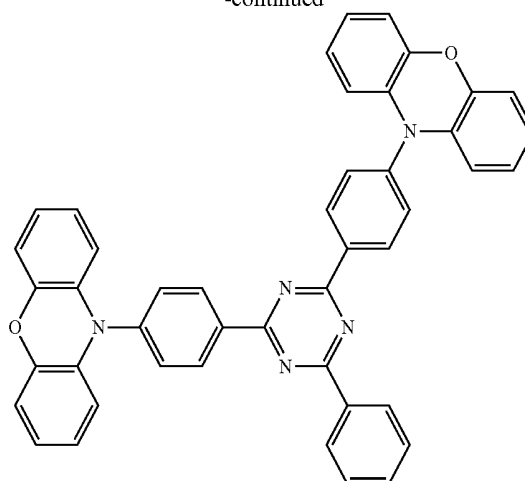
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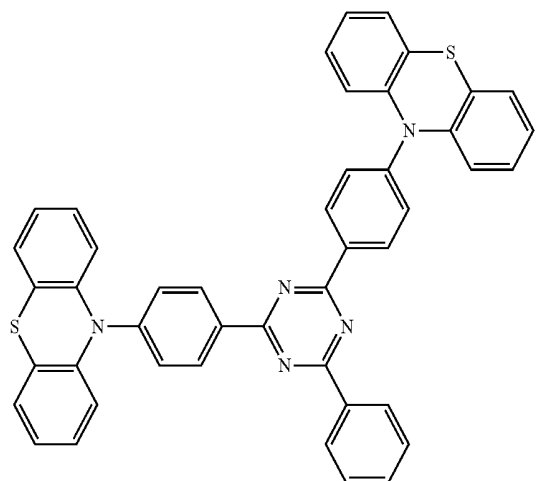
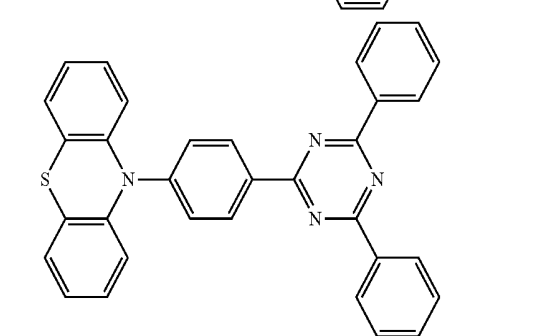
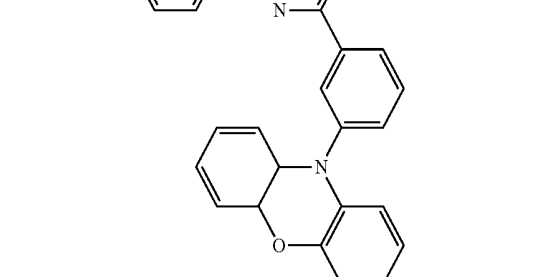
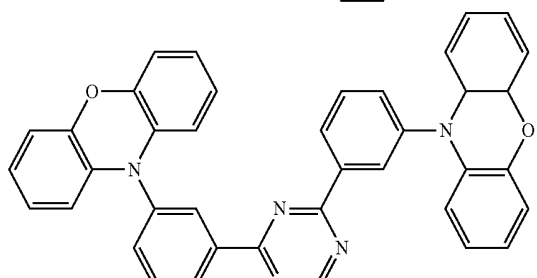
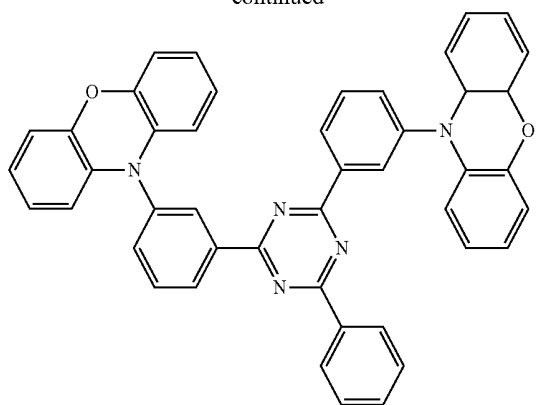
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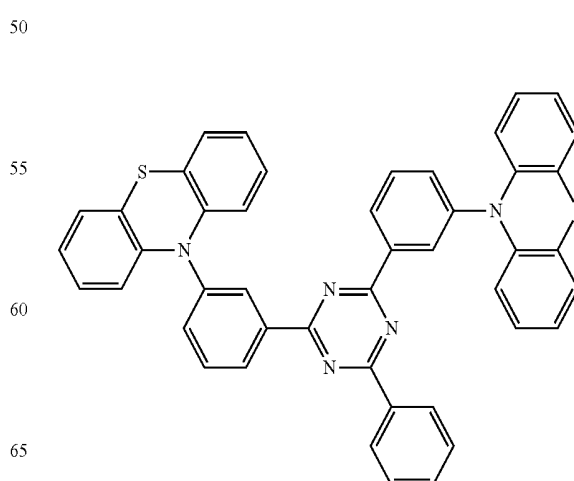
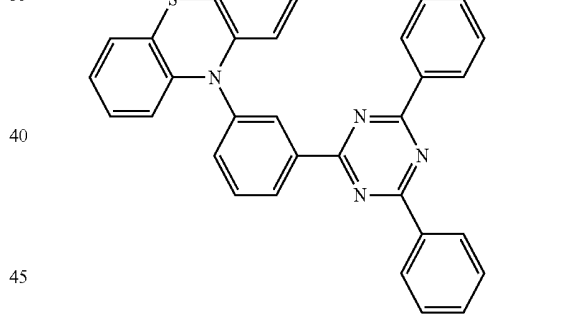
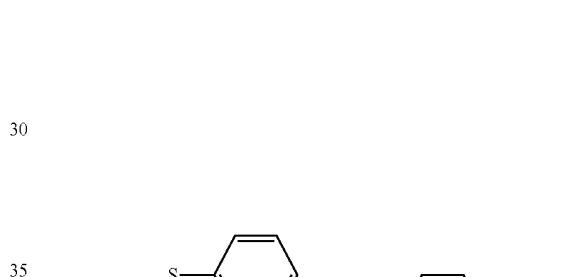
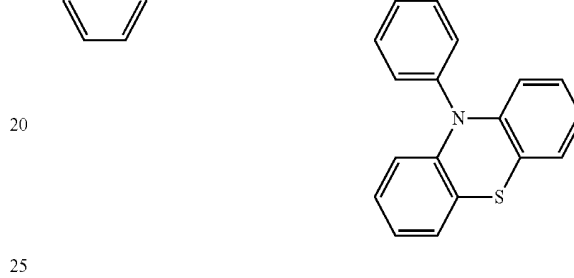
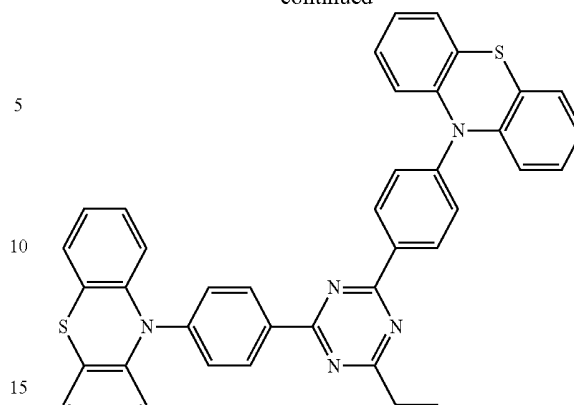


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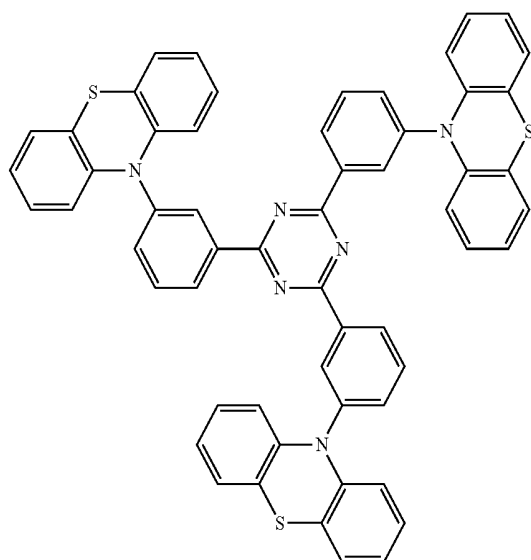
**148**

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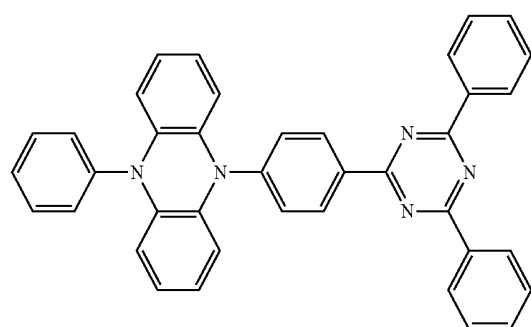
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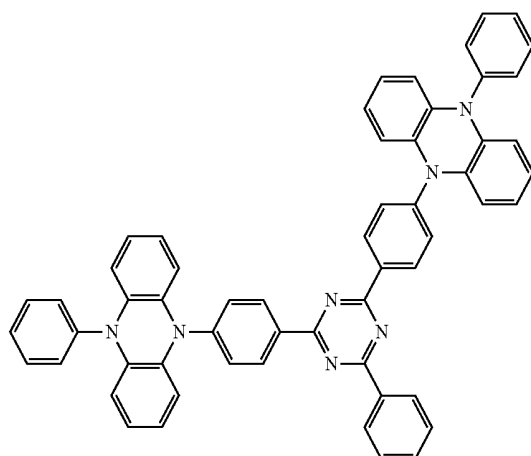


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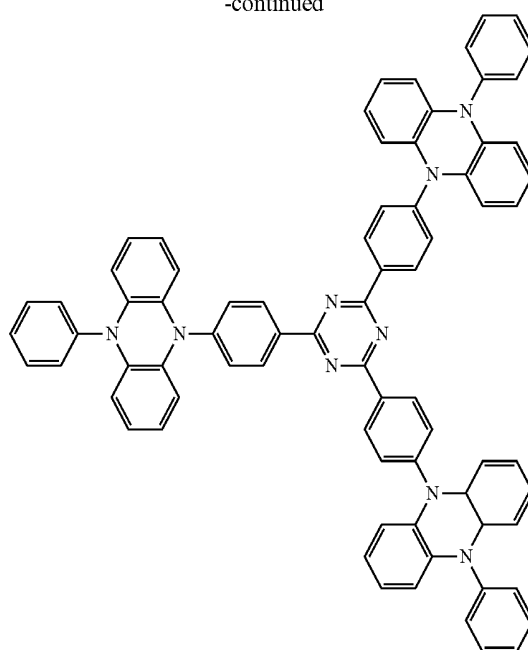
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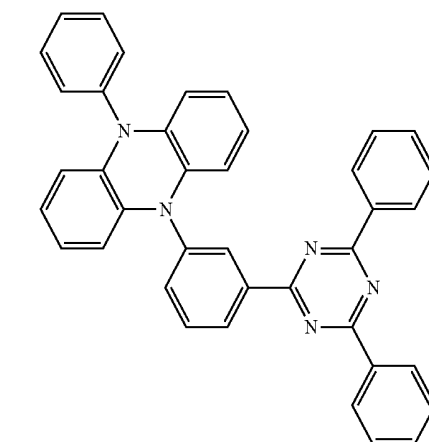
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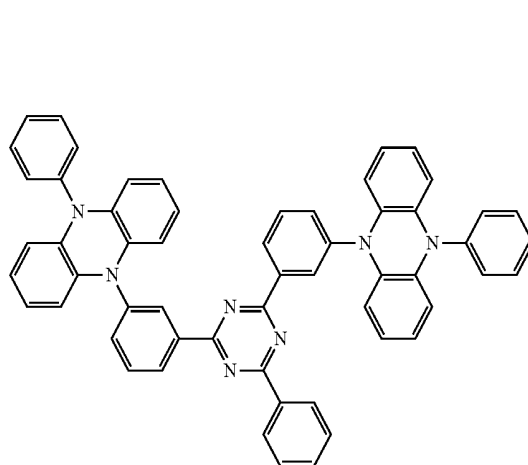
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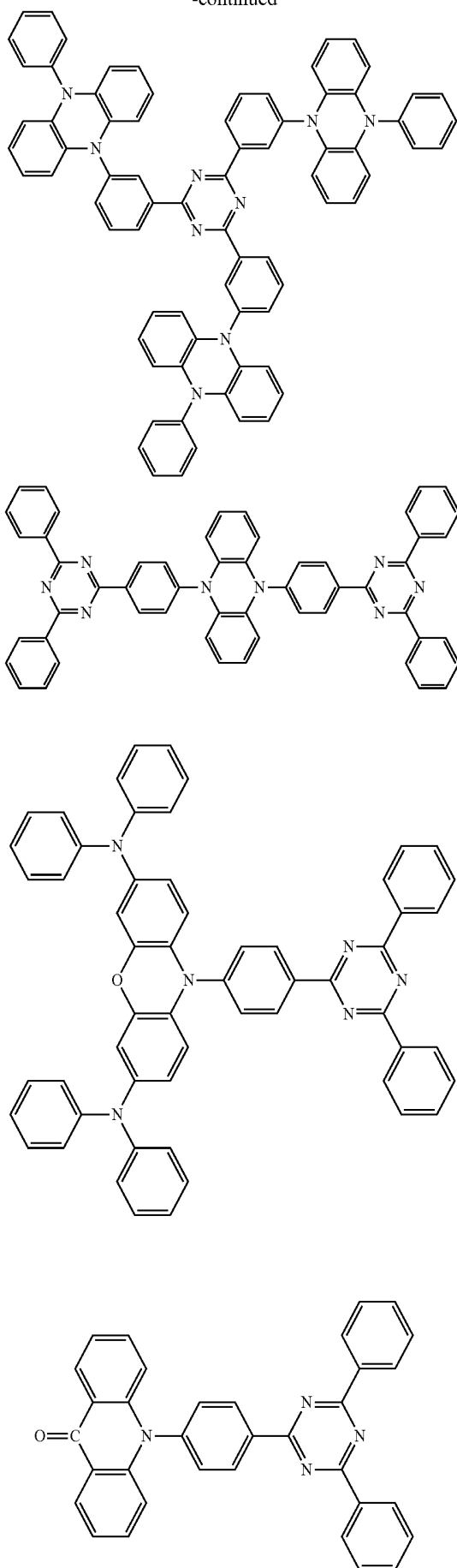
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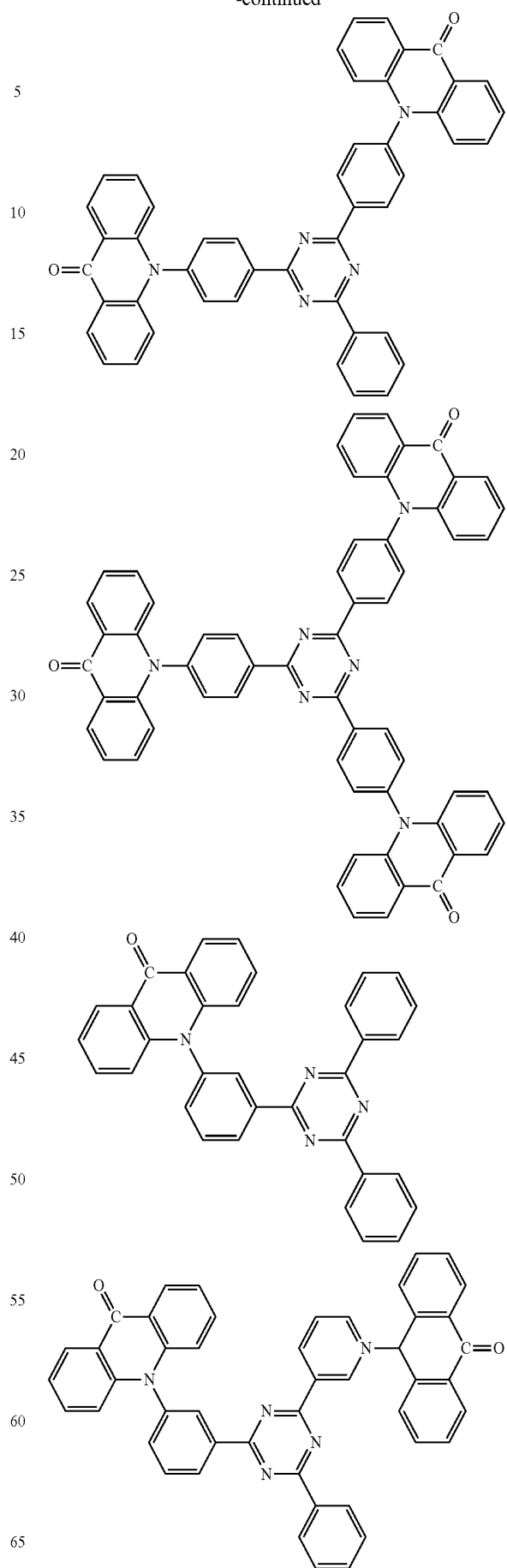
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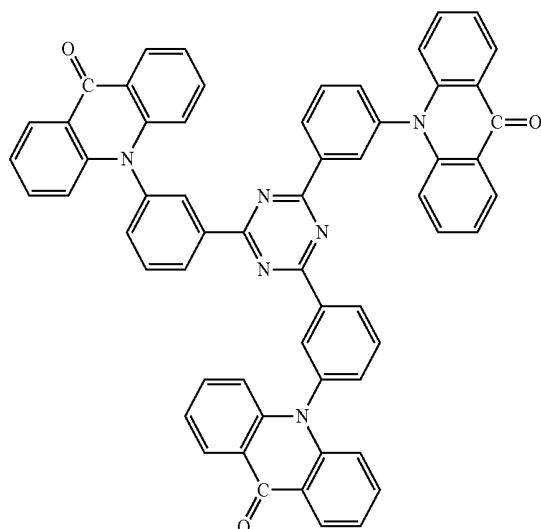
**152**

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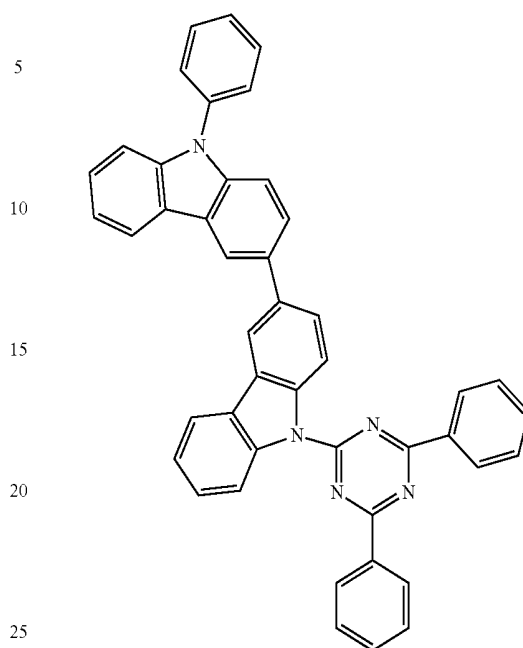
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Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of JP-A-2013-116975 including the paragraphs 0008 to 0020 and 0038 to 0040 is incorporated herein by reference as a part of the description of the present application.

154

[Chem. 46]

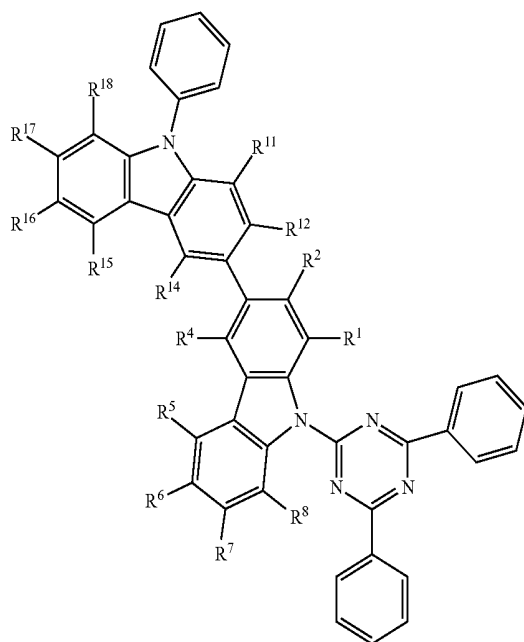


Examples of the preferred delayed fluorescent material include the following compounds.

[1] A compound represented by the following general formula (191):

[Chem. 45]

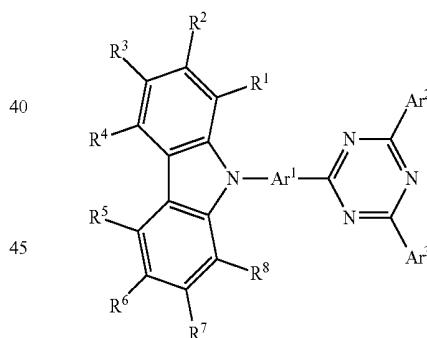
General Formula (181)



[In the general formula (R^1 , R^2 , R^4 to R^8 , R^{11} , R^{12} and R^{14} to R^{18} each independently represent a hydrogen atom or a substituent.)

[Chem. 47]

General Formula (191)



[In the general formula (191), Ar^1 represents a substituted or unsubstituted arylene group; Ar^2 and Ar^3 each independently represent a substituted or unsubstituted aryl group. R^1 to R^8 each independently represent a hydrogen atom or a substituent, provided that at least one of R^1 to R^8 represents a substituted or unsubstituted diarylamino group, and R^1 and R^2 , R^2 and R^3 , R^3 and R^4 , R^5 and R^6 , R^6 and R^7 , and R^7 and R^8 each may be bonded to each other to form a cyclic structure.

[2] The compound according to [1], wherein in the general formula (191), at least one of R^1 to R^4 represents a substituted or unsubstituted diarylamino group, and at least one of R^5 to R^8 represents a substituted or unsubstituted diarylamino group.

[3] The compound according to [2], wherein in the general formula (191), R^3 and R^6 each represent a substituted or unsubstituted diarylamino group.

155

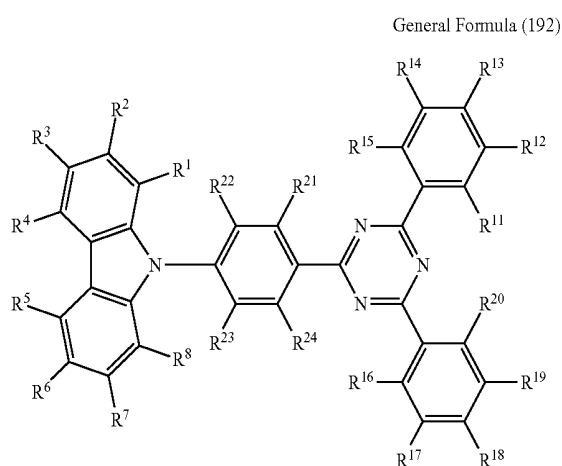
[4] The compound according to any one of [1] to [3], wherein in the general formula (191), at least one of R¹ to R⁸ represents a substituted or unsubstituted diphenylamino group.

[5] The compound according to any one of [1] to [4], wherein in the general formula (191), Ar² and Ar³ each independently represent a substituted or unsubstituted phenyl group.

[6] The compound according to any one of [1] to [5], wherein in the general formula (191), Ar¹ each independently represents a substituted or unsubstituted phenylene group, a substituted or unsubstituted naphthylene group or a substituted or unsubstituted anthracenylene group.

[7] The compound according to [1], wherein the compound has a structure represented by the following general formula (192):

[Chem. 48]



[In the general formula (192), R¹ to R⁸ and R¹¹ to R²⁴ each independently represent a hydrogen atom or a substituent, provided that at least one of R¹ to R⁸ represents a substituted or unsubstituted diarylamino group, and R¹ and R², R² and R³, R³ and R⁴, R⁵ and R⁶, R⁶ and R⁷, R⁷ and R⁸, R¹¹ and R¹², R¹² and R¹³, R¹³ and R¹⁴, R¹⁴ and R¹⁵, R¹⁶ and R¹⁷, R¹⁷ and R¹⁸, R¹⁸ and R¹⁹, R¹⁹ and R²⁰, R²¹ and R²², and R²³ and R²⁴ each may be bonded to each other to form a cyclic structure.]

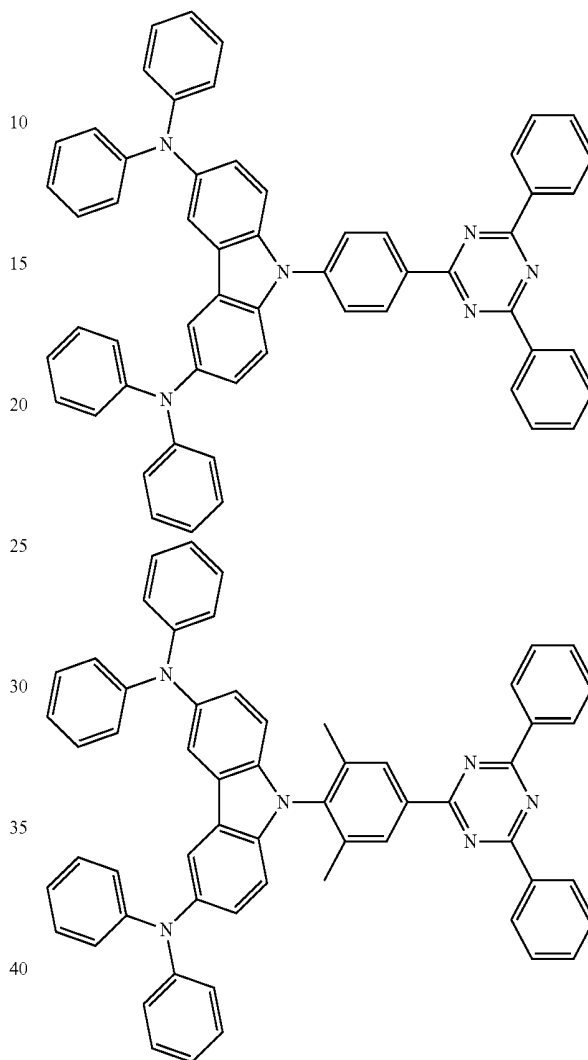
[8] The compound according to [7], wherein in the general formula (192), at least one of R¹ to R⁴ represents a substituted or unsubstituted diarylamino group, and at least one of R⁵ to R⁸ represents a substituted or unsubstituted diarylamino group.

[9] The compound according to [8], wherein in the general formula (192), R³ and R⁶ each represent a substituted or unsubstituted diarylamino group.

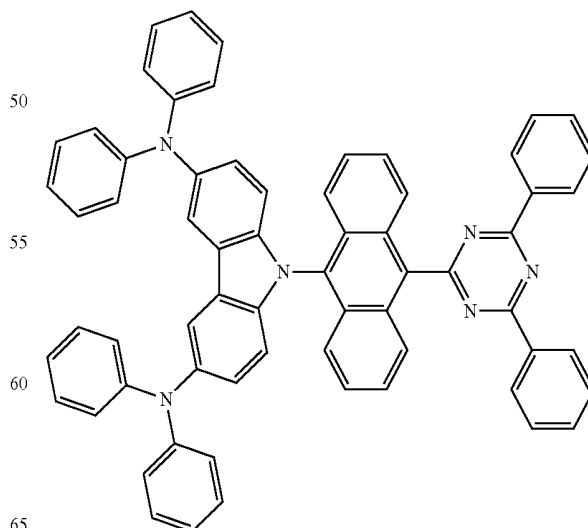
156

Specific examples of the compound include the following compounds. Ph represents a phenyl group.

[Chem. 49]



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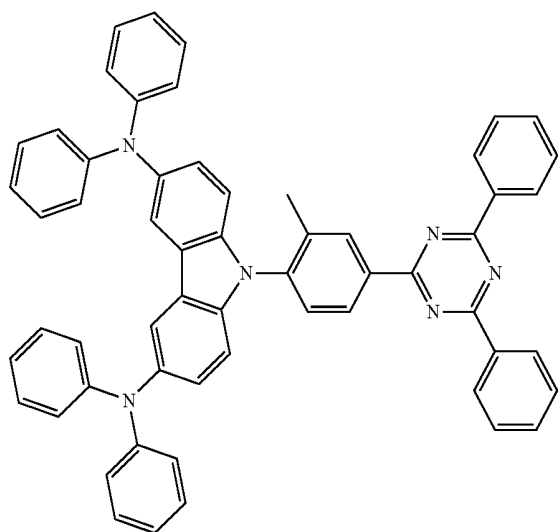


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157

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[Chem. 50]



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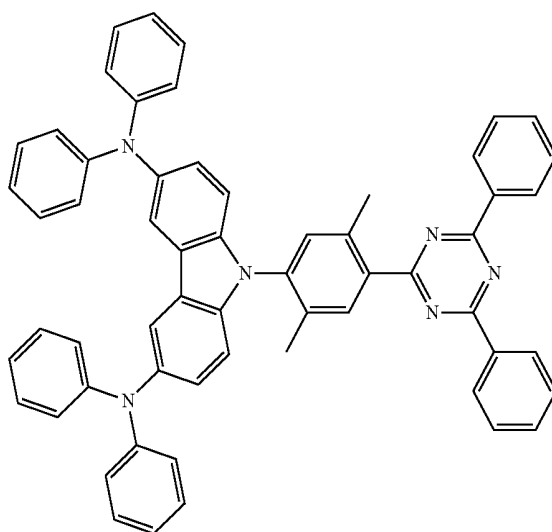
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[Chem. 51]



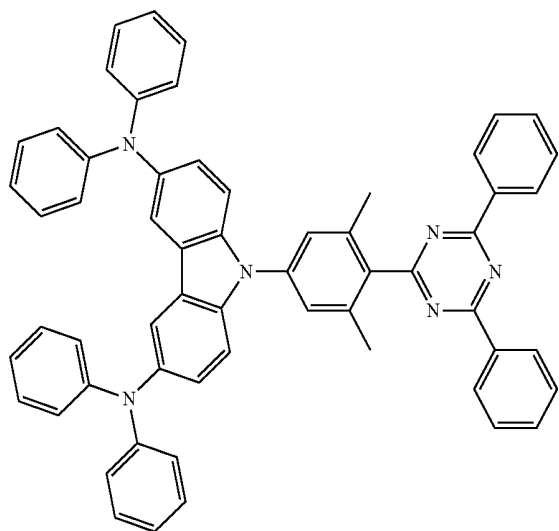
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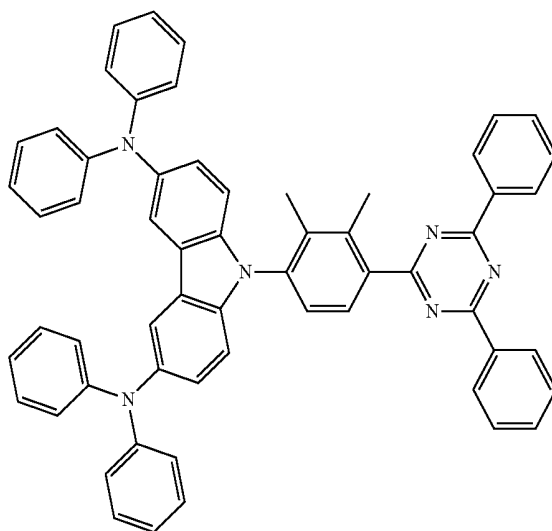


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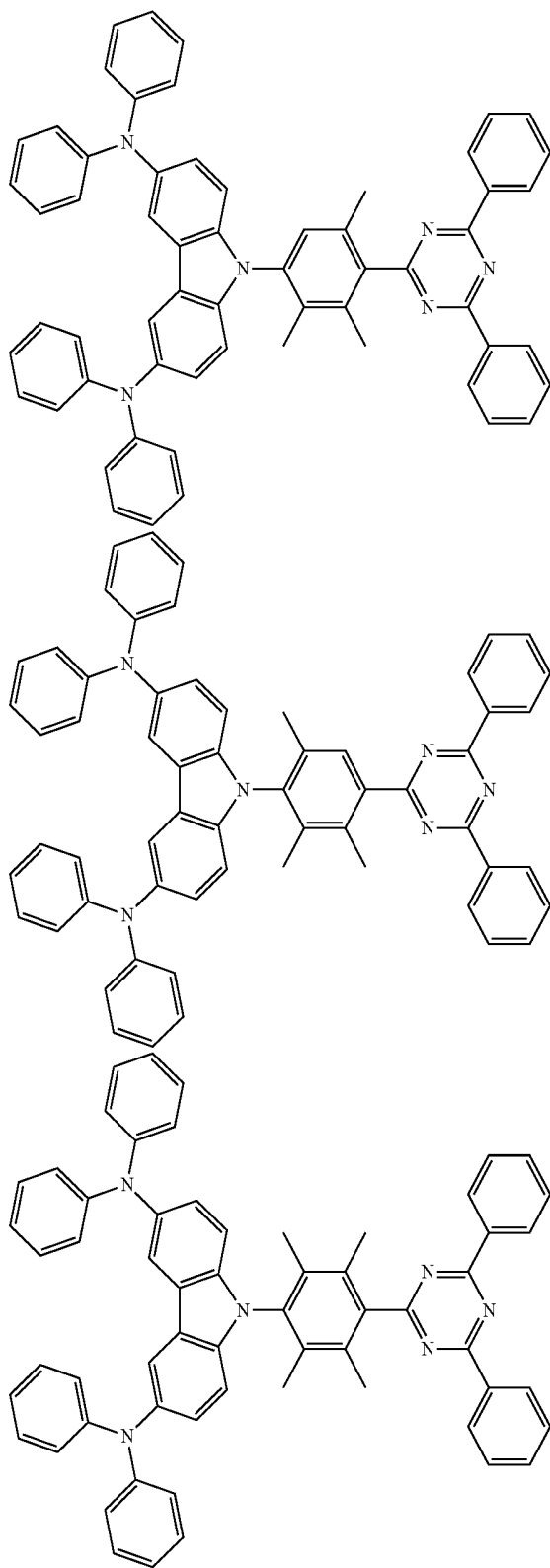
65



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-continued

[Chem. 52]



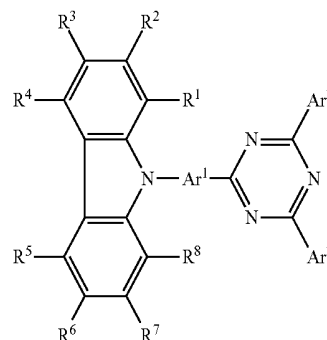
160

Examples of the preferred delayed fluorescent material include the following compounds.

[1] A compound represented by the following general formula (201):

[Chem. 53]

General Formula (201)



(In the above formula, R^1 to R^8 each independently represent a hydrogen atom or a substituent, provided that at least one of R^1 to R^8 represents a substituted or unsubstituted carbazolyl group. Ar^1 to Ar^3 each independently represent a substituted or unsubstituted aromatic ring or a heteroaromatic ring)

[2] The compound according to [1], wherein in the general formula (201), at least one of R^3 and R^6 represents a substituted or unsubstituted carbazolyl group.

[3] The compound according to [1] or [2], wherein the carbazolyl group is a 1-carbazolyl group, a 2-carbazolyl group, a 3-carbazolyl group or a 4-carbazolyl group.

[4] The compound according to any one of [1] to [3], wherein the carbazolyl group has a substituent on the nitrogen atom in the carbazole cyclic structure.

[5] The compound according to any one of [1] to [4], wherein in the general formula (201), at least one of Ar^1 , Ar^2 and Ar^3 represents a benzene ring or a naphthalene ring.

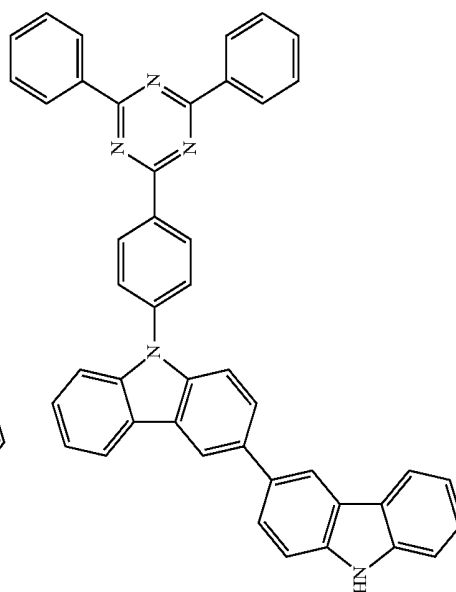
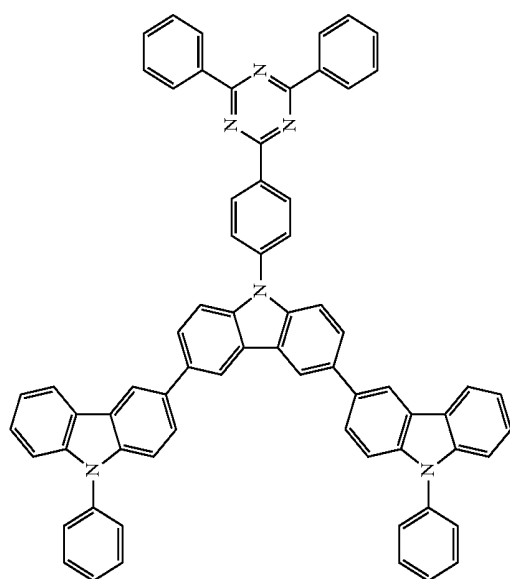
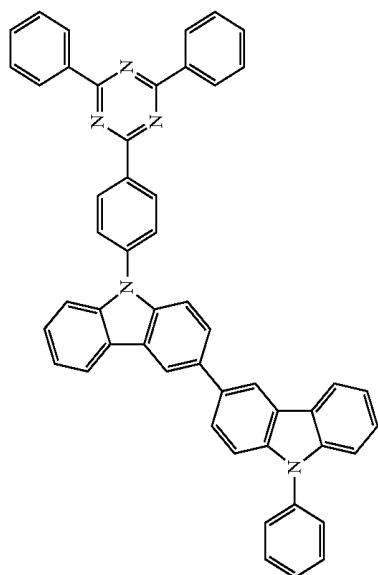
[6] The compound according to any one of [1] to [5], wherein in the general formula (201), Ar^1 , Ar^2 and Ar^3 each represent the same aromatic ring or the same heteroaromatic ring.

[7] The compound according to any one of [1] to [6], wherein in the general formula (201), Ar^1 , Ar^2 and Ar^3 each represent a benzene ring.

Examples of the compound include the following compounds.

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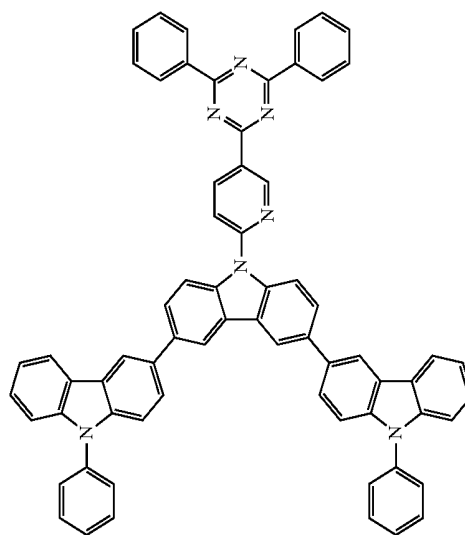
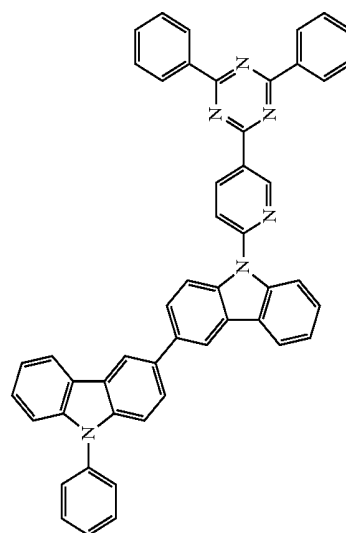
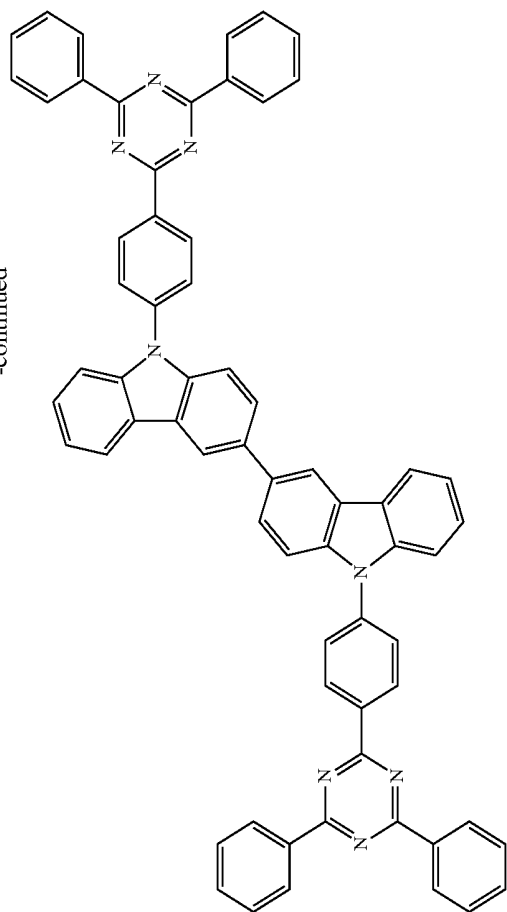


[Chem. 54]

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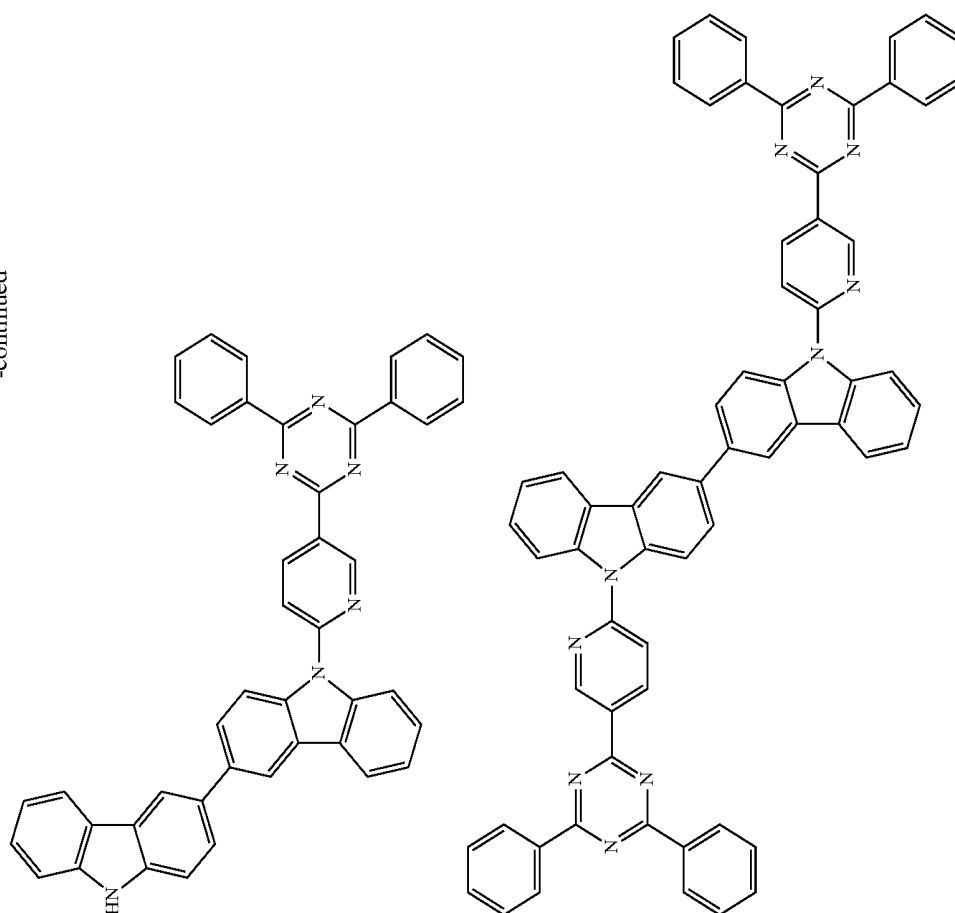
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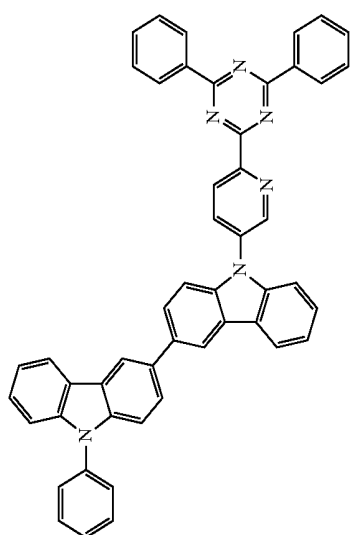
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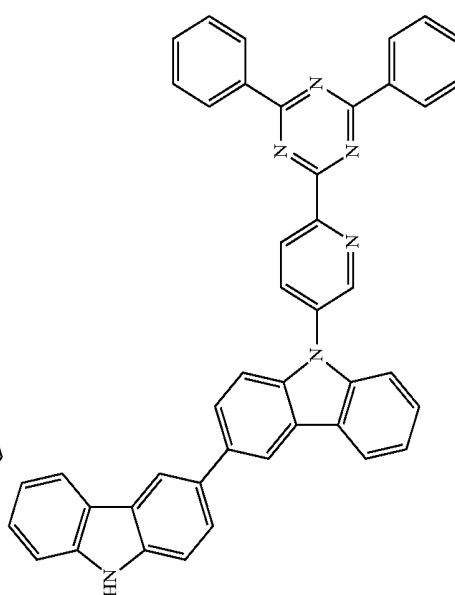
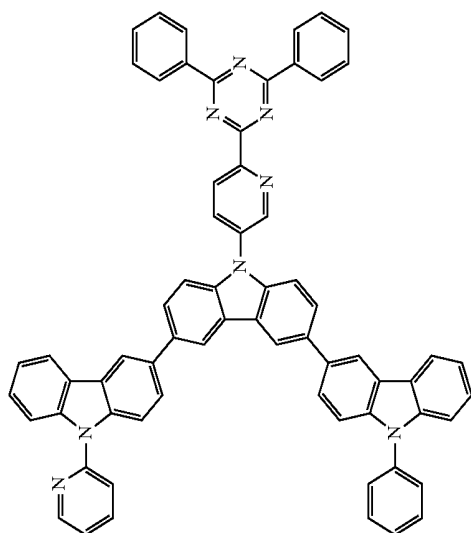
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168

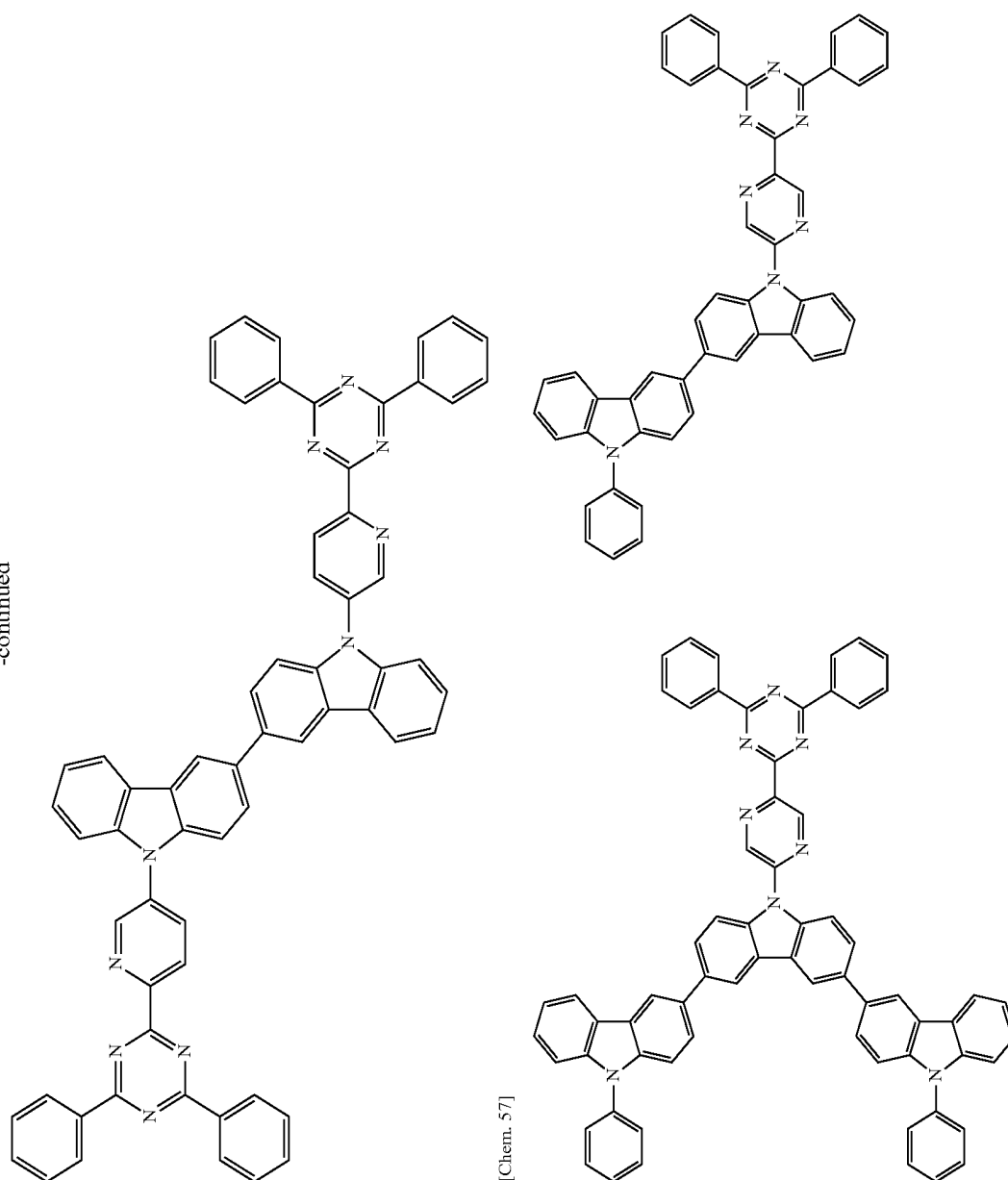
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[Chem. 56]



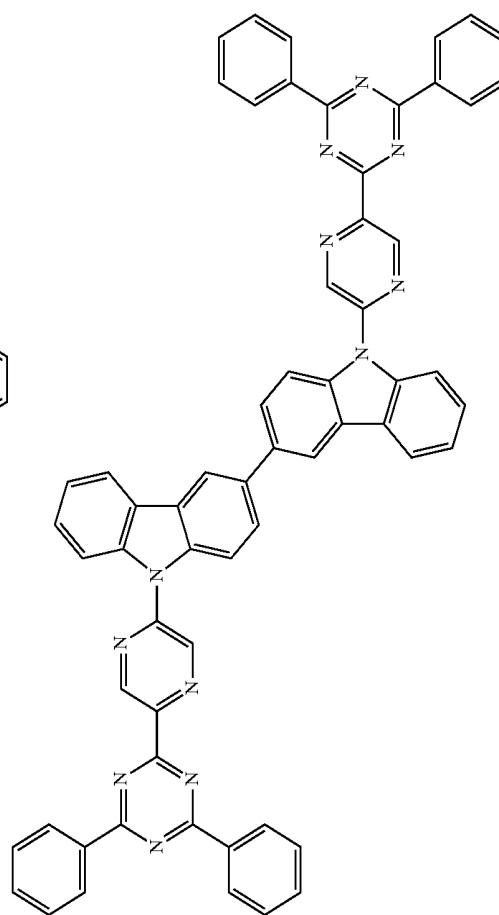
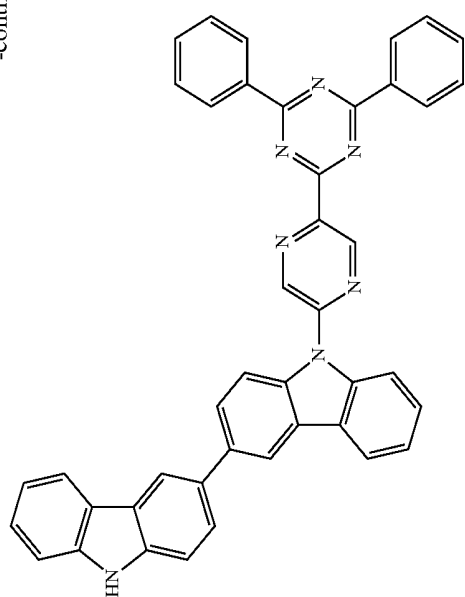
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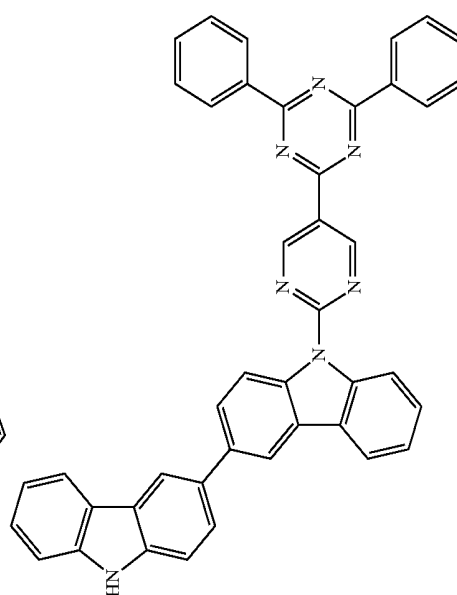
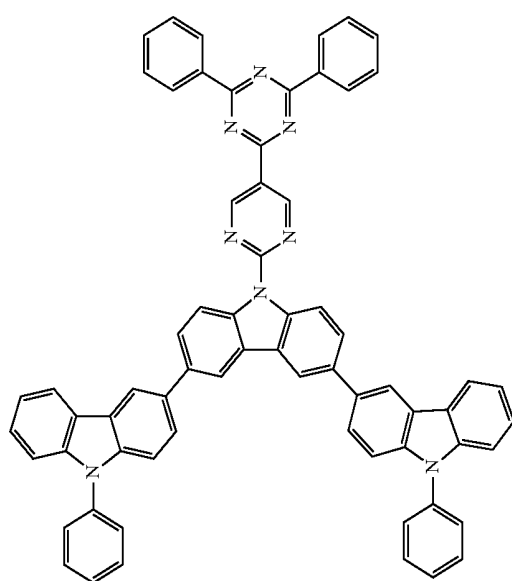
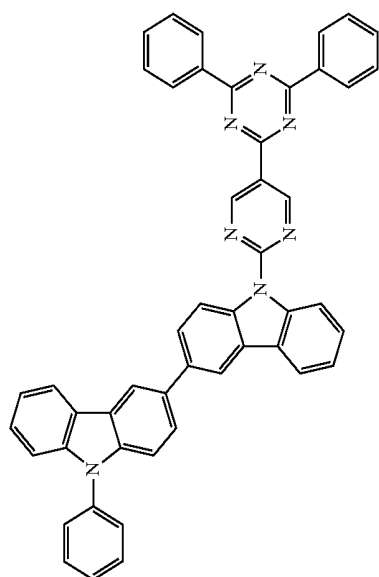
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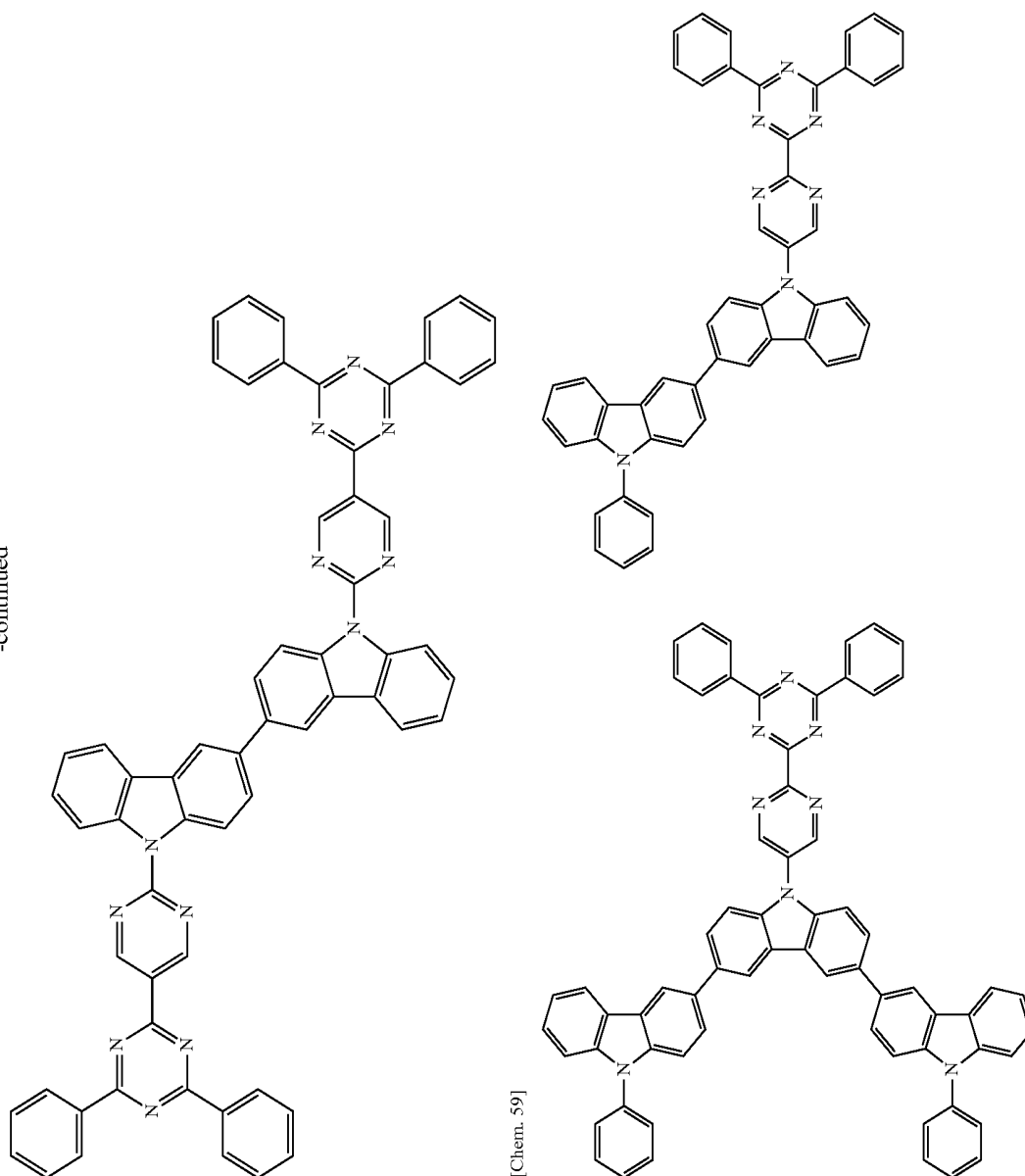


[Chem. 58]

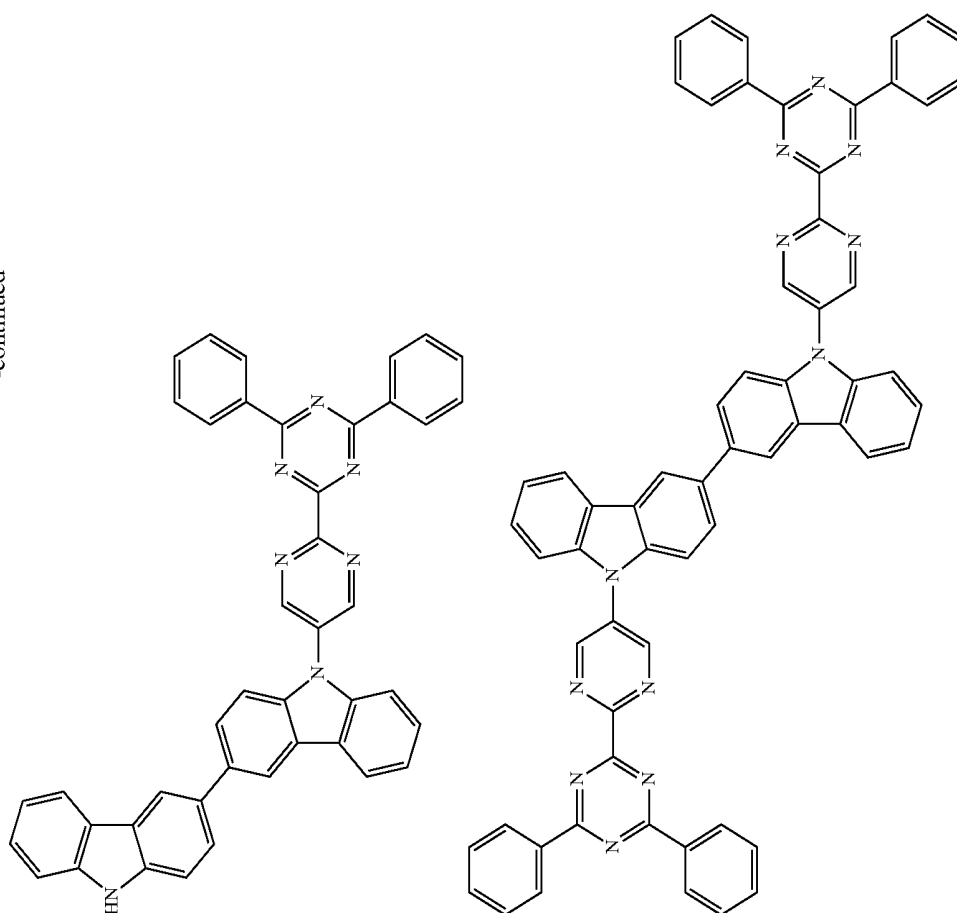
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176

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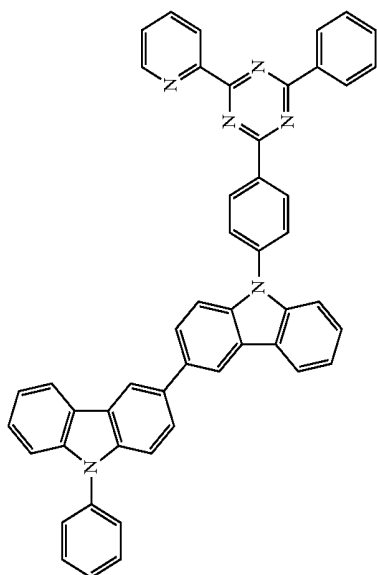
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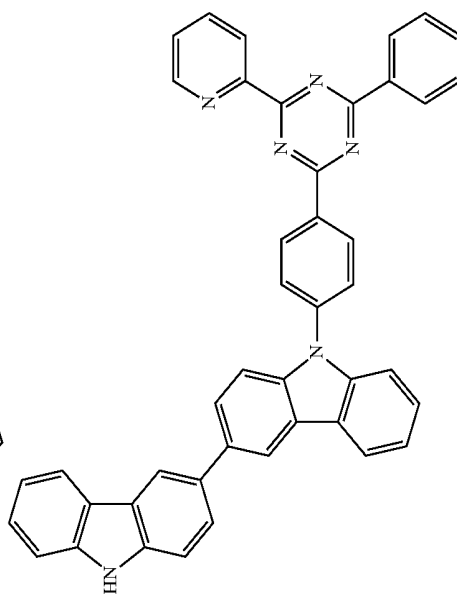
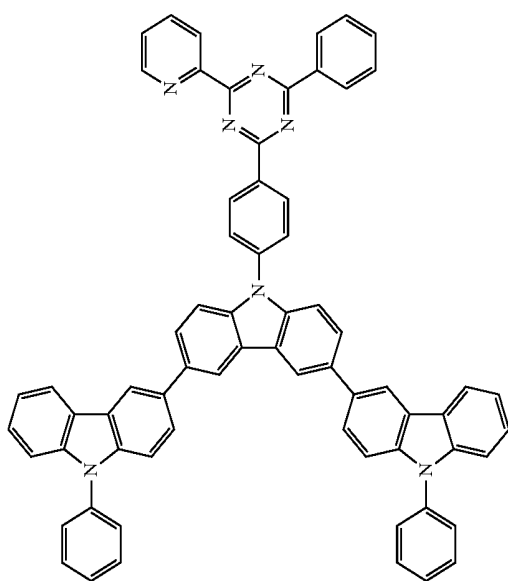
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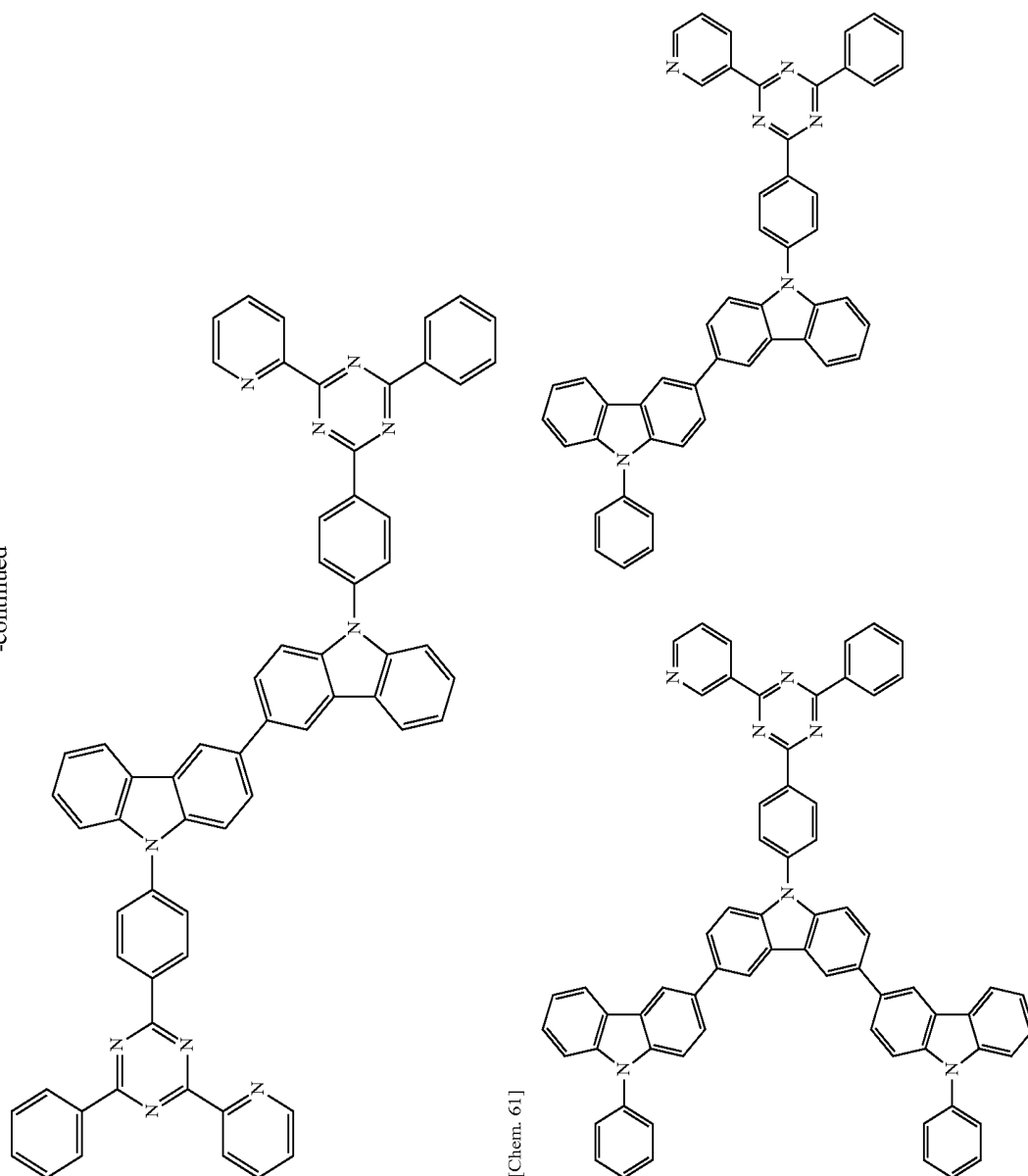
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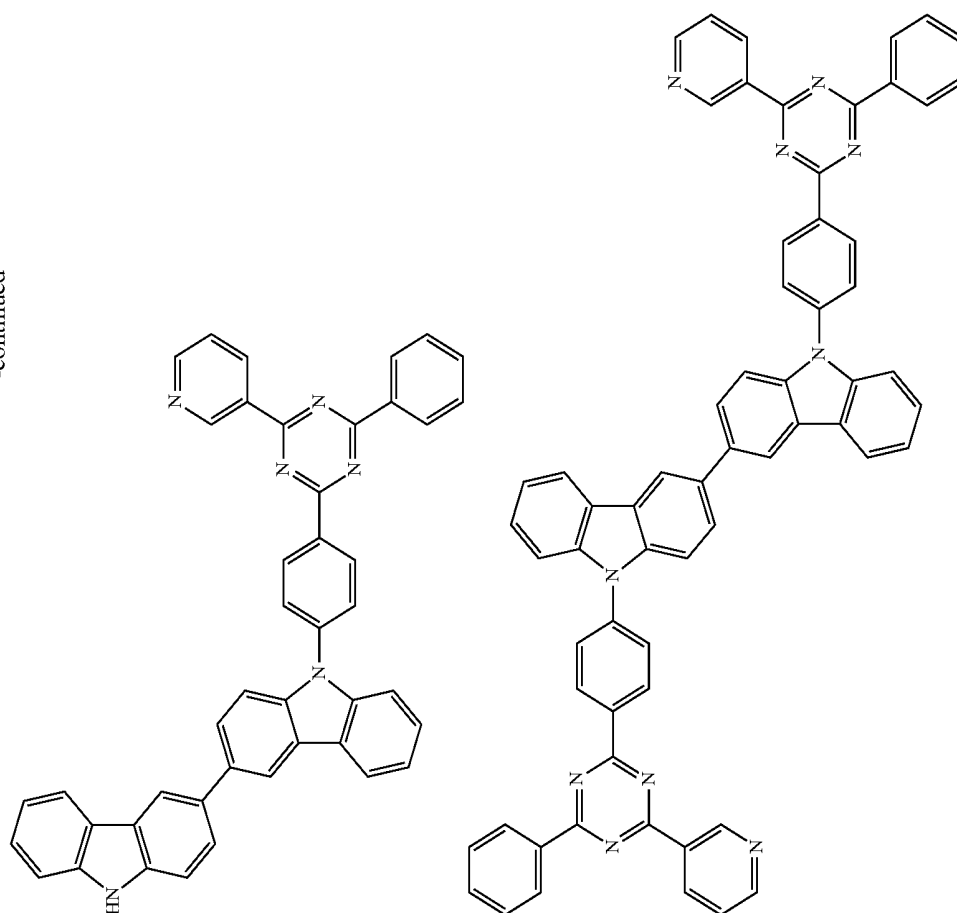
[Chem. 60]



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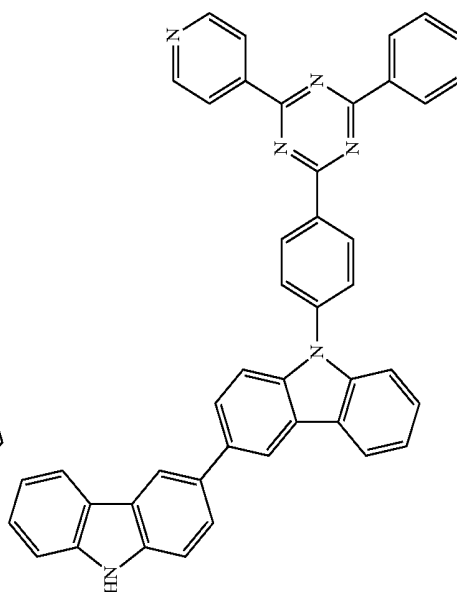
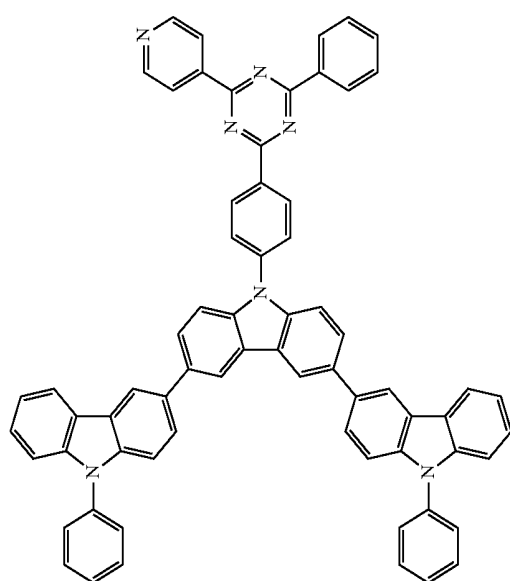
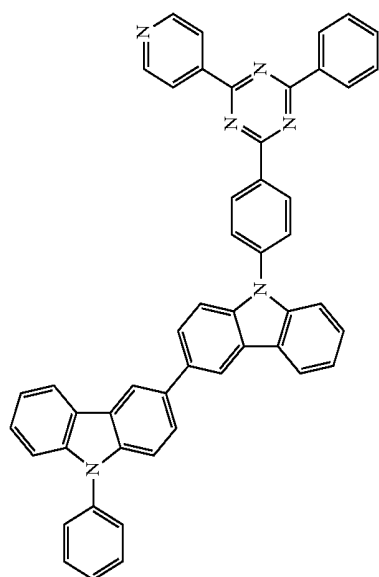
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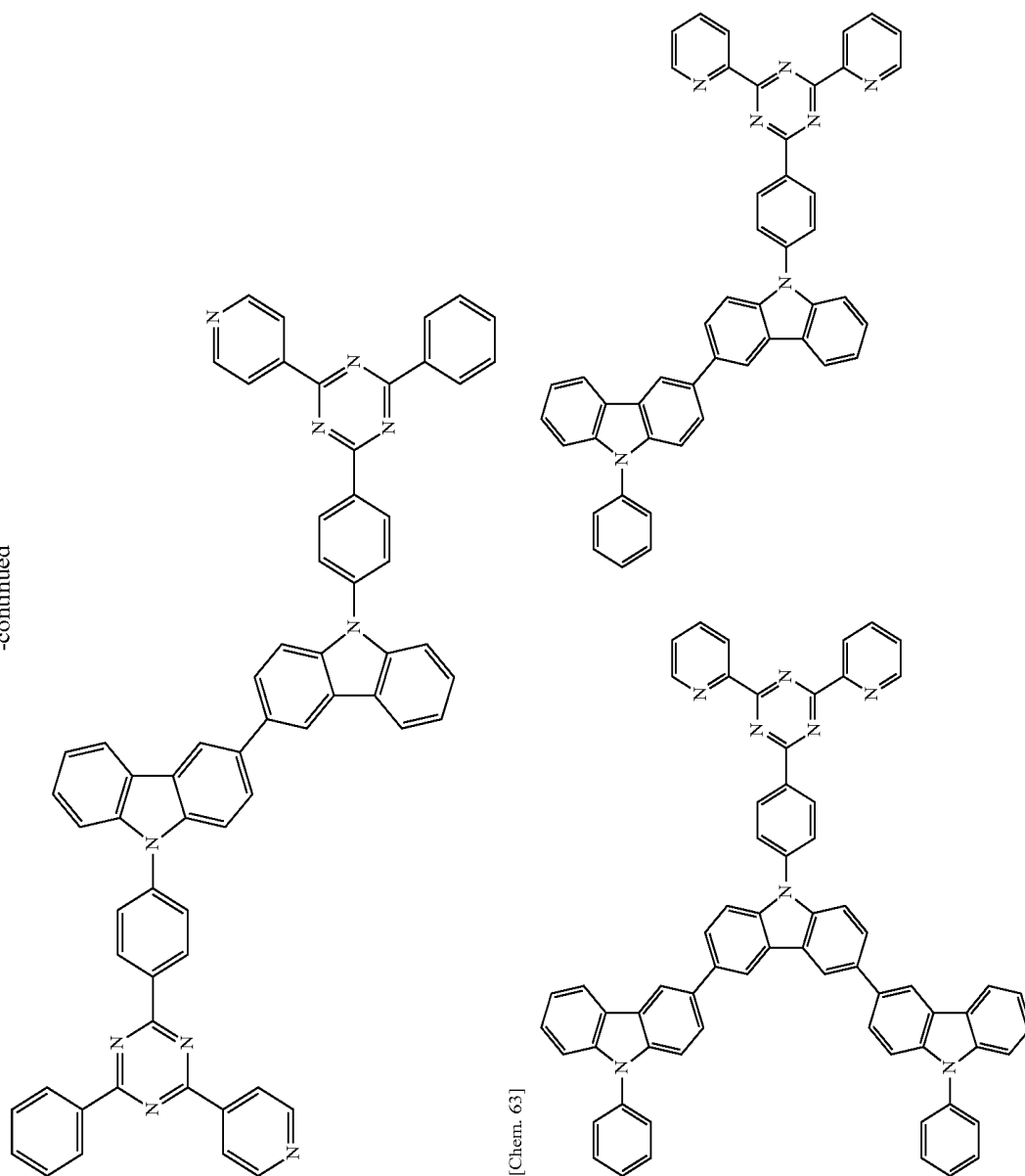
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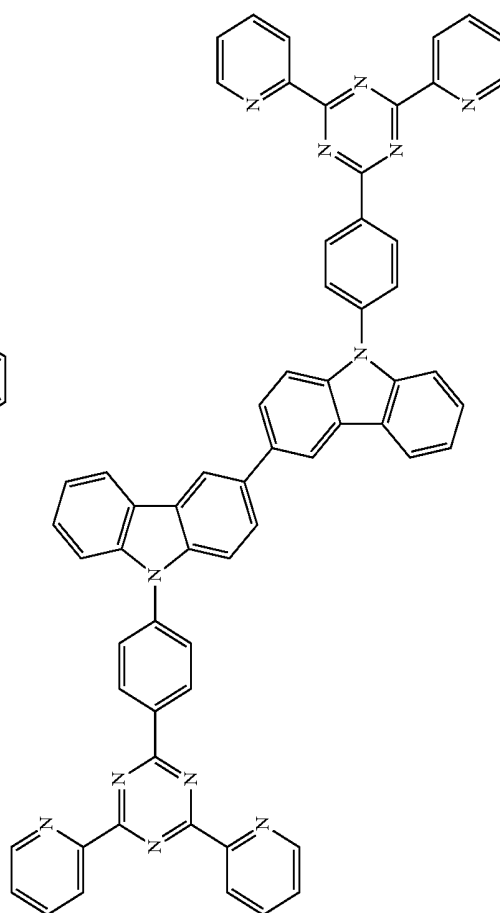
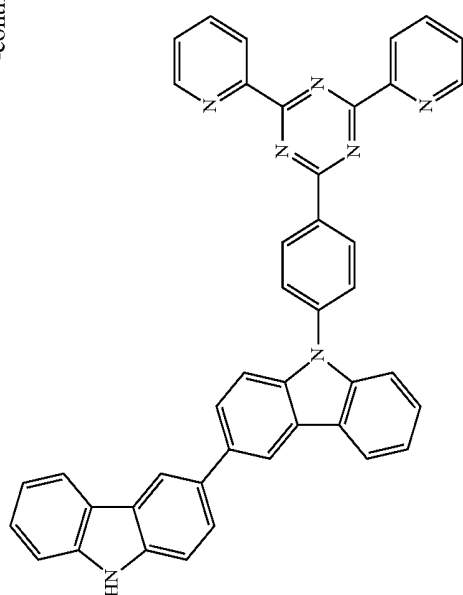


[Chem. 62]

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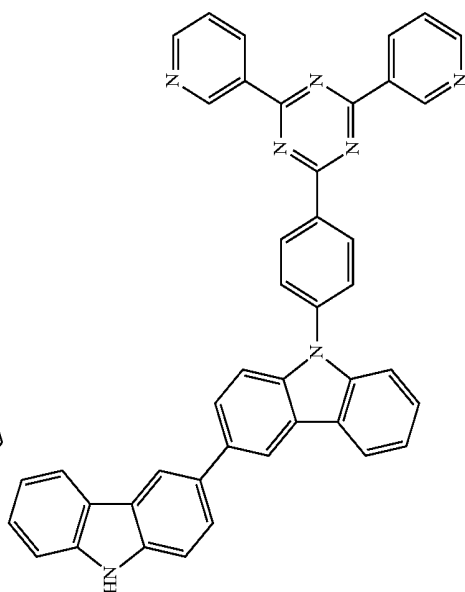
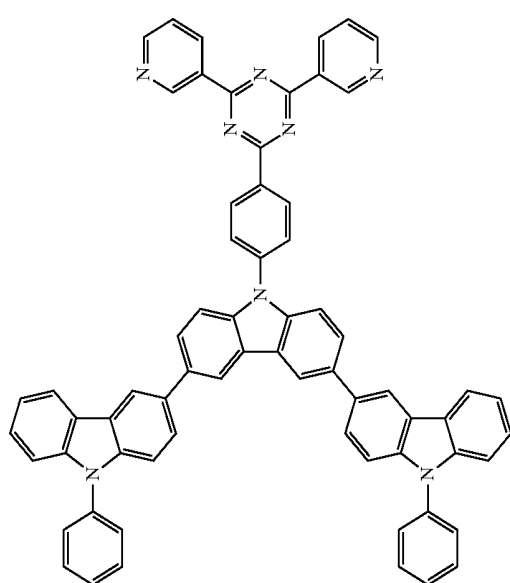
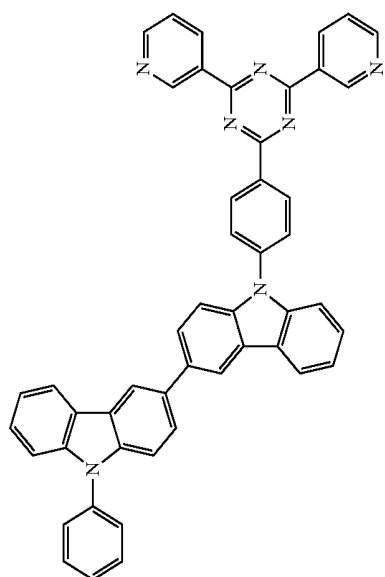
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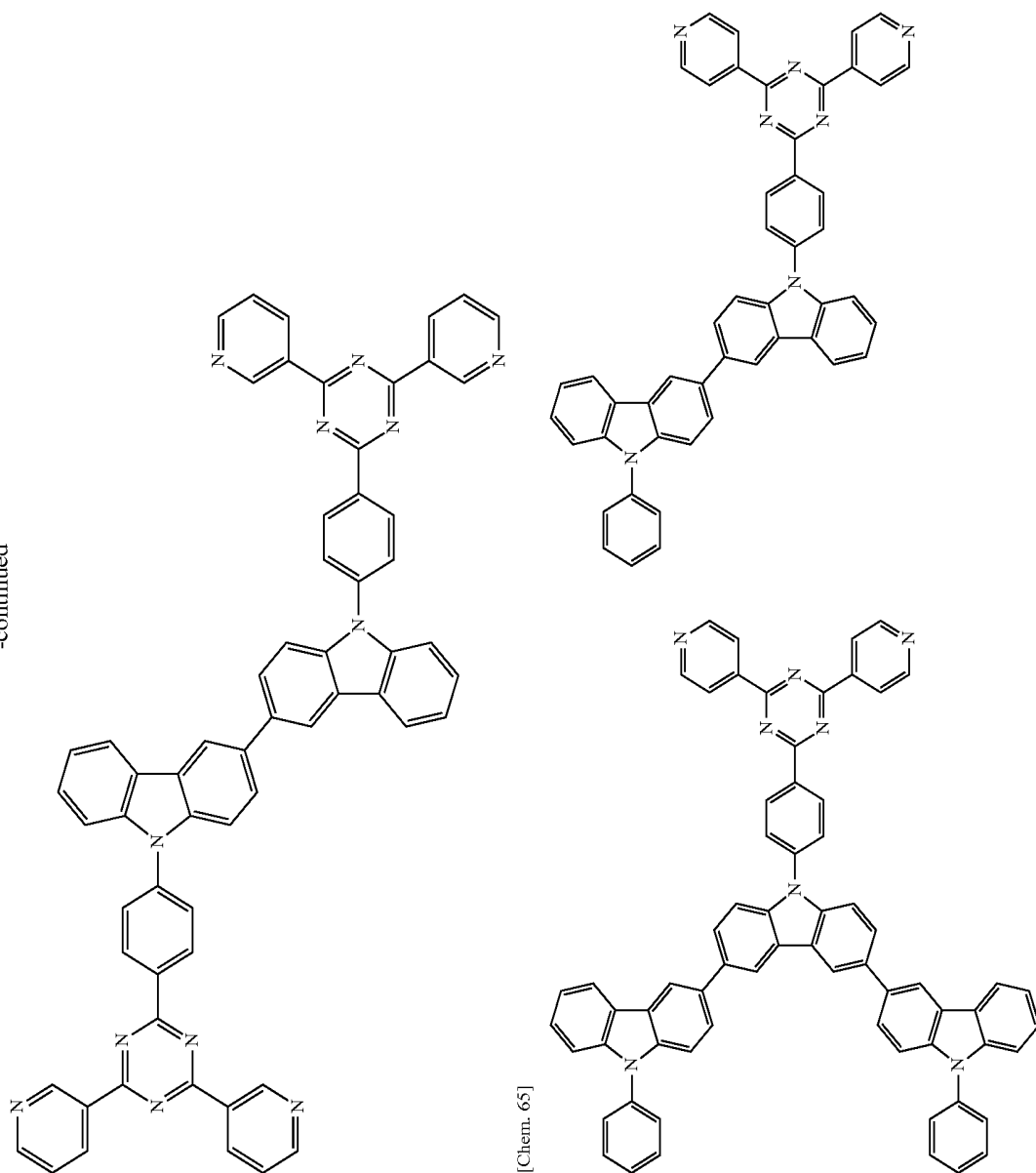
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[Chem. 64]

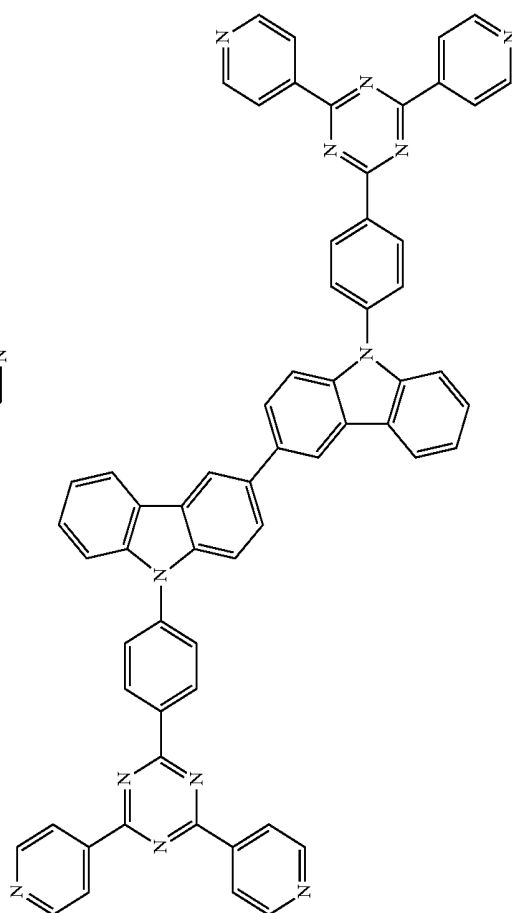
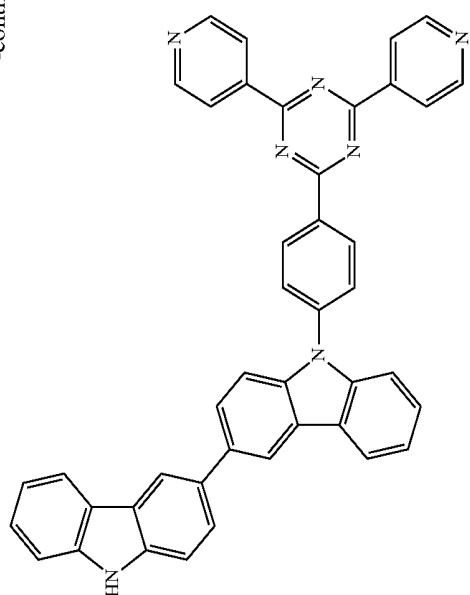
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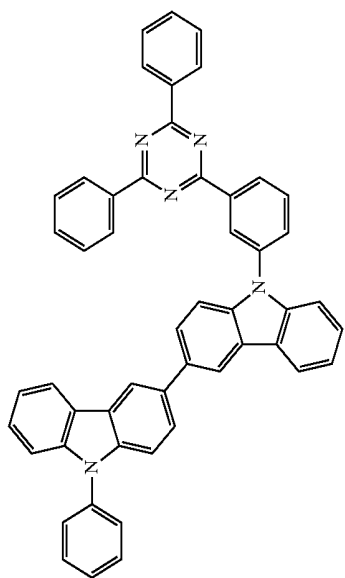
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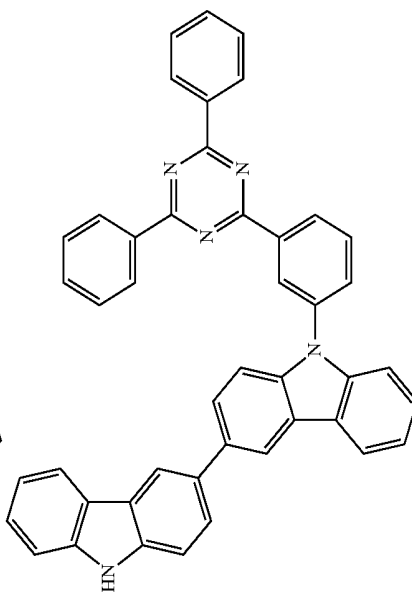
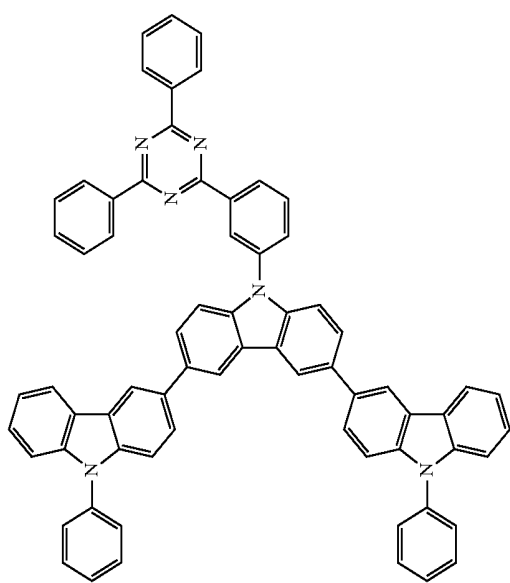
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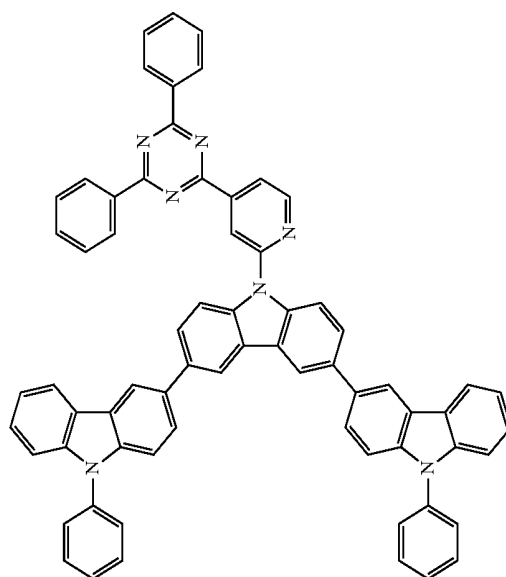
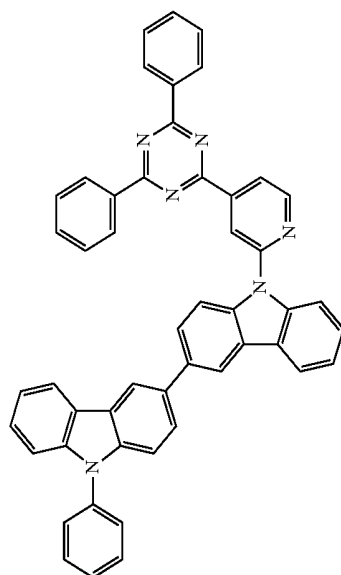
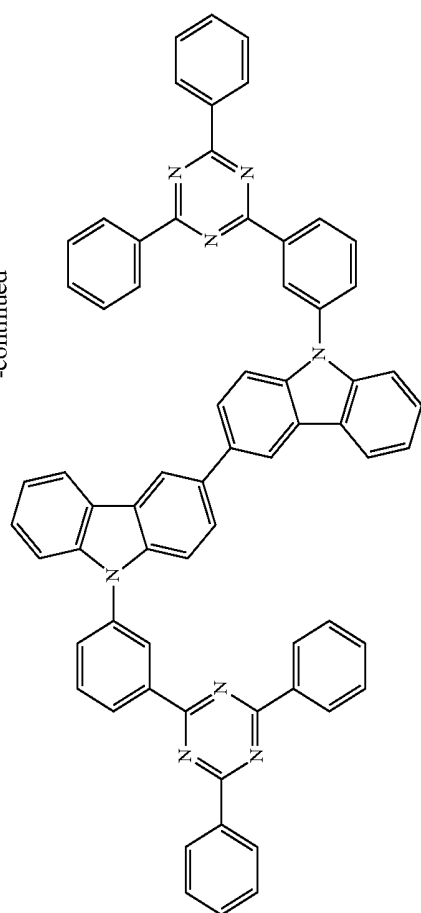
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[Chem. 66]



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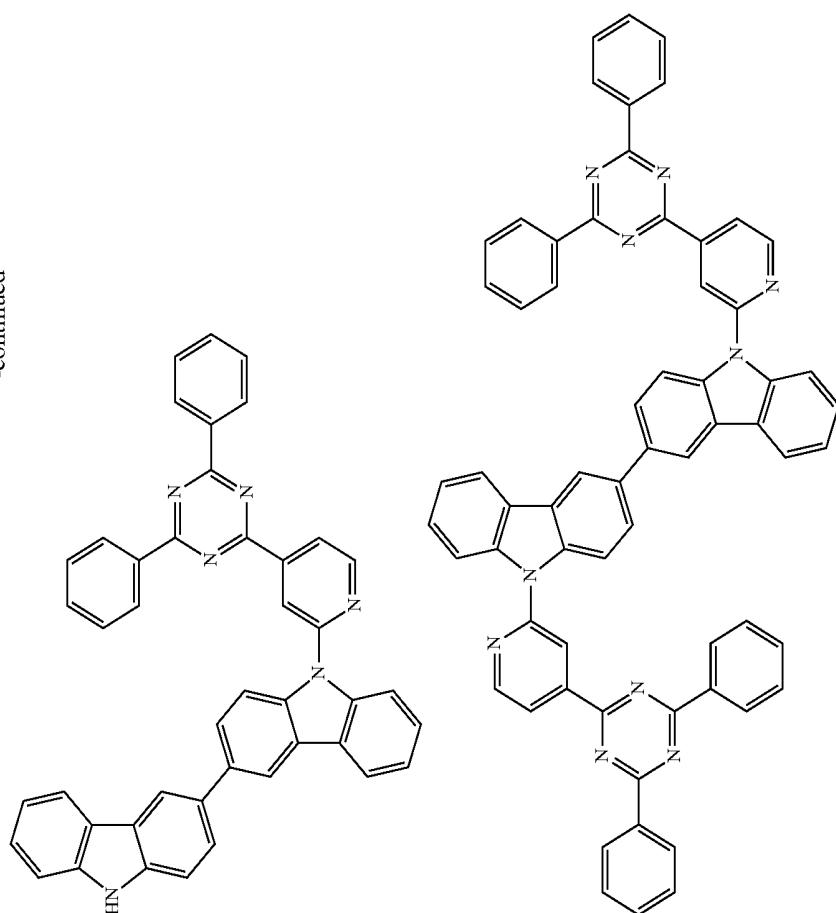


[Chem. 67]

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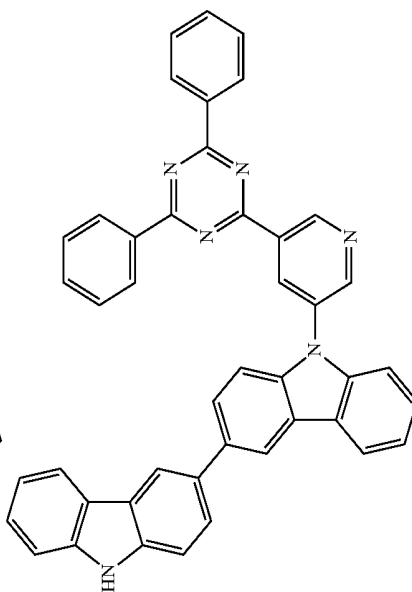
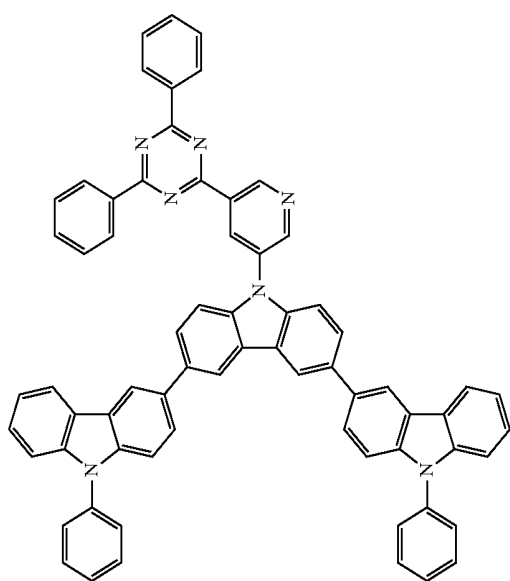
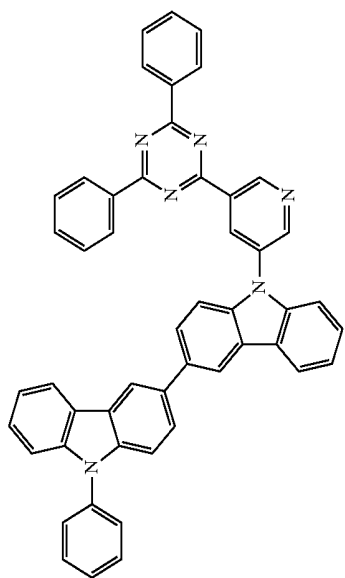
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203

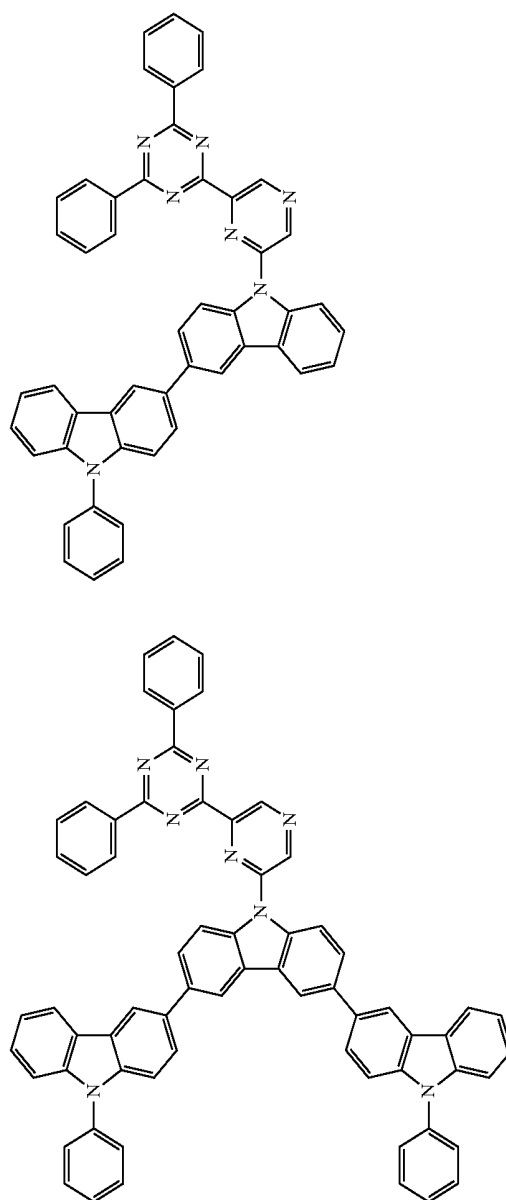
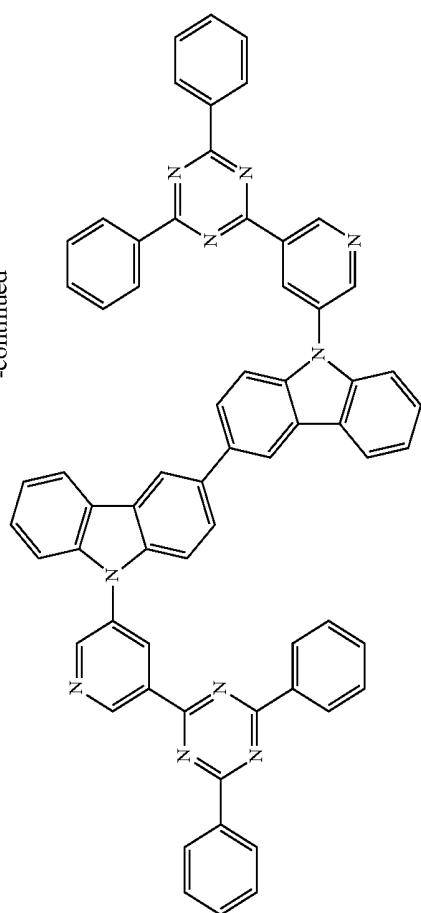
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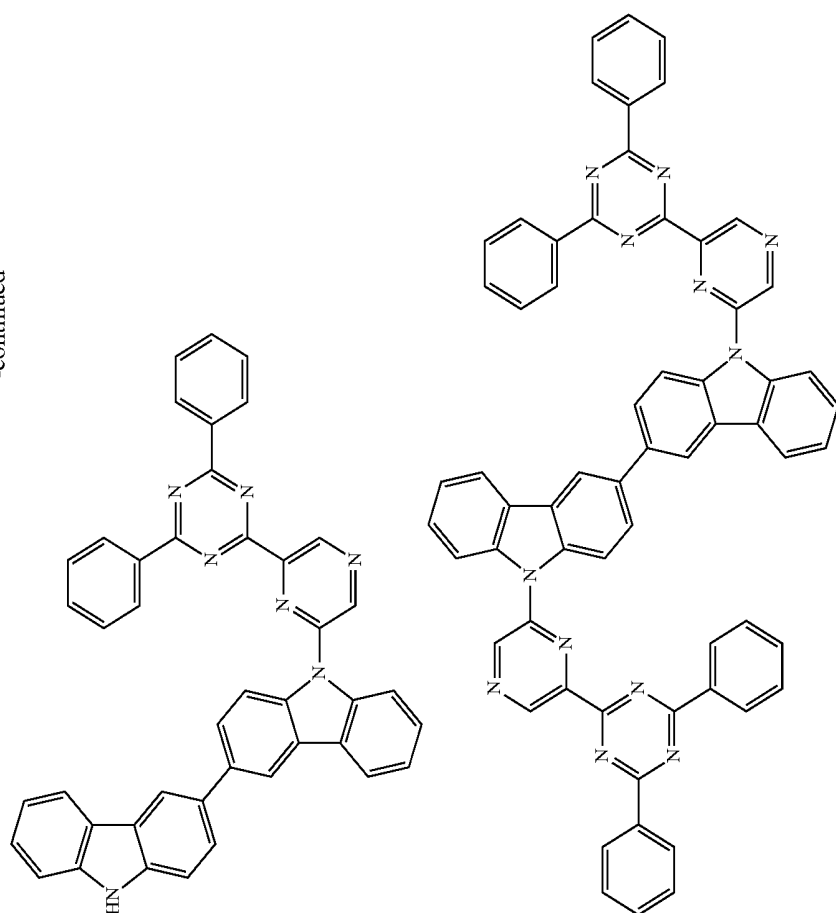


[Chem. 68]

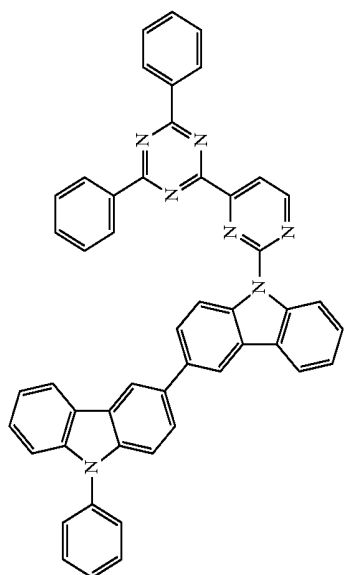
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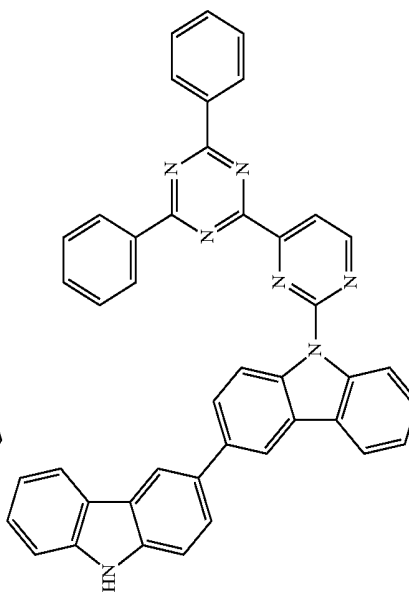
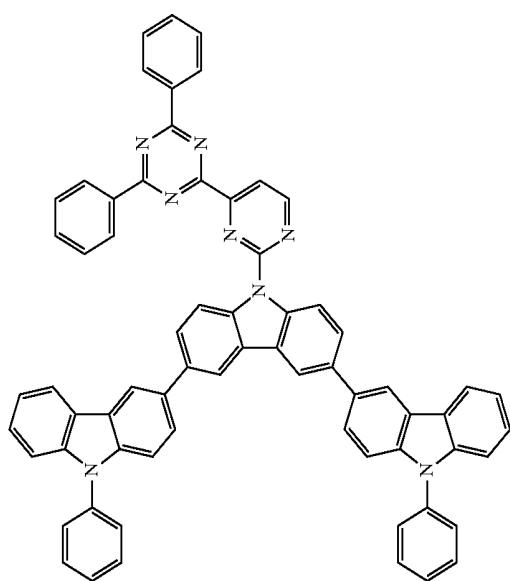
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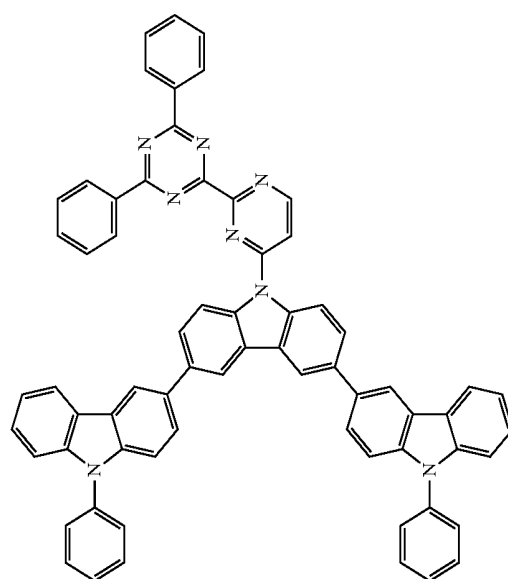
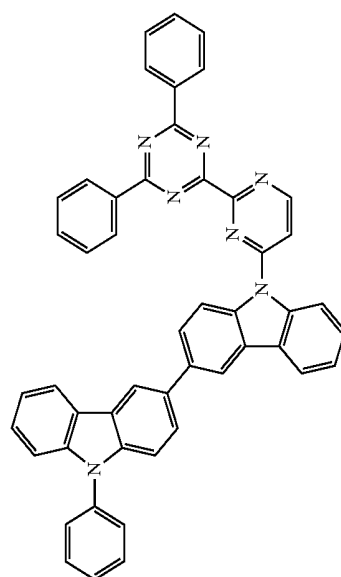
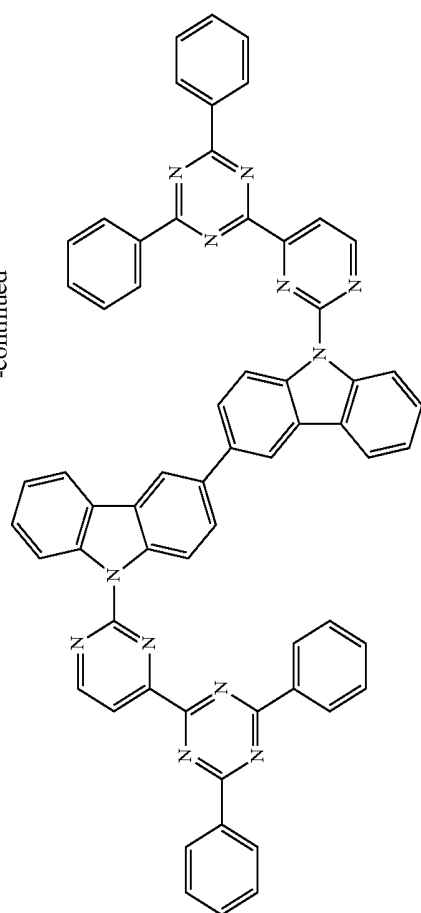
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[Chem. 70]

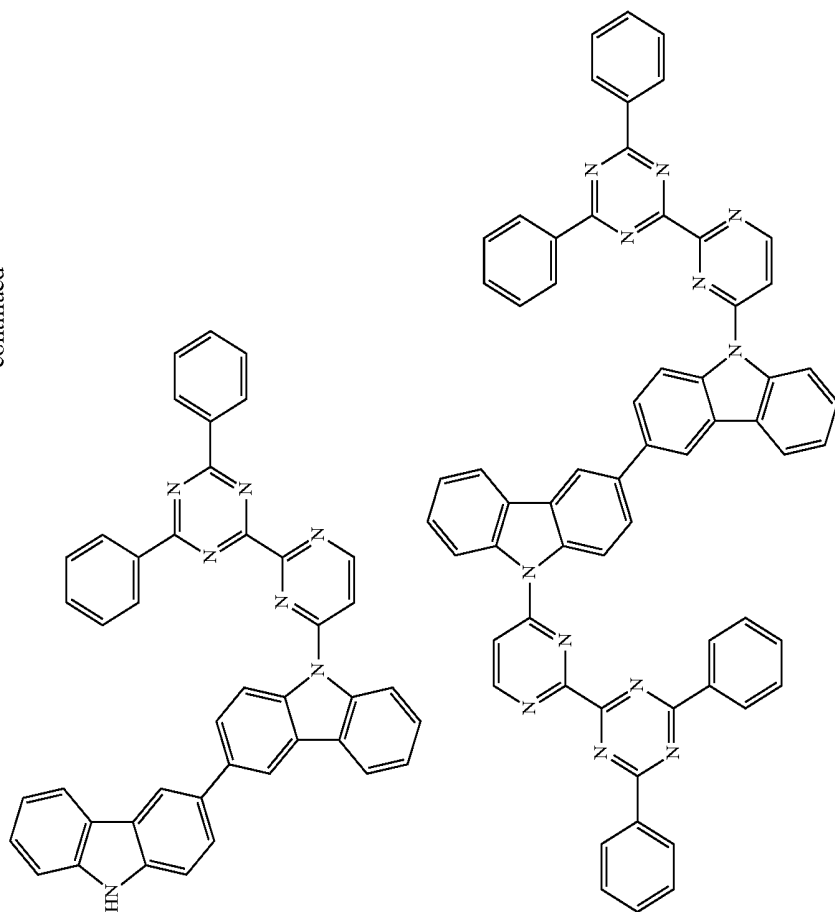


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[Chem. 71]

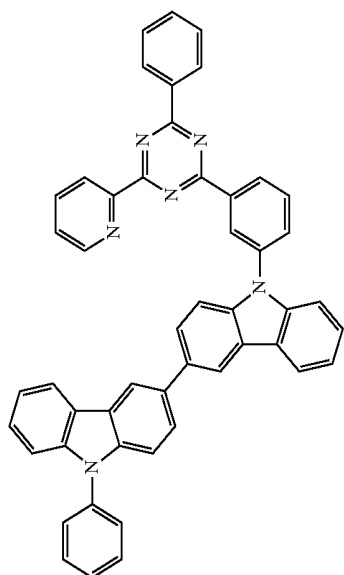
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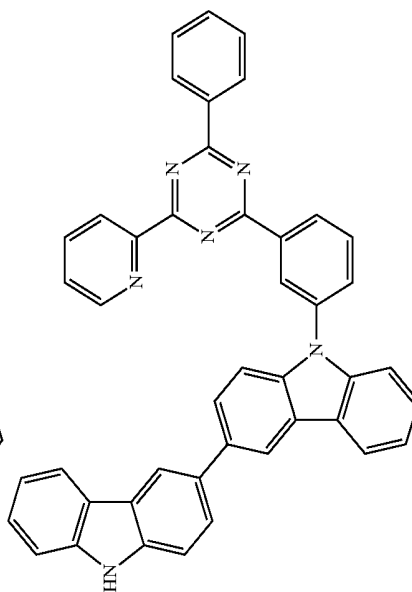
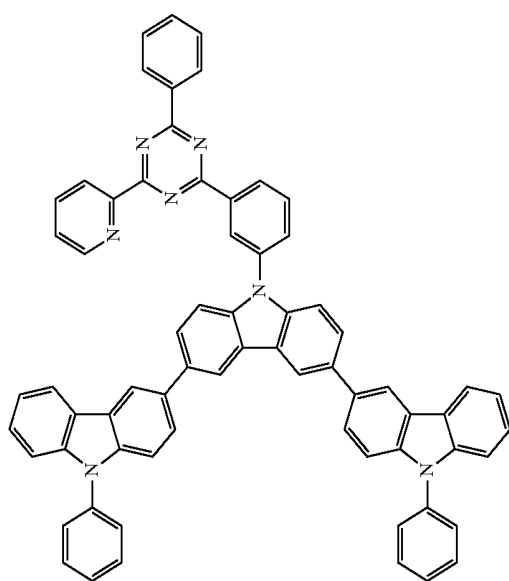
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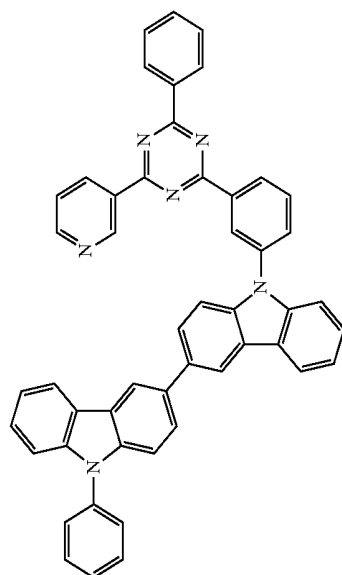
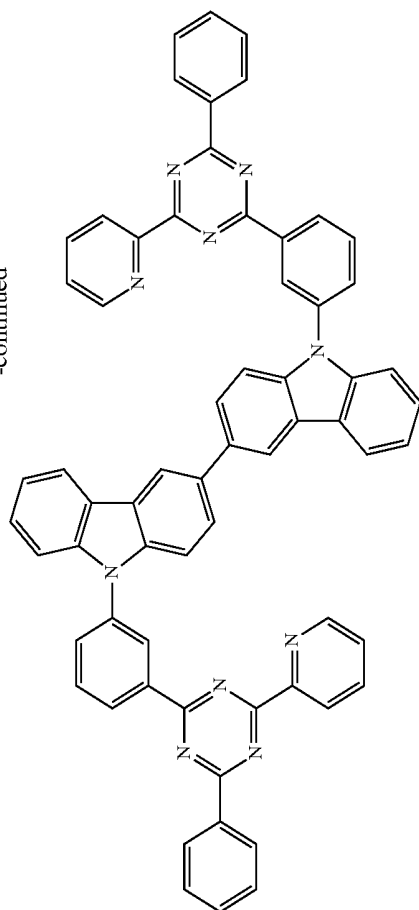
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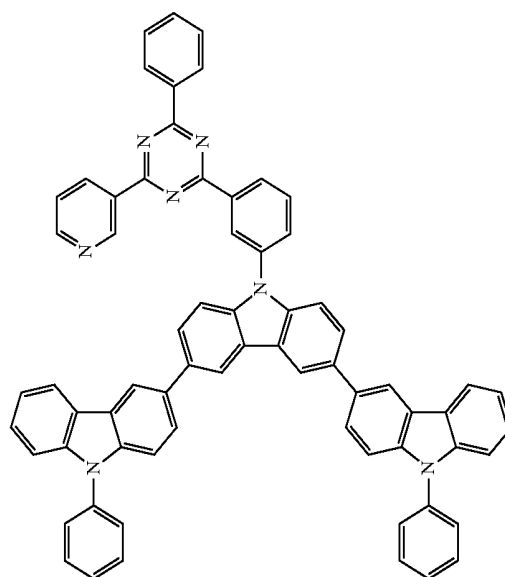
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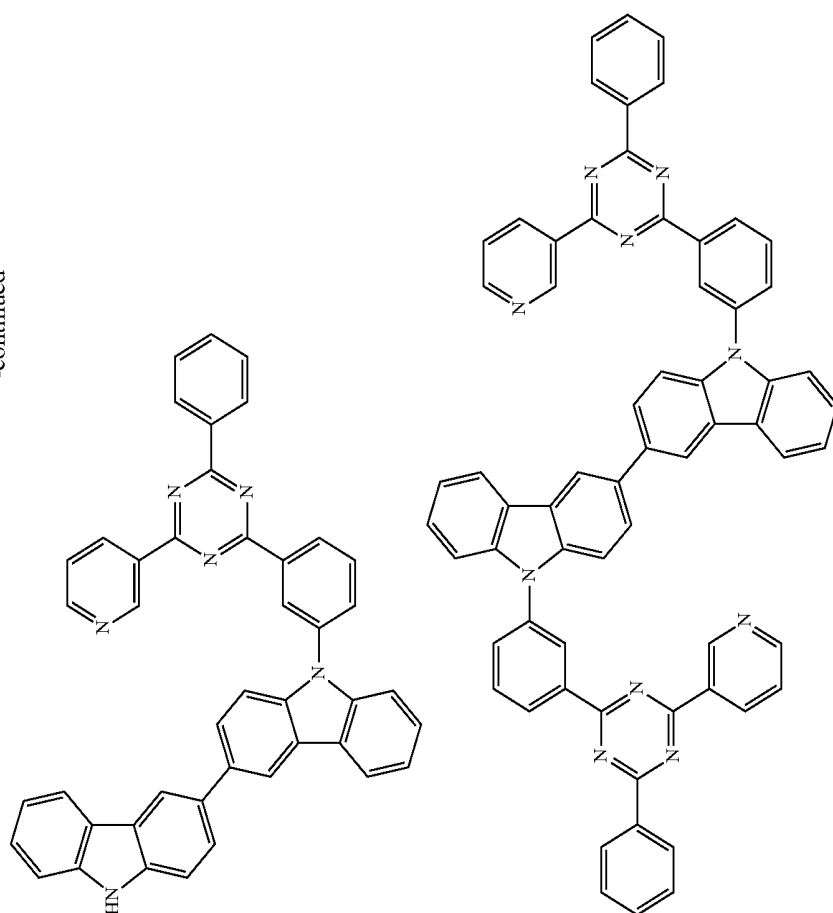
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[Chem. 73]



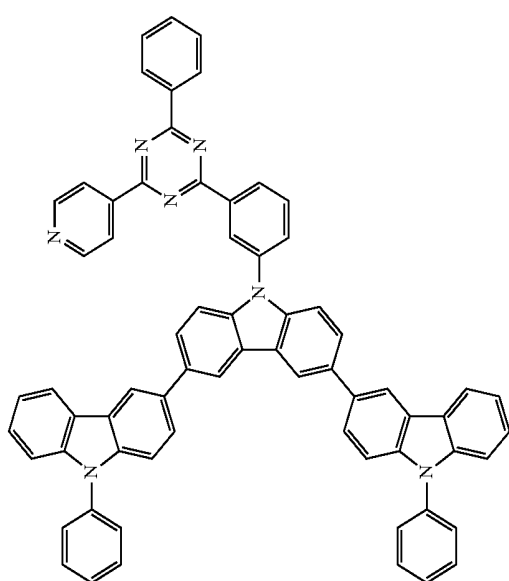
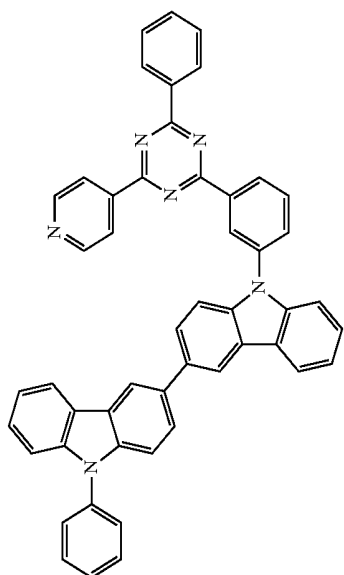
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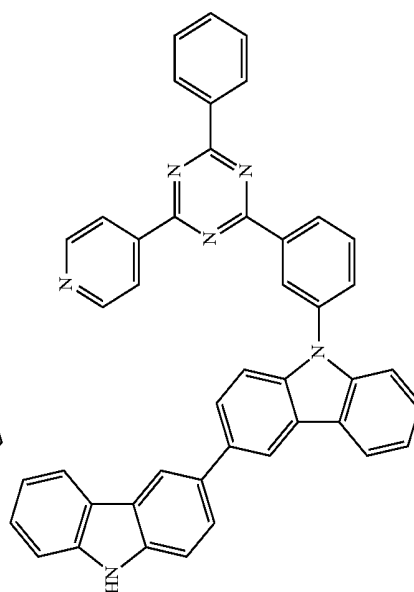
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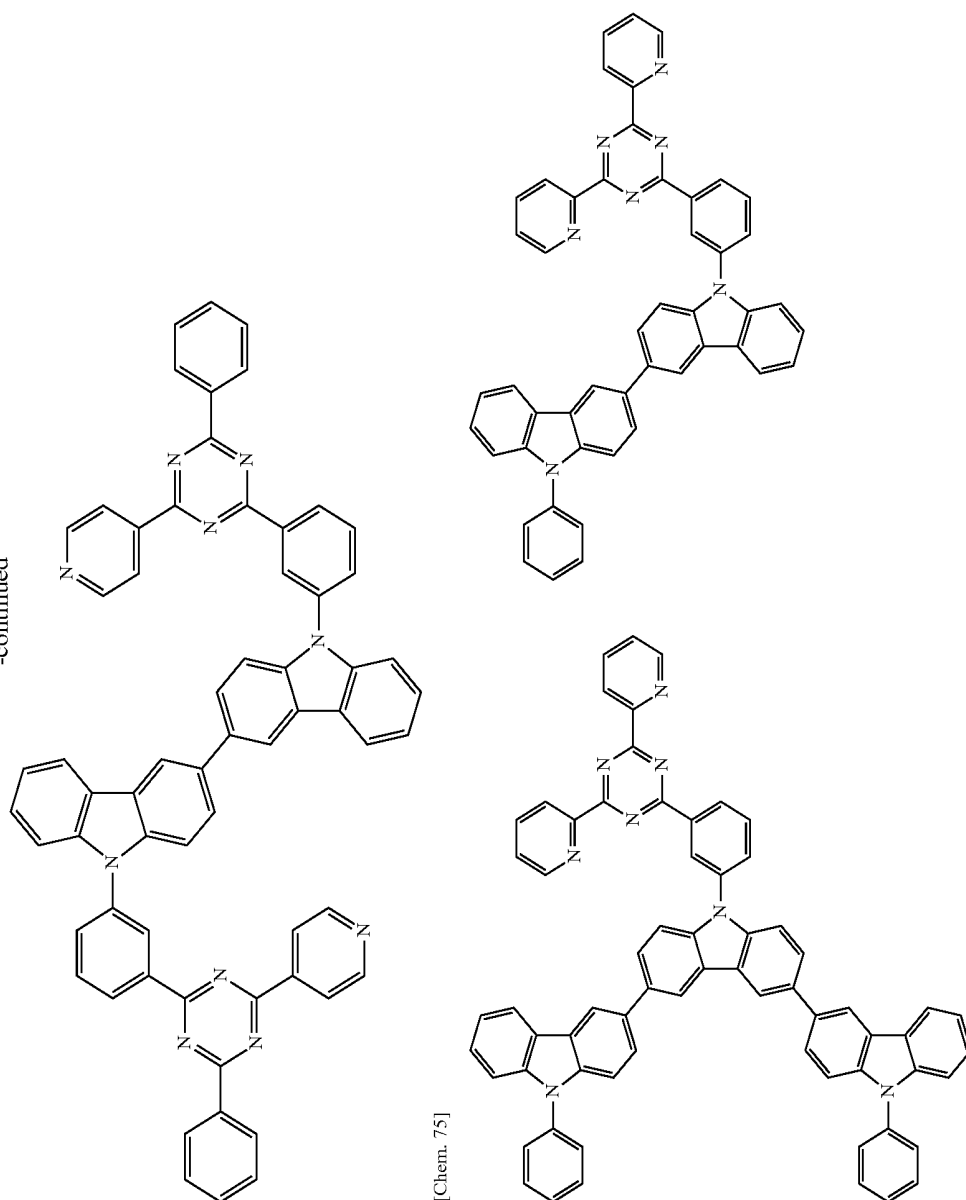
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[Chem. 74]



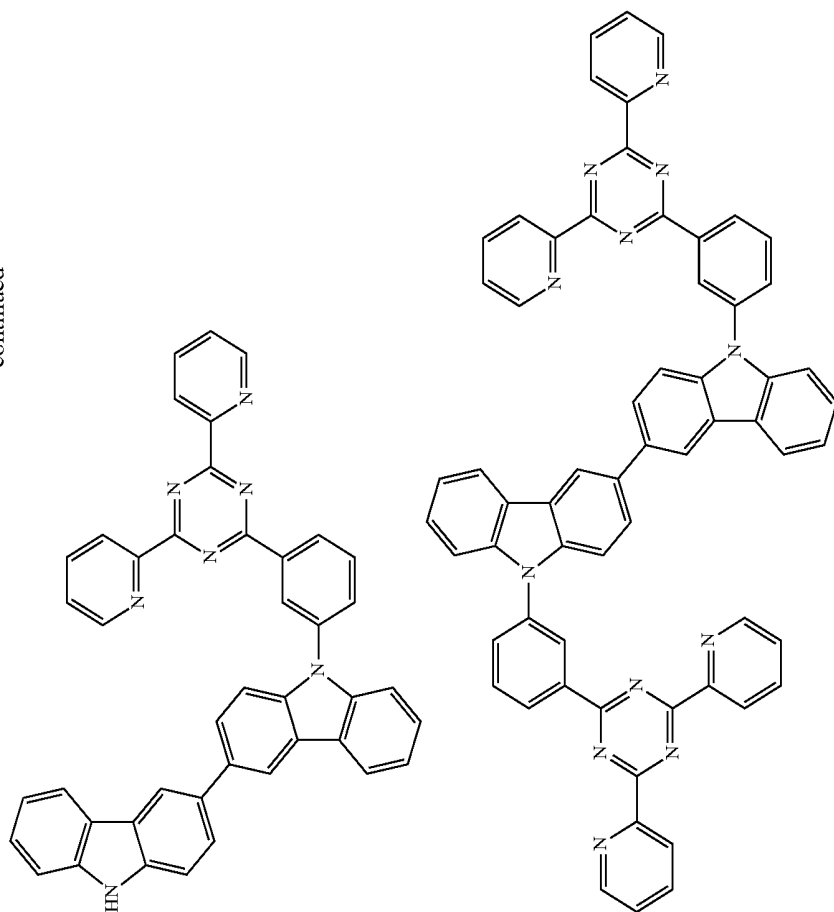
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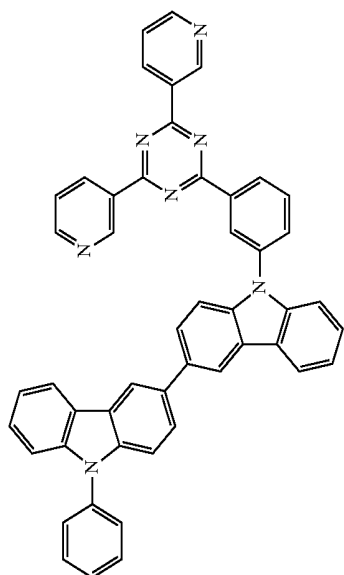
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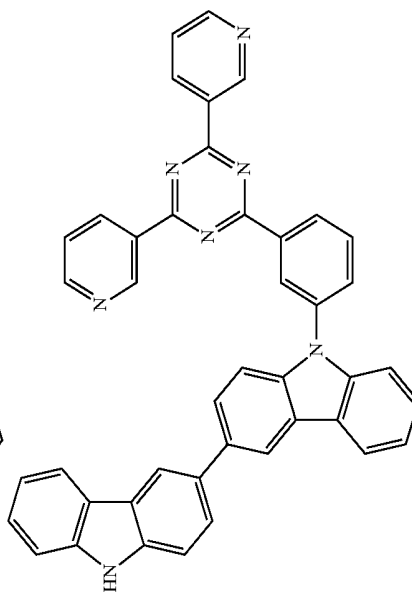
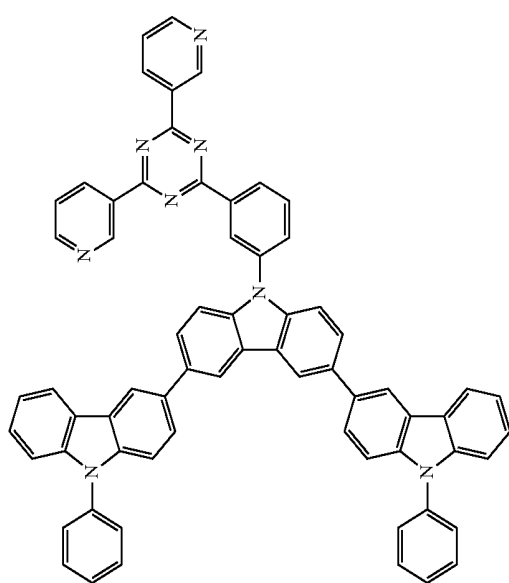
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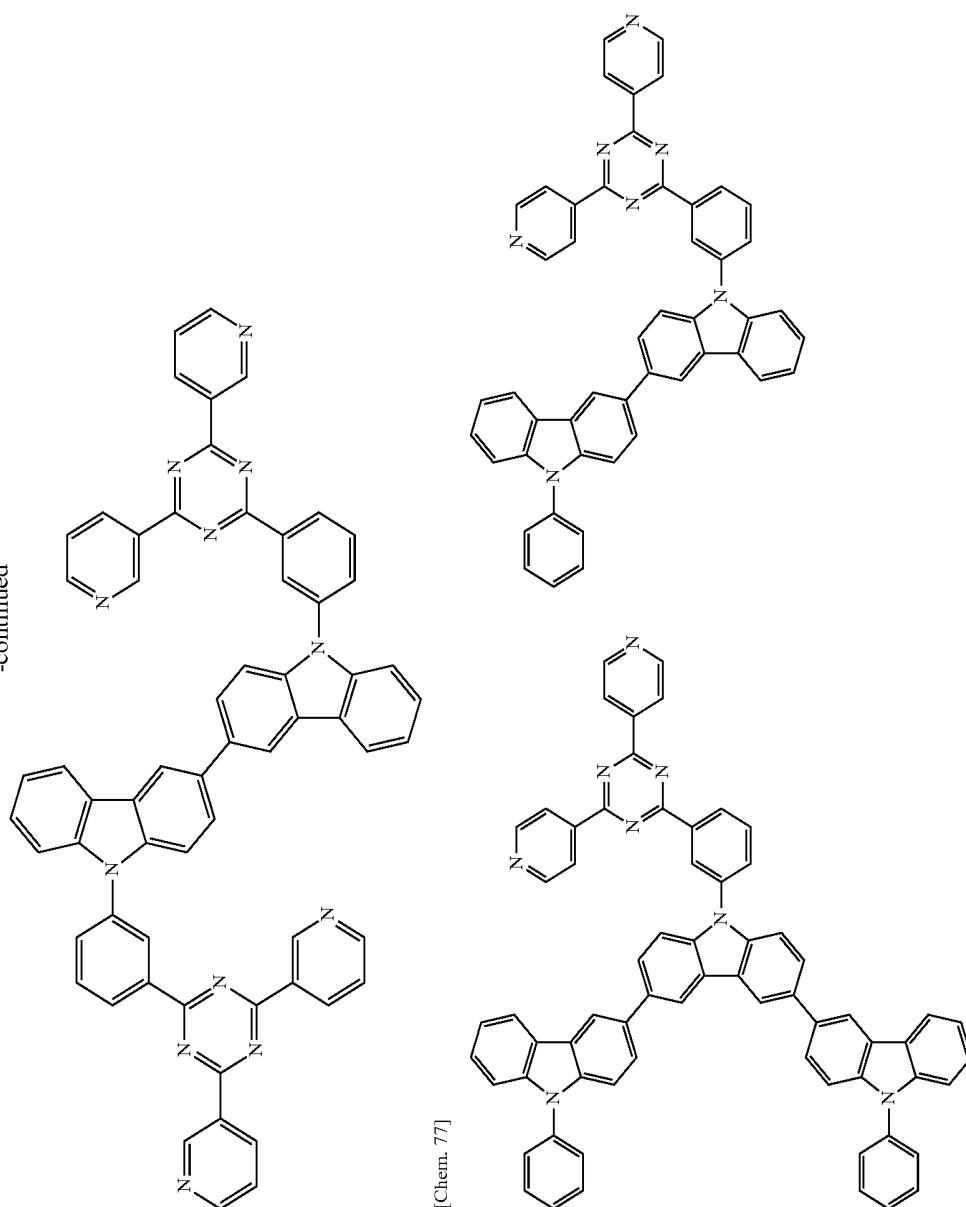
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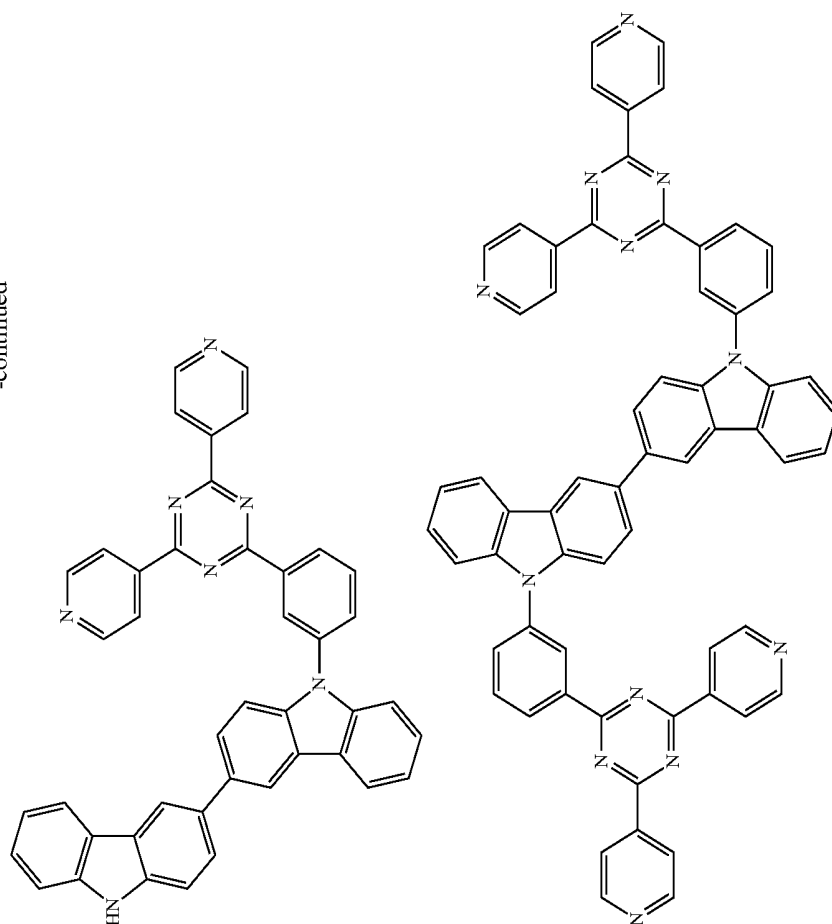
[Chem. 76]



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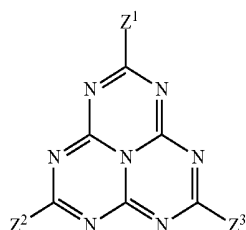


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Examples of the preferred delayed fluorescent material include compounds represented by the following general formulae. The entire description of WO 2013/133359 including the paragraphs 0007 to 0032 and 0079 to 0084 is incorporated herein by reference as a part of the description of the present application.

[Chem. 78]

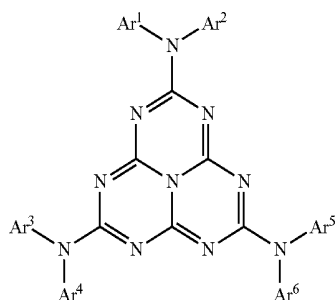
General Formula (211)



[In the general formula (211), Z¹, Z² and Z³ each independently represent a substituent.]

[Chem. 79]

General Formula (212)

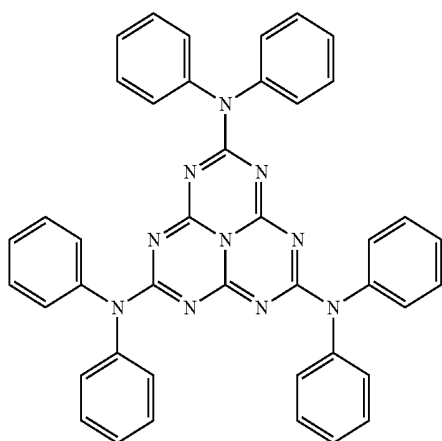


[In the general formula (212), Ar¹, Ar², Ar³, Ar⁴, Ar⁵ and Ar⁶ each independently represent a substituted or unsubstituted aryl group.]

Specific examples of the compound represented by the general formula (212) include the compound represented by the following structural formula.

[Chem. 80]

Compound 4001



Specific examples of the compound represented by the general formula (212) include the compounds shown in the

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following table. Here, Ar¹, Ar², Ar³, Ar⁴, Ar⁵ and Ar⁶ are the same as each other, and are expressed by Ar.

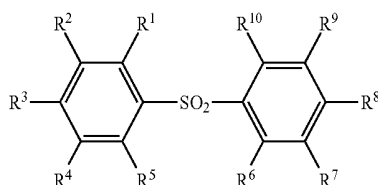
TABLE 21

Compound No.	Ar
4002	4-fluorophenyl
4003	3-fluorophenyl
4004	2-fluorophenyl
4005	3,5-difluorophenyl
4006	2,4,6-trifluorophenyl
4007	4-methylphenyl
4008	3-methylphenyl
4009	2-methylphenyl
4010	3,5-dimethylphenyl
4011	2,4,6-trimethylphenyl
4012	4-ethylphenyl
4013	3-ethylphenyl
4014	2-ethylphenyl
4015	3,5-diethylphenyl
4016	4-propylphenyl
4017	3-propylphenyl
4018	3,5-dipropylphenyl
4019	4-tert-butylphenyl
4020	3-tert-butylphenyl
4021	3,5-di-tert-butylphenyl
4022	1-naphthyl
4023	2-naphthyl

Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of WO 2013/161437 including the paragraphs 0008 to 0054 and 0101 to 0121 is incorporated herein by reference as a part of the description of the present application.

[Chem. 81]

General Formula (221)



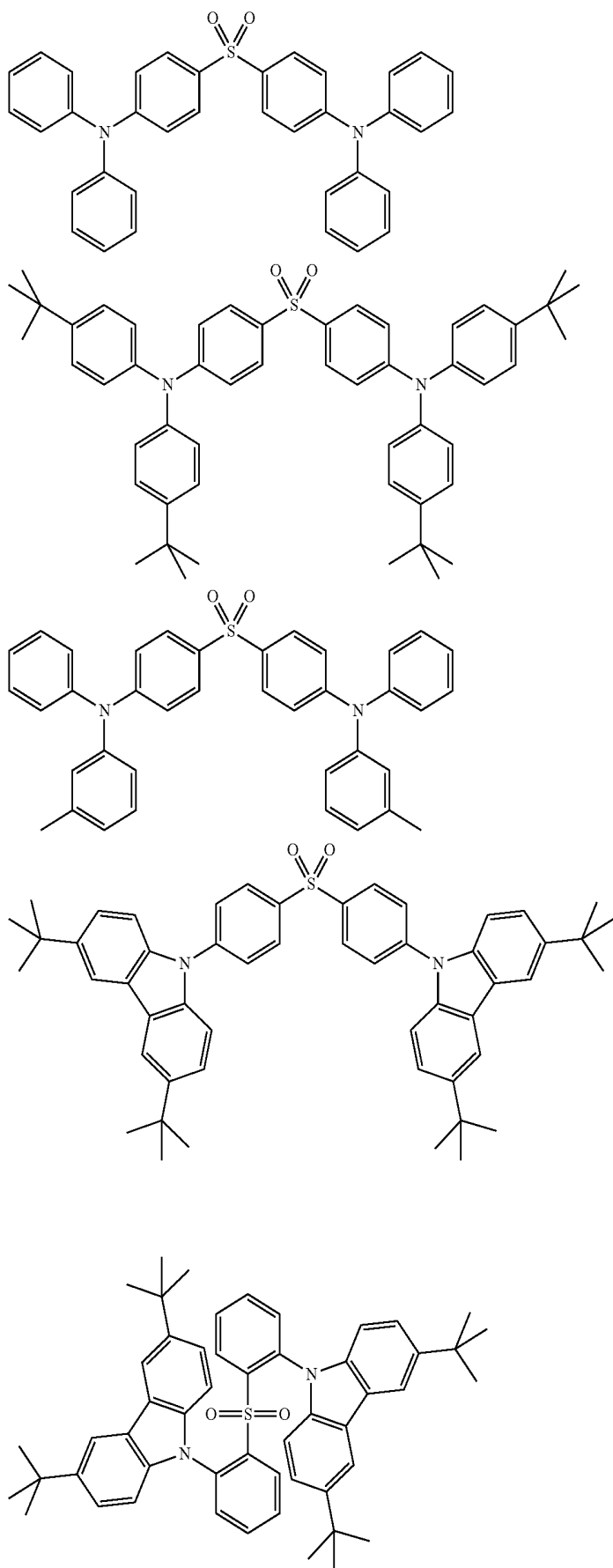
[In the general formula (221), R¹ to R¹⁰ each independently represent a hydrogen atom or a substituent, provided that at least one of R¹ to R¹⁰ represents a substituted or unsubstituted aryl group, a substituted or unsubstituted diarylamino group or a substituted or unsubstituted 9-carbazolyl group. R¹ and R², R² and R³, R³ and R⁴, R⁴ and R⁵, R⁵ and R⁶, R⁶ and R⁷, R⁷ and R⁸, R⁸ and R⁹, and R⁹ and R¹⁰ each may be bonded to each other to form a cyclic structure.]

Specific examples of the compound include the following compounds.

235

236

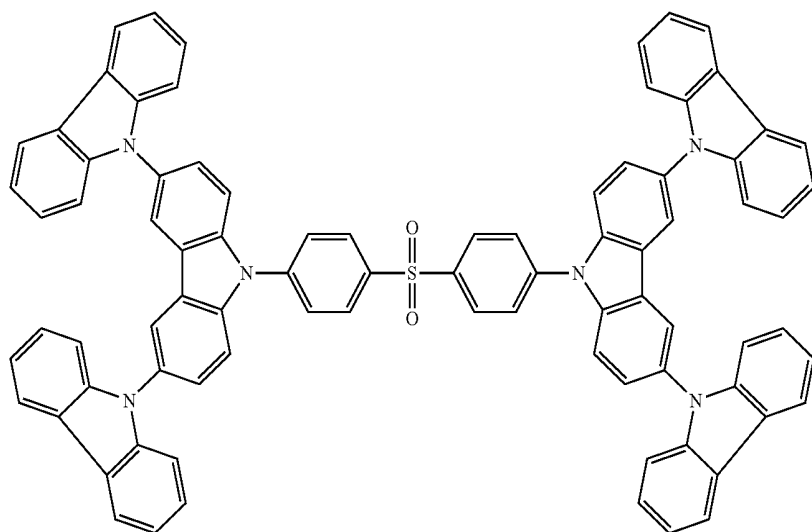
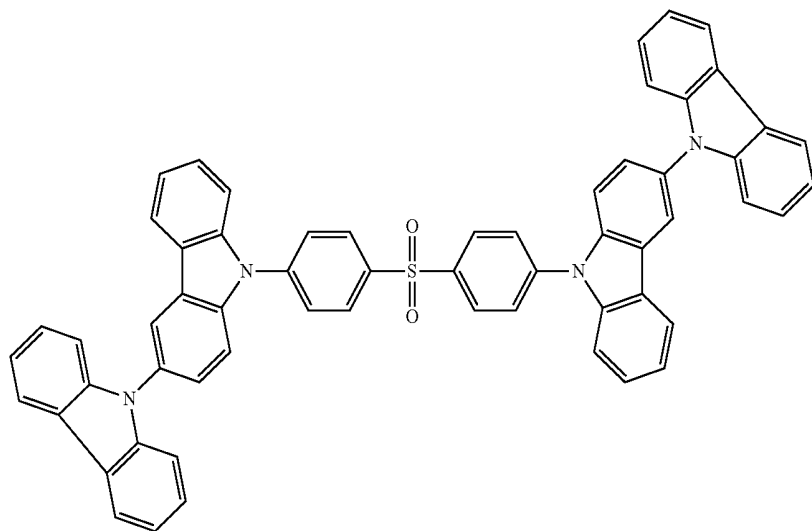
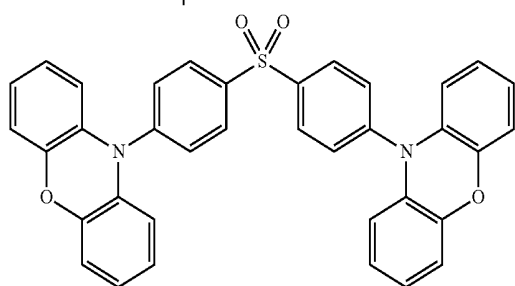
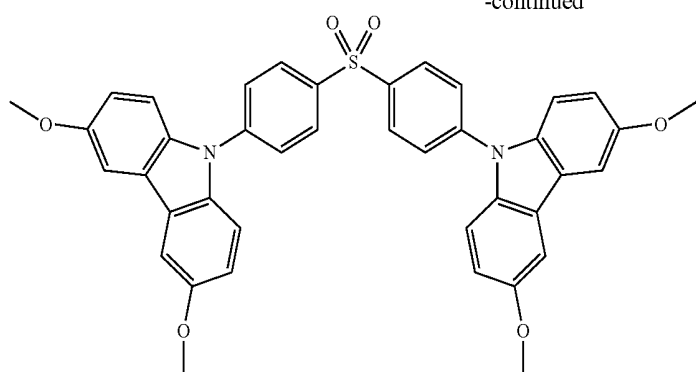
[Chem. 82]



237

238

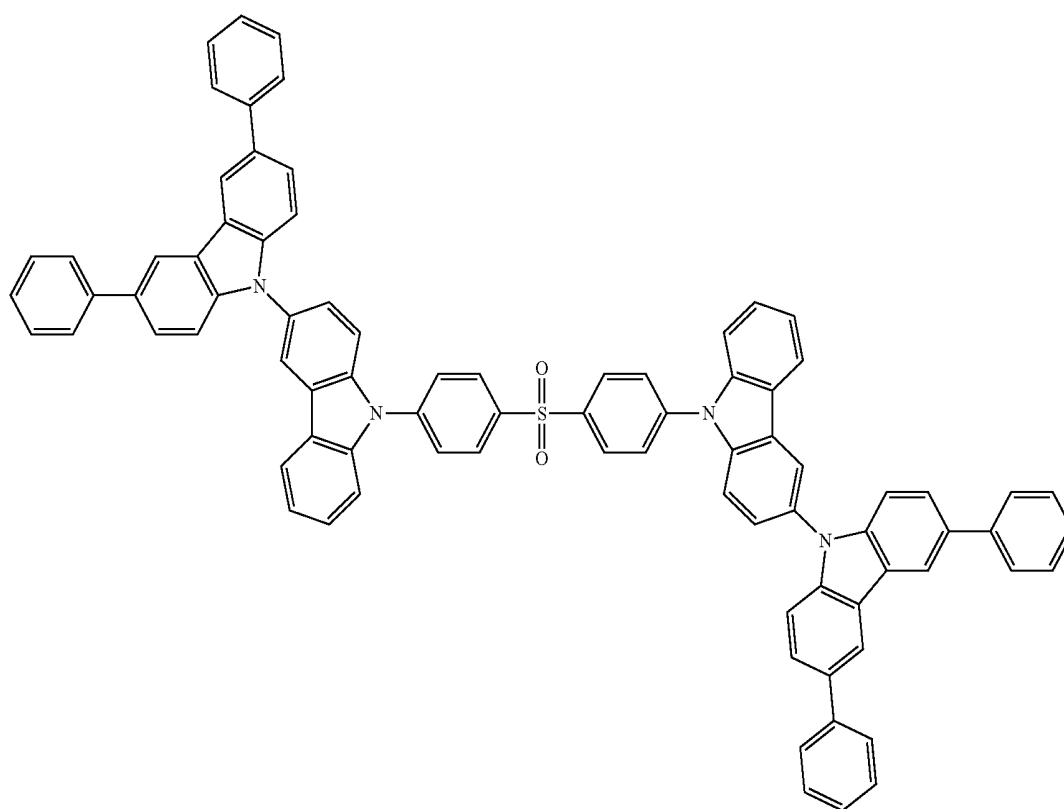
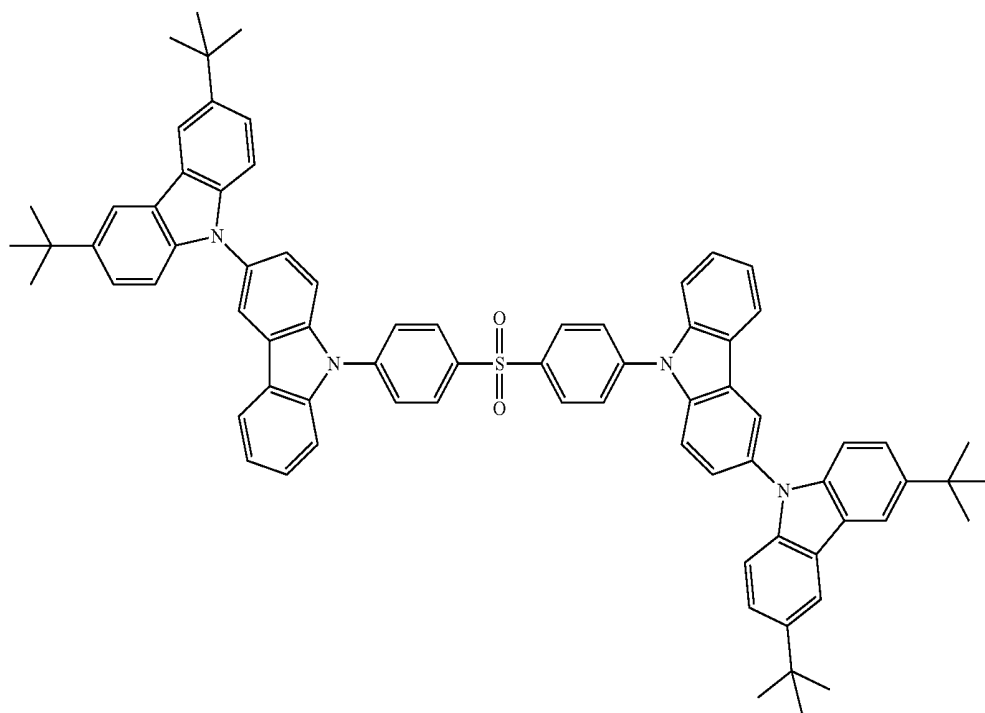
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239

240

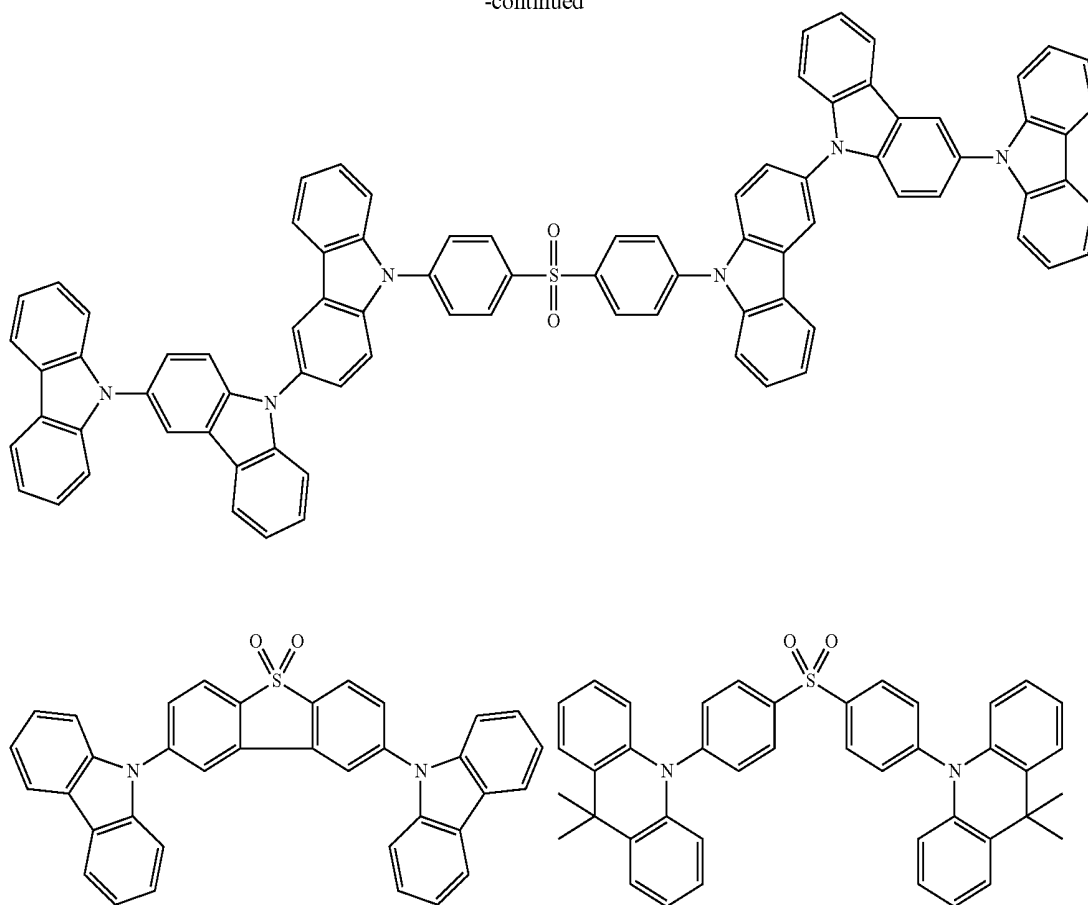
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241

242

-continued



35

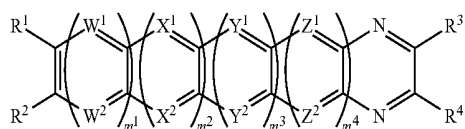
Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of JP-A-2014-9352 including the paragraphs 0007 to 0041 and 0060 to 0069 is incorporated herein by reference as a part of the description of the present application.

40

[Chem. 83]

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General Formula (231)



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[In the general formula (231), R¹ to R⁴ each independently represent a hydrogen atom or a substituted or unsubstituted (N,N-diarylamino)aryl group, provided that at least one of R¹ to R⁴ represents a substituted or unsubstituted (N,N-diarylamino)aryl group. Two aryl groups constituting the diarylamino moiety of the (N,N-diarylamino)aryl group may be bonded to each other. W¹, W², X¹, X², Y¹, Y², Z¹ and Z² each independently represent a carbon atom or a nitrogen atom. m¹ to m⁴ each independently represent 0, 1 or 2.]

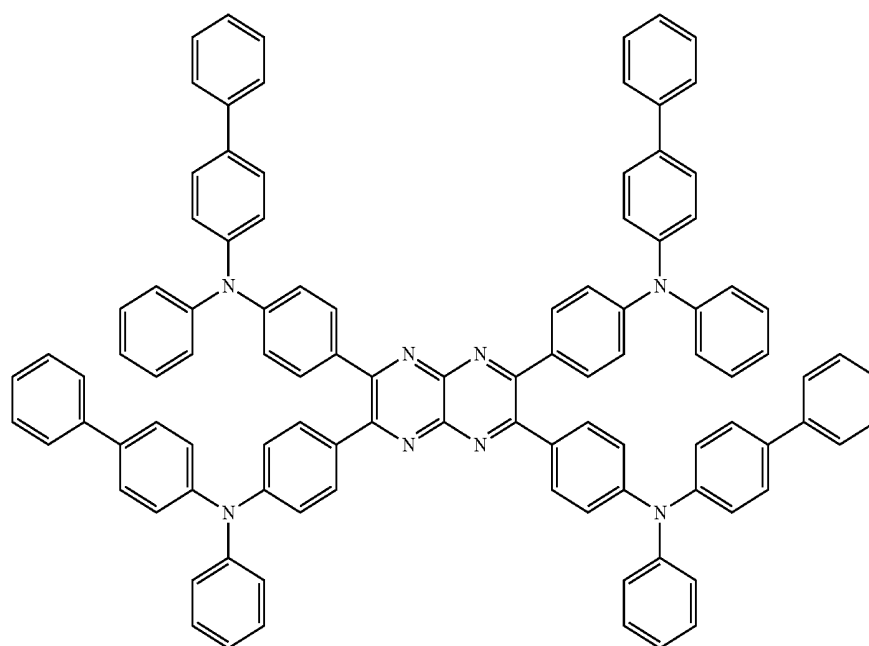
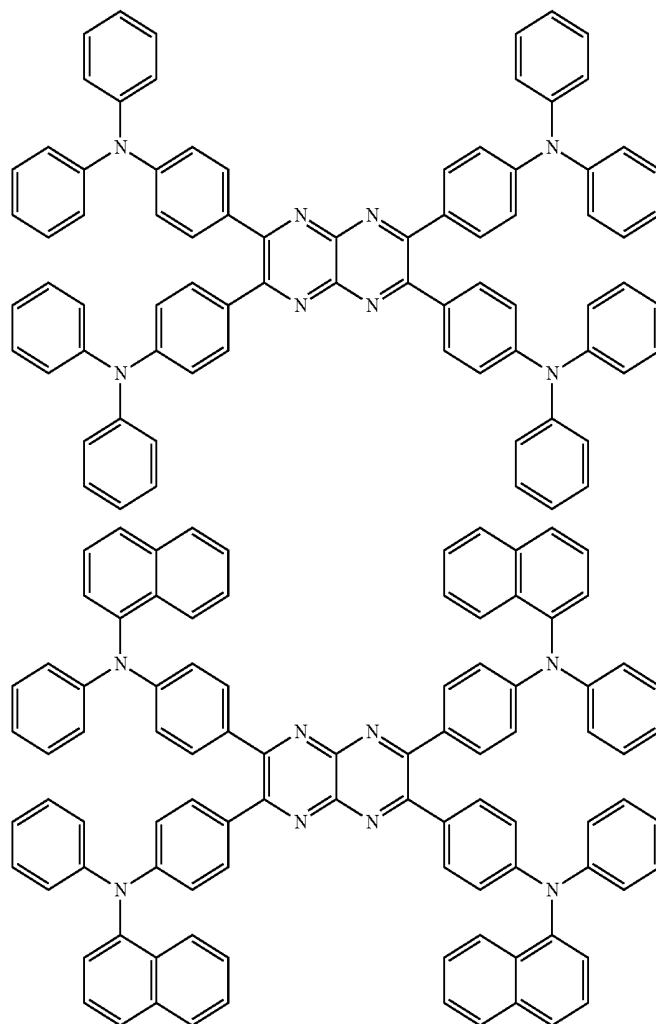
65

Examples of the compound include the following compounds.

243

244

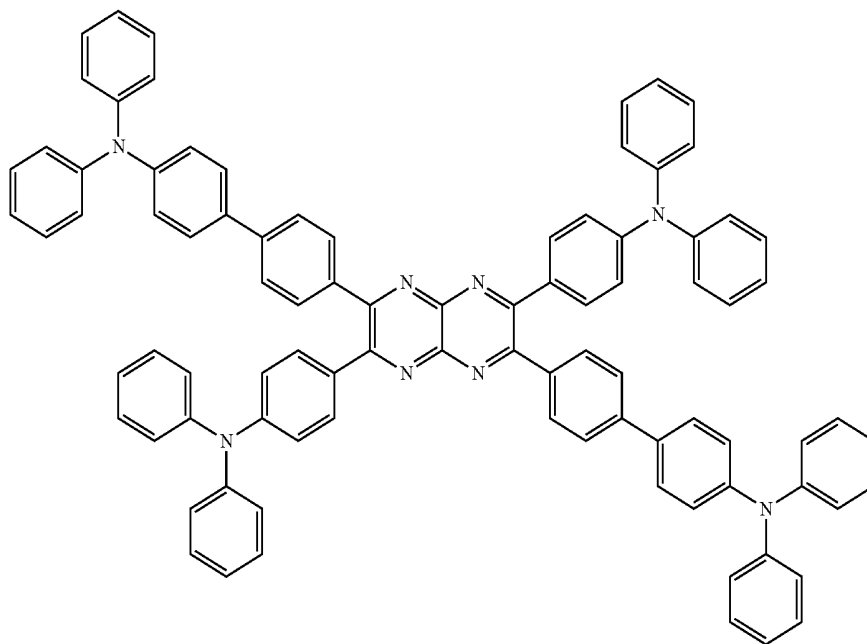
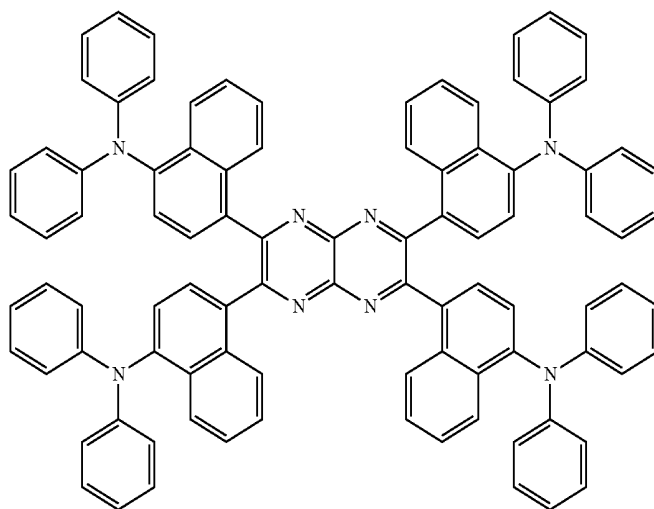
[Chem. 84]



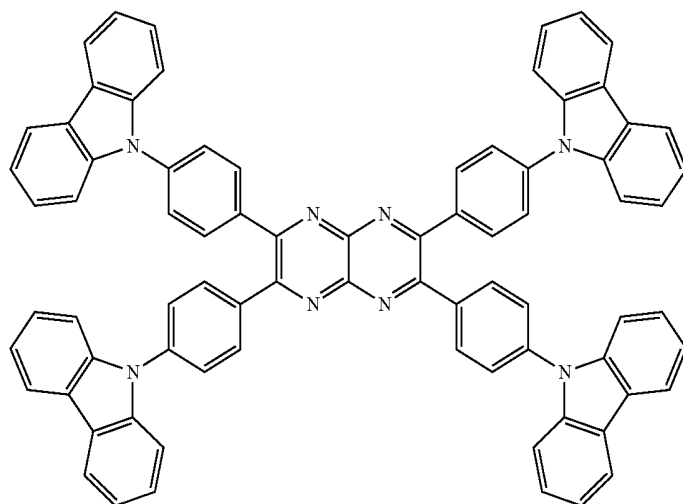
245

246

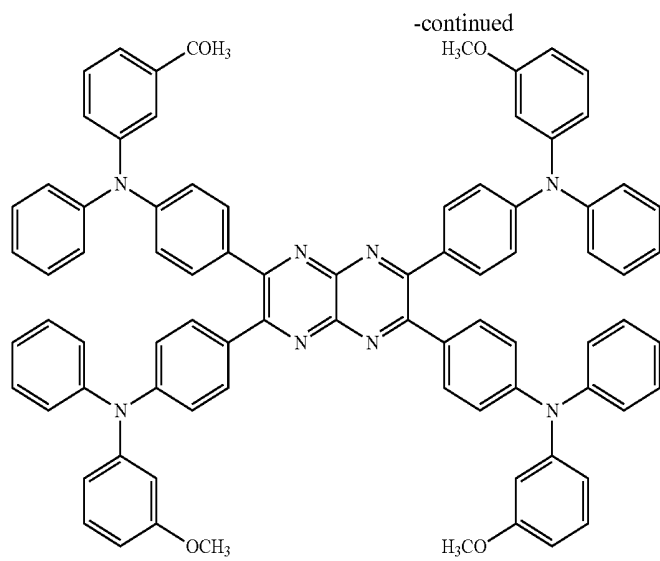
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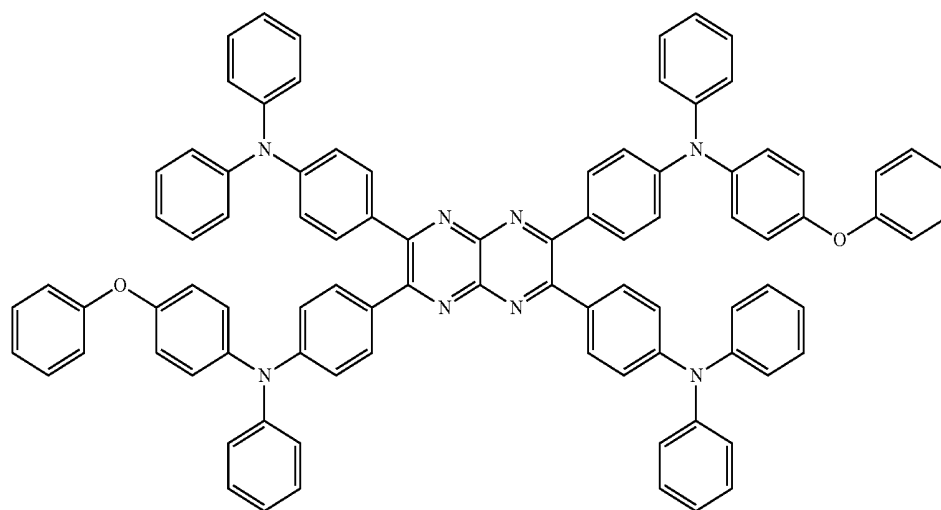
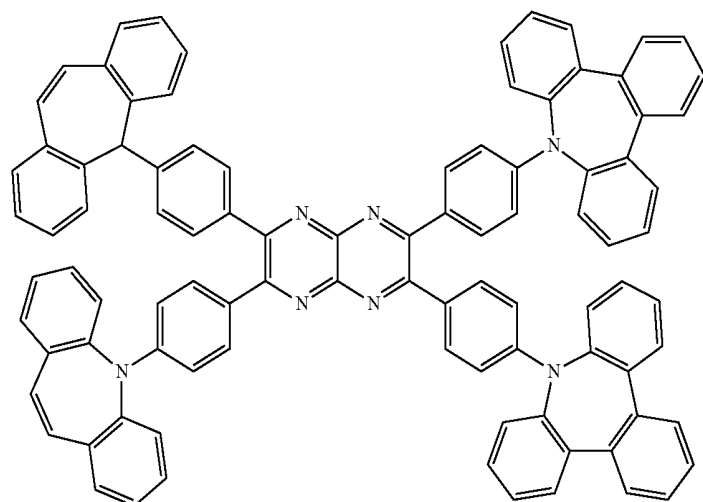
[Chem. 85]



247



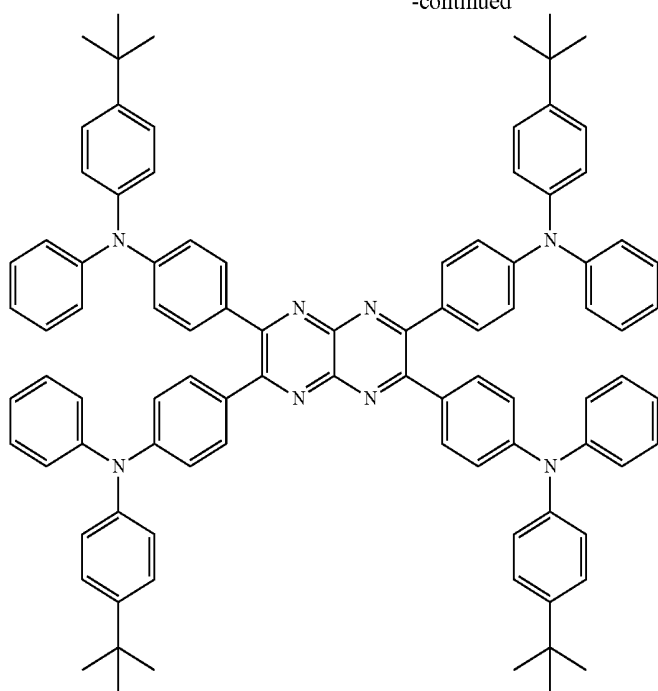
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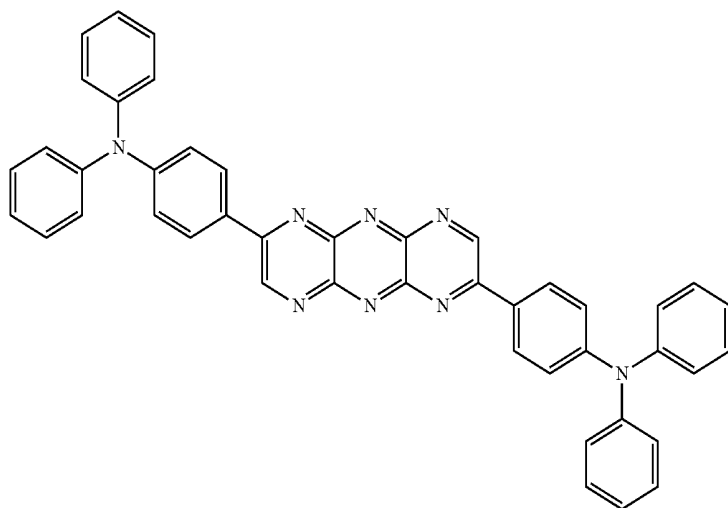
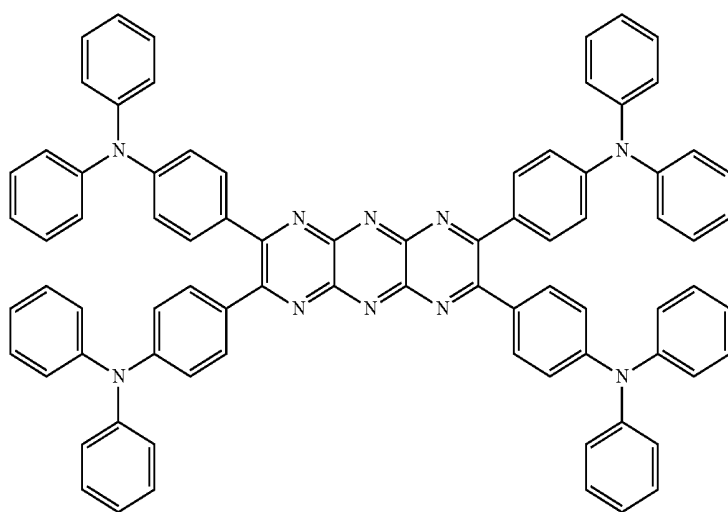
249

250

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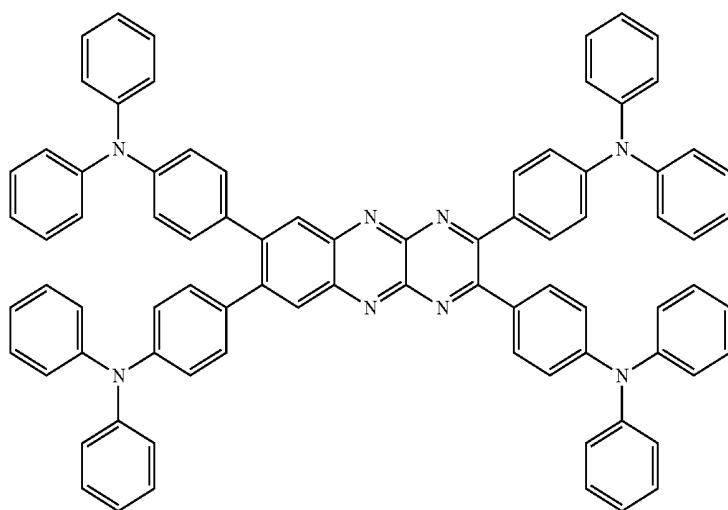
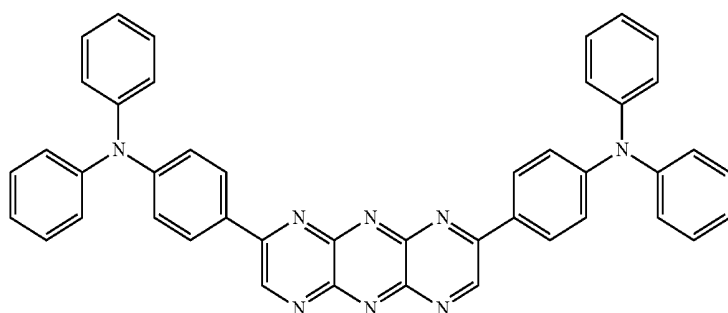
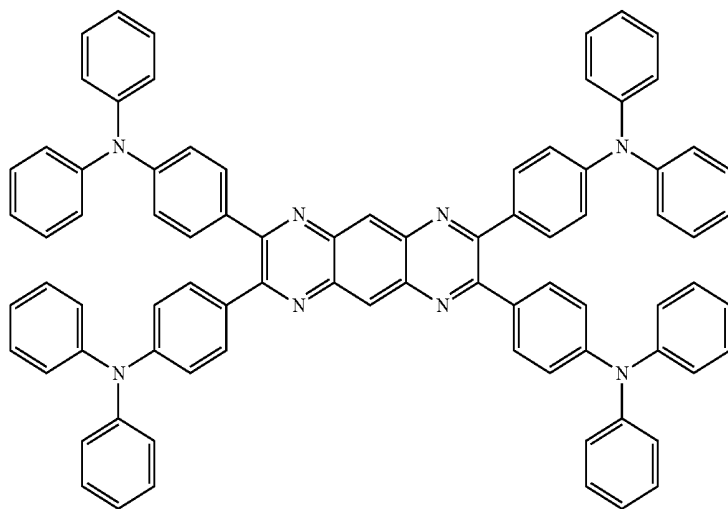
[Chem. 86]



251

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252

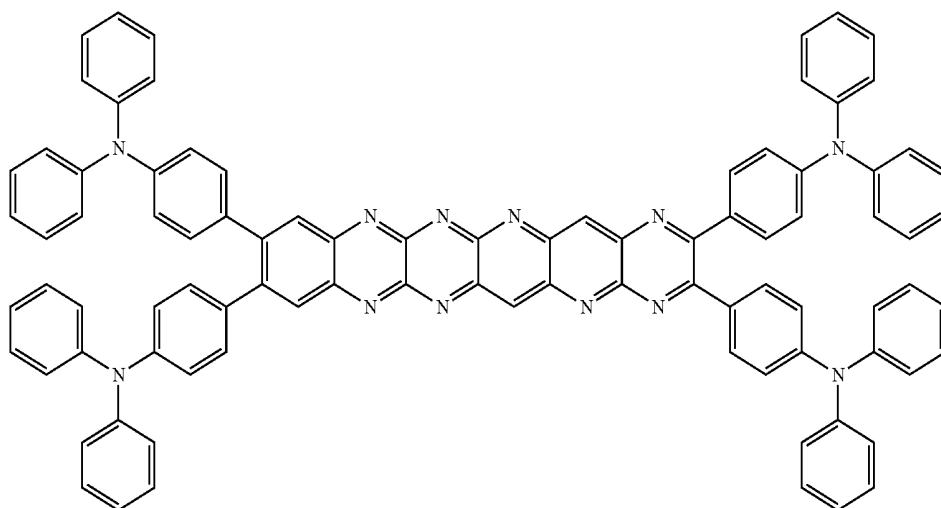
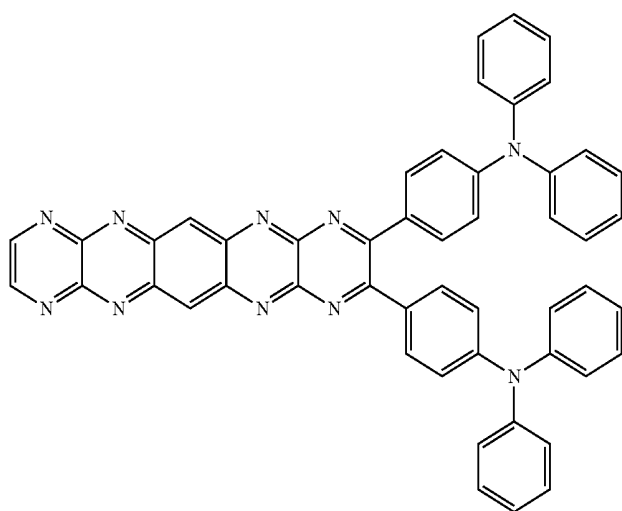
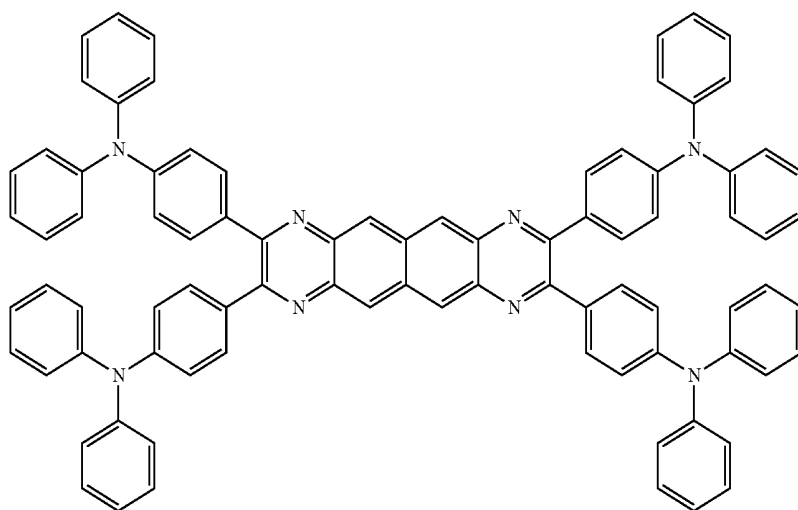


253

254

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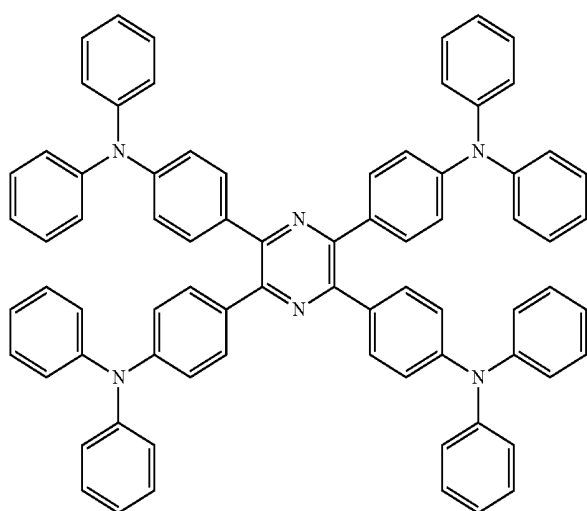
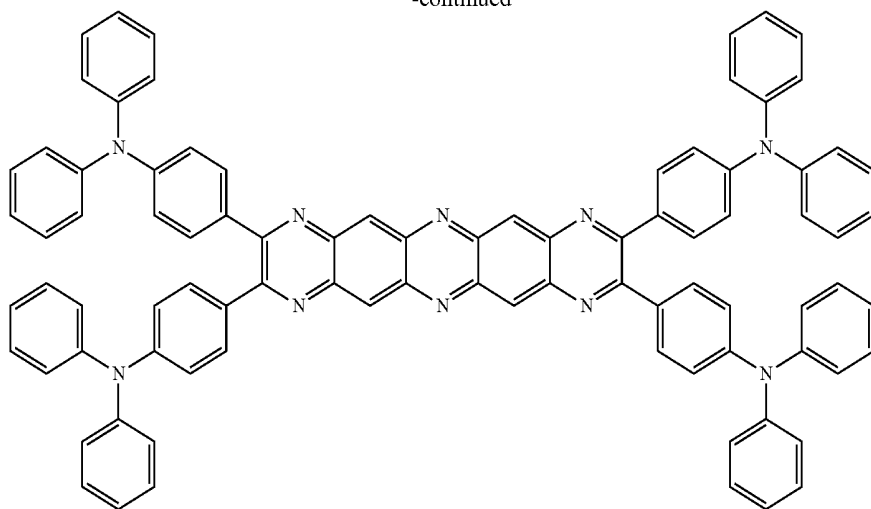
[Chem. 87]



255

256

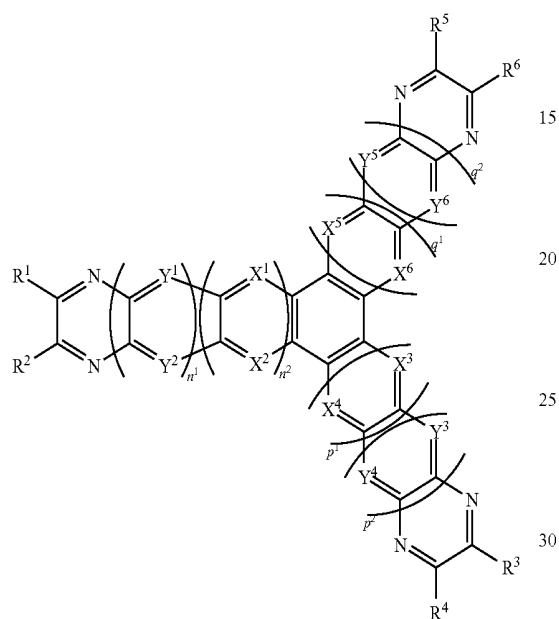
-continued



Examples of the preferred delayed fluorescent material include compounds represented by the following general formula. The entire description of JP-A-2014-9224 including the paragraphs 0008 to 0048 and 0067 to 0076 is incorporated herein by reference as a part of the description of the present application.

[Chem. 88]

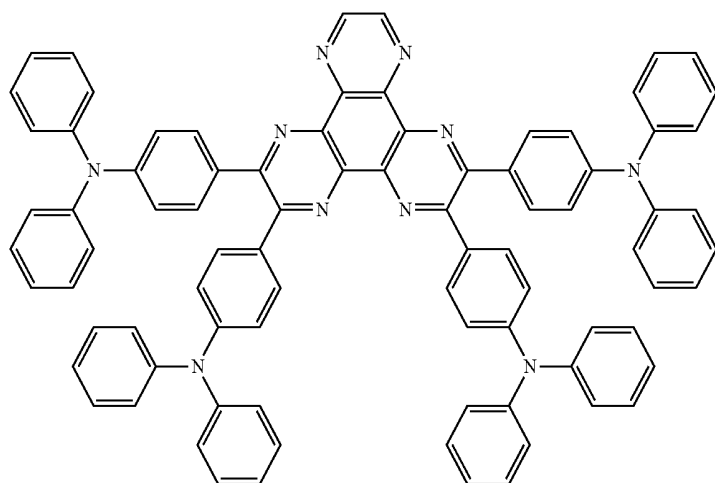
General Formula (241)



[In the general formula (241), R¹ to R⁶ each independently represent a hydrogen atom or a substituent, provided that at least one of R¹ to R⁶ represents a substituted or unsubstituted (N,N-diarylamino)aryl group, and two aryl groups constituting the diarylamino moiety of the (N,N-diarylamino)aryl group may be bonded to each other. X¹ to X⁶ and Y¹ to Y⁶ each independently represent a carbon atom or a nitrogen atom. n¹, n², p¹, p², q¹ and q² each independently represent 0, 1 or 2.]

Examples of the compound include the following compounds.

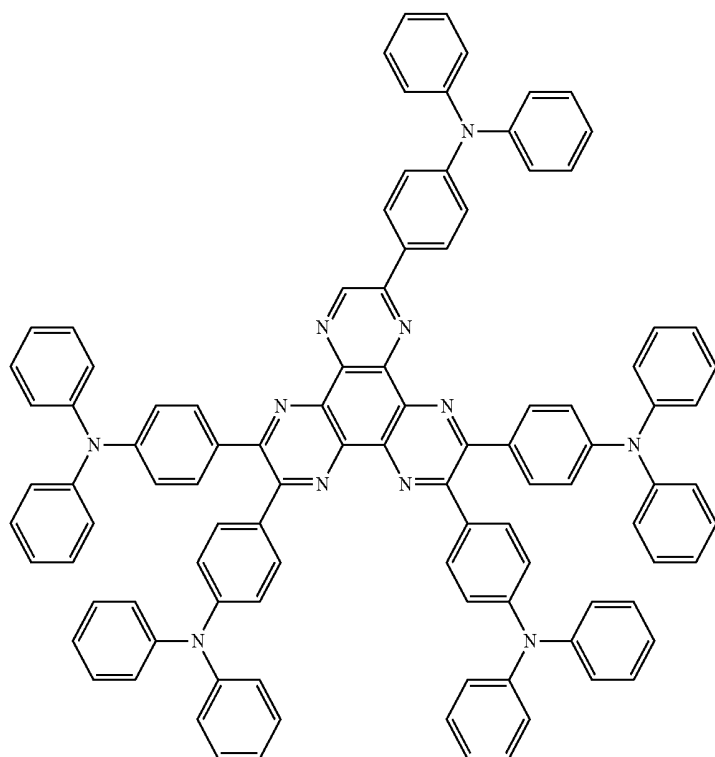
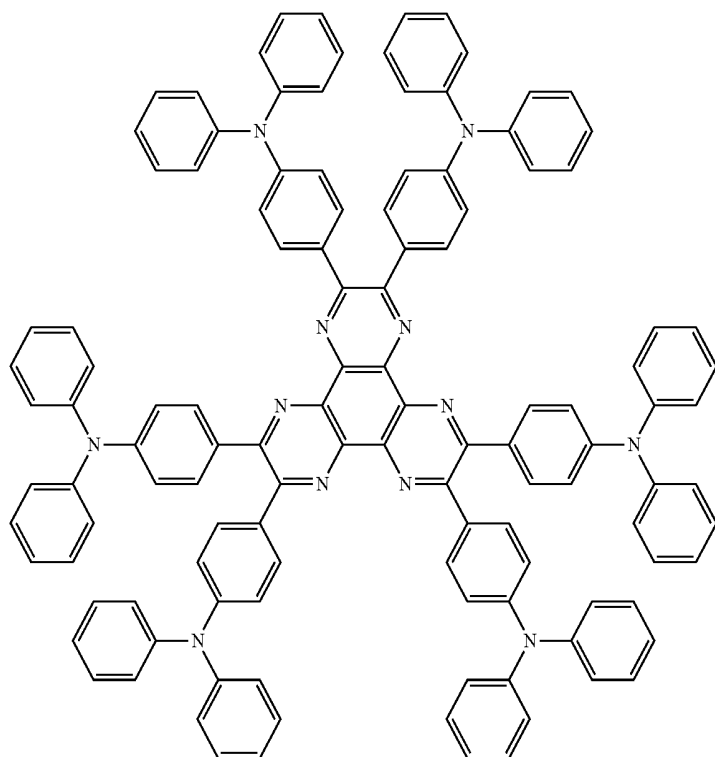
[Chem. 89]



259

260

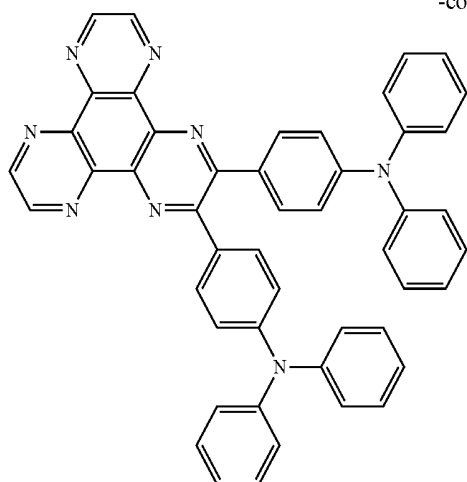
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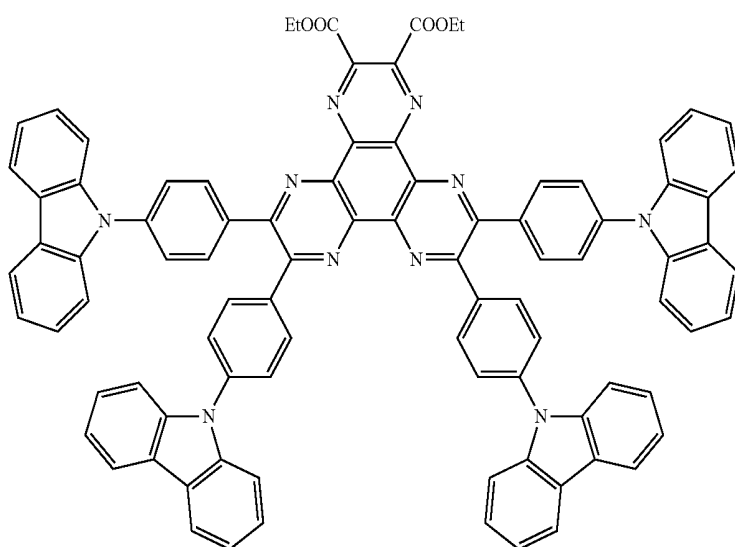
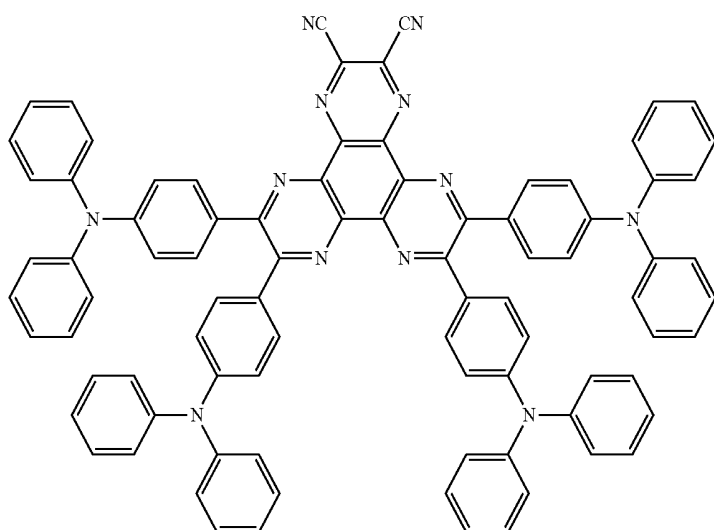
261

262

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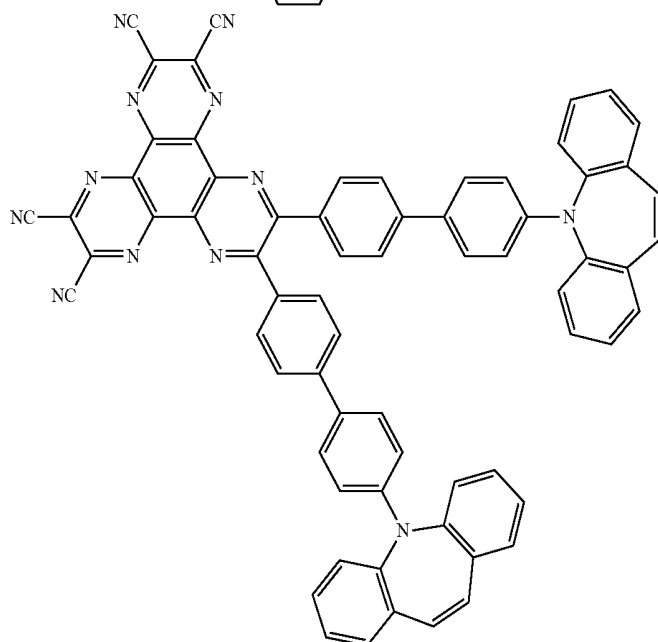
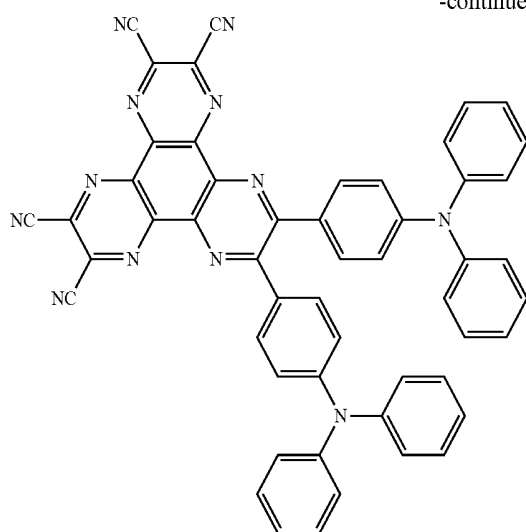
[Chem. 90]



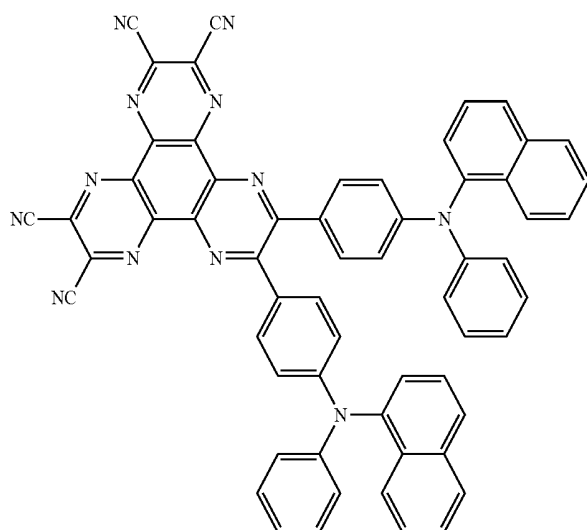
263

264

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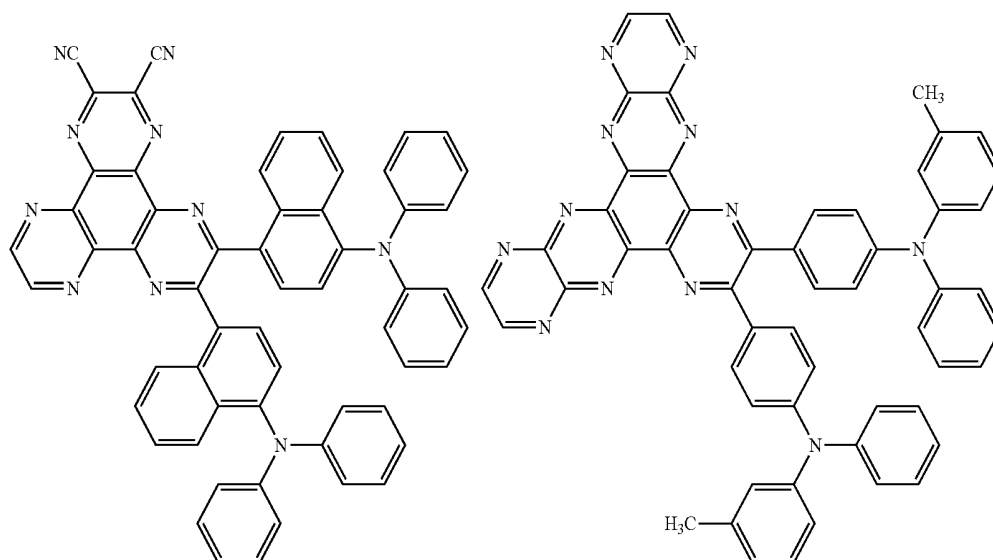
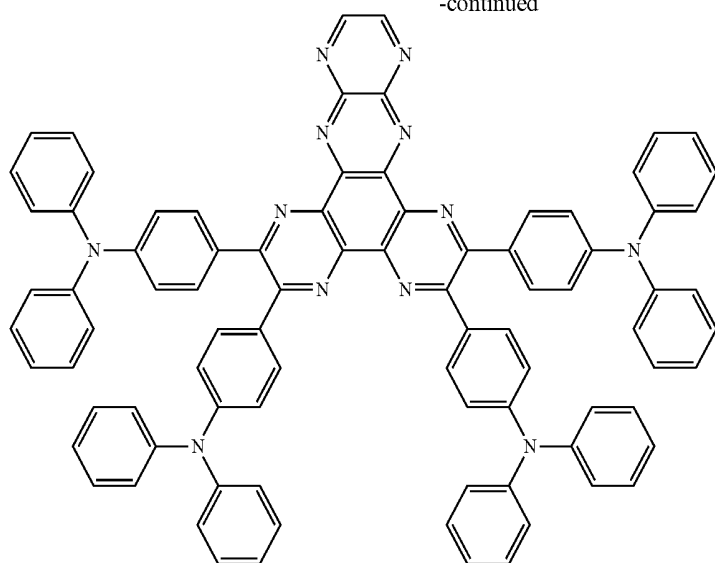
[Chem. 91]



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266

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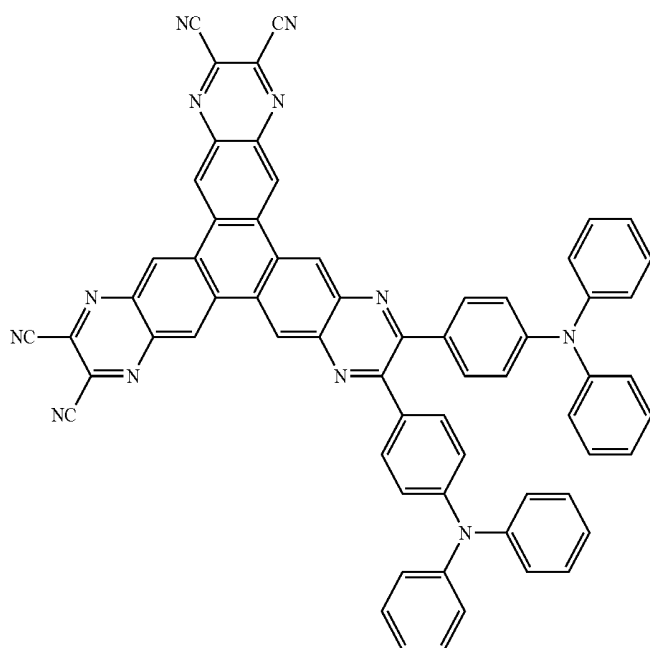
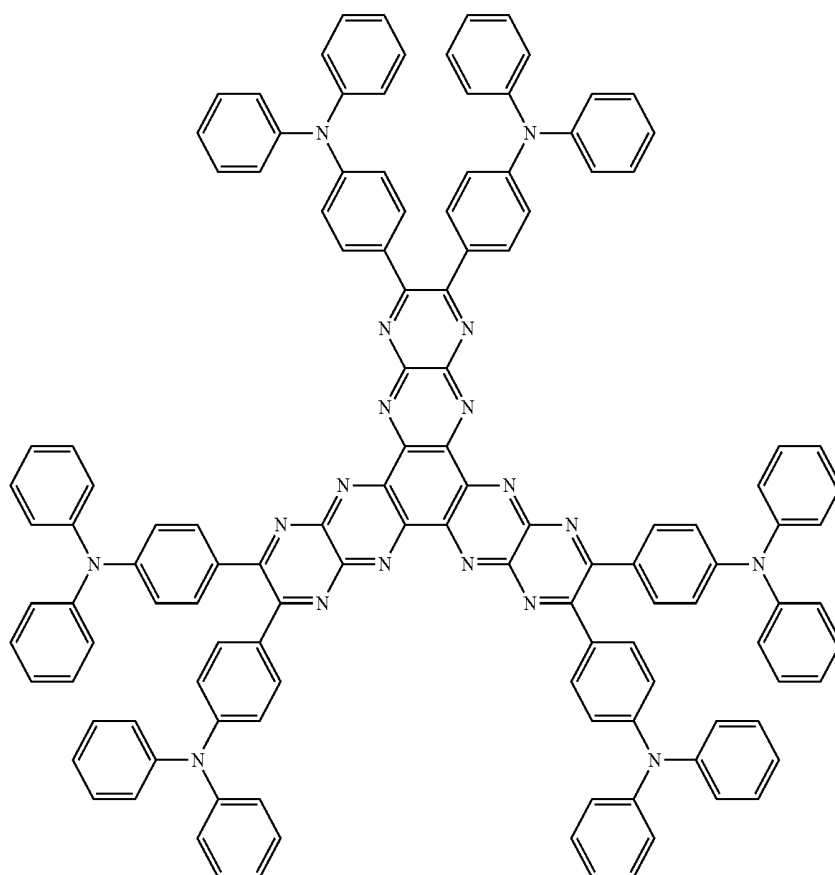


267

268

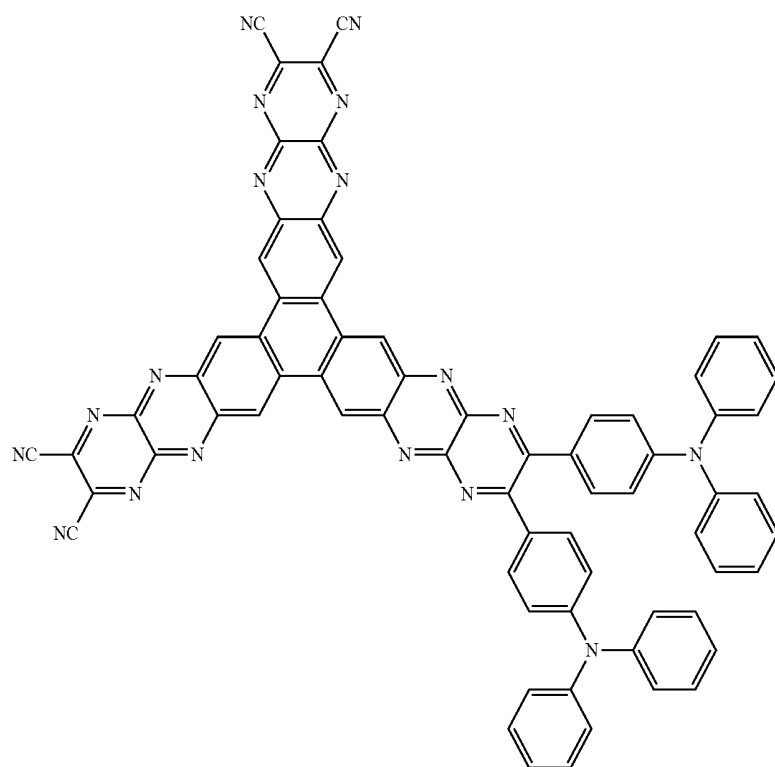
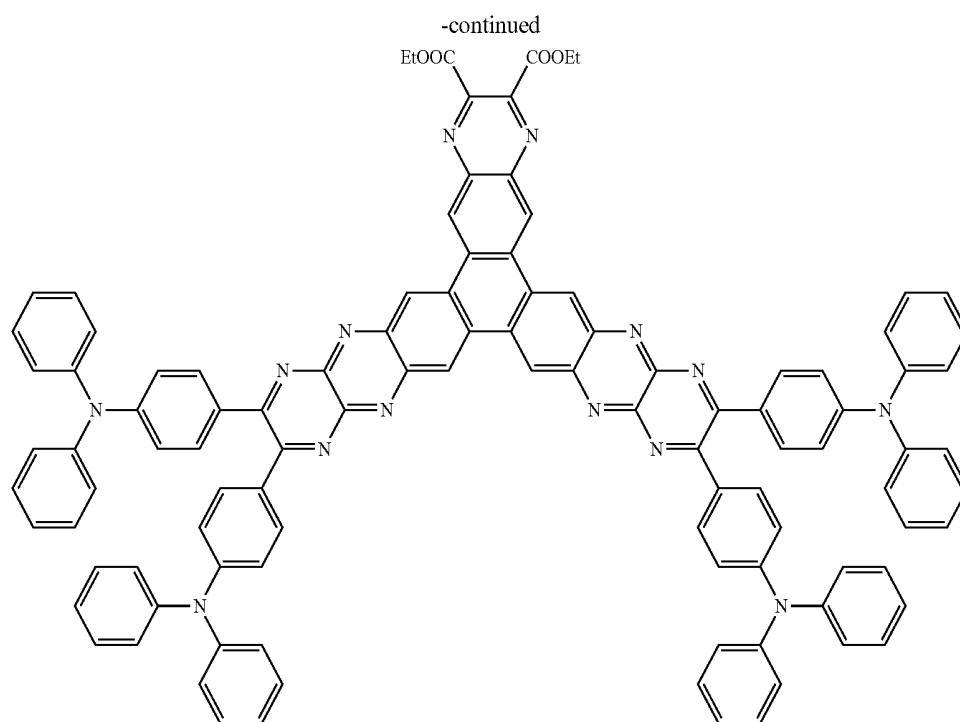
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[Chem. 92]



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270

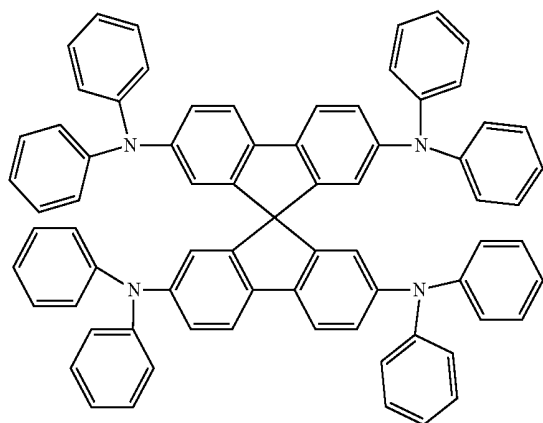
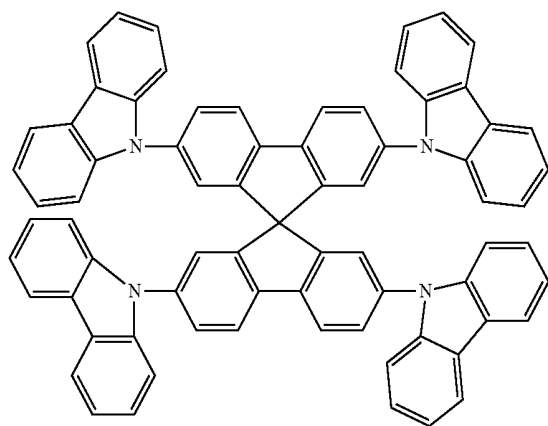
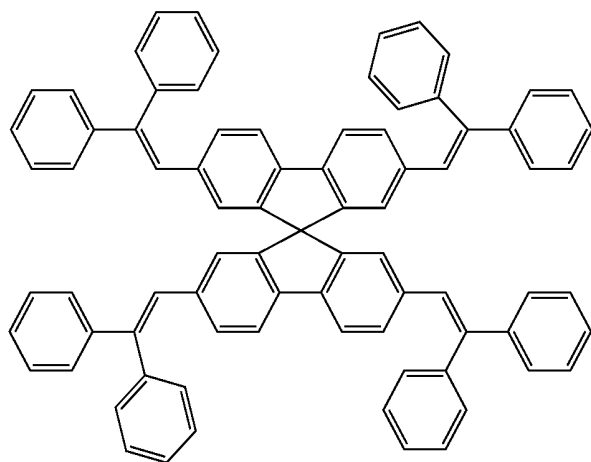
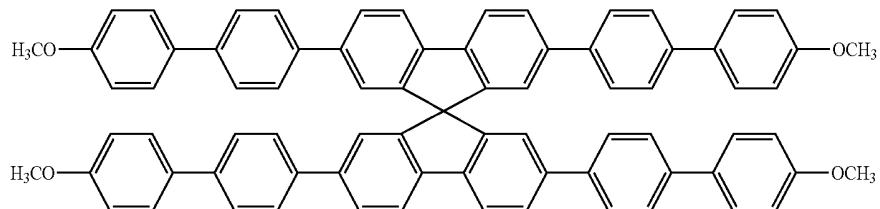


271

Preferred compounds for host materials that can be used together with the host material for delayed fluorescent materials of the present invention are mentioned below.

272

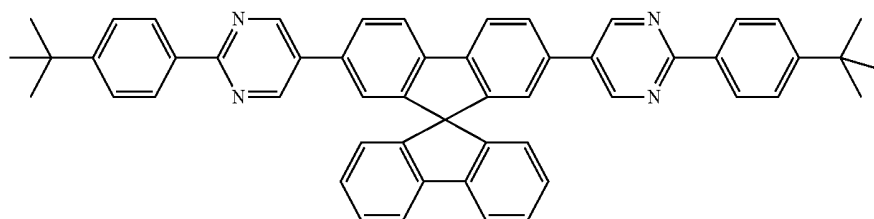
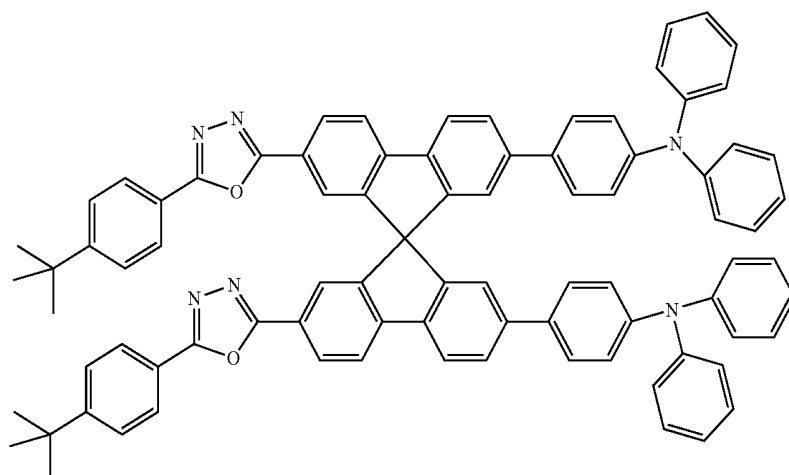
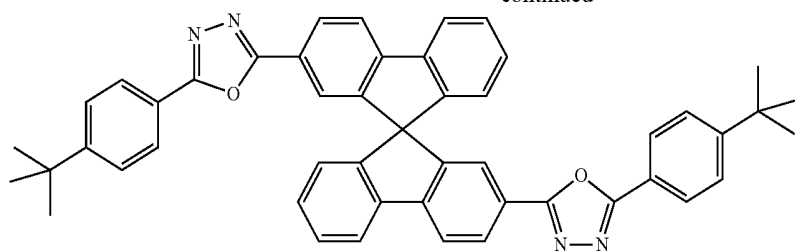
[Chem. 93]



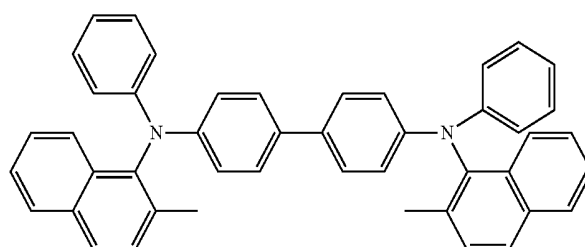
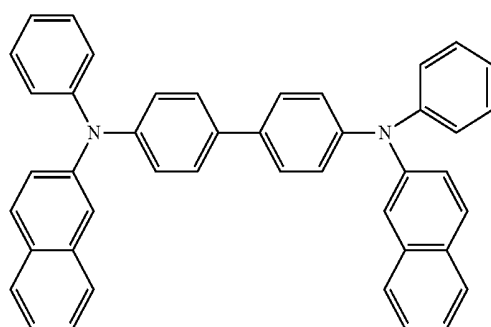
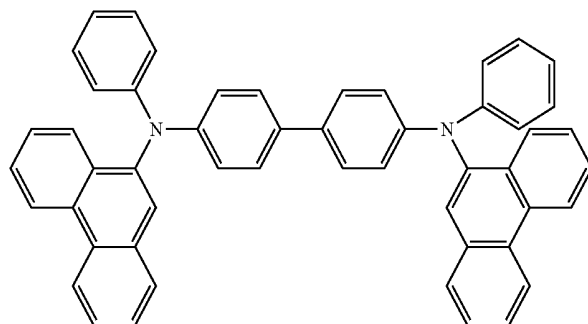
273

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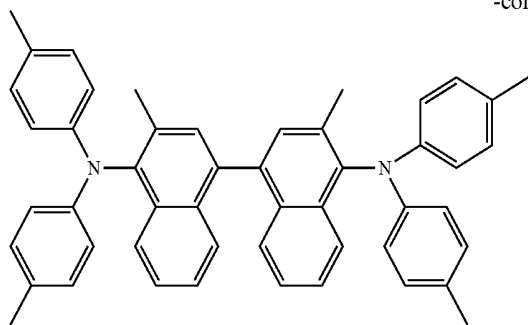


[Chem. 94]

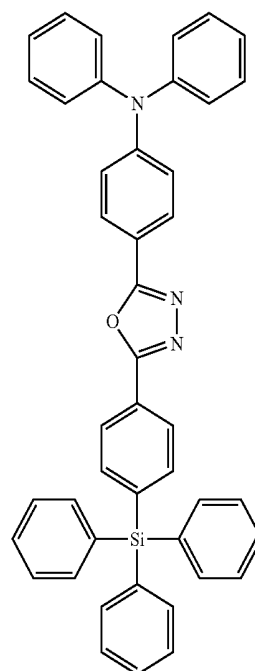
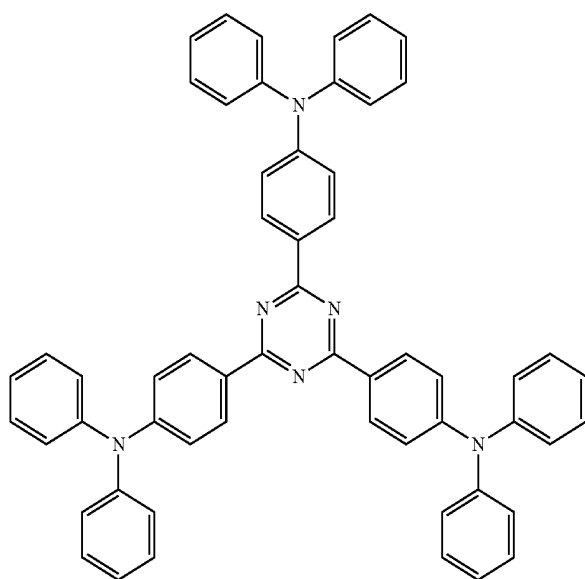
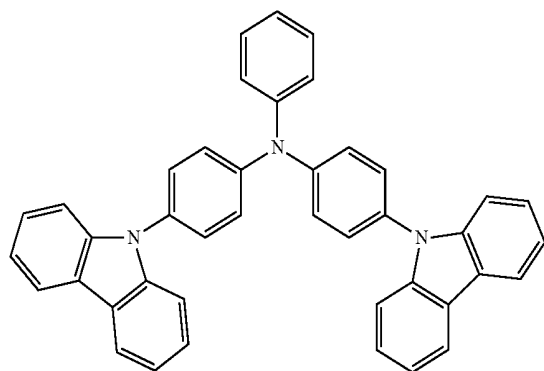


275

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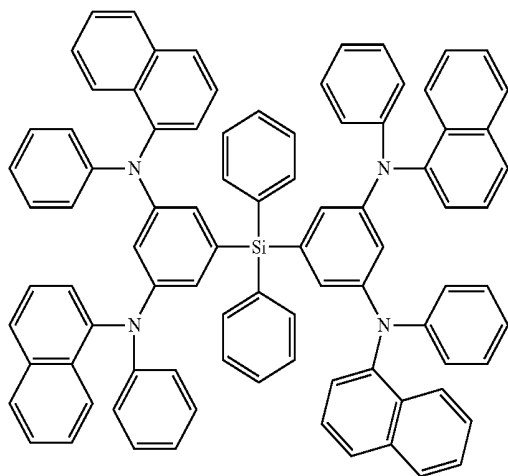


276

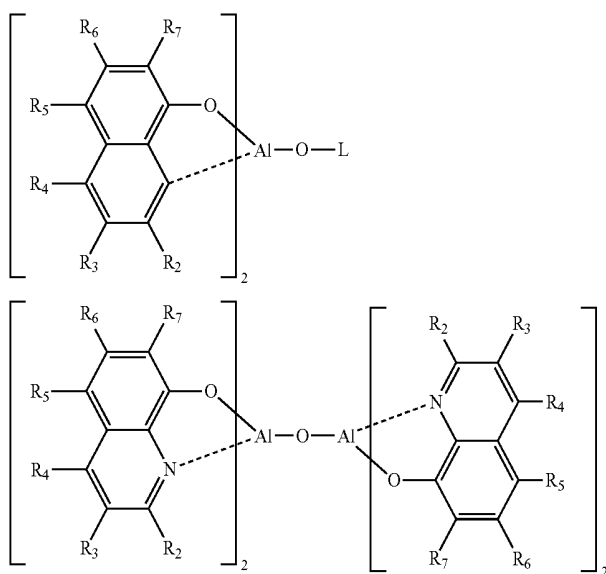
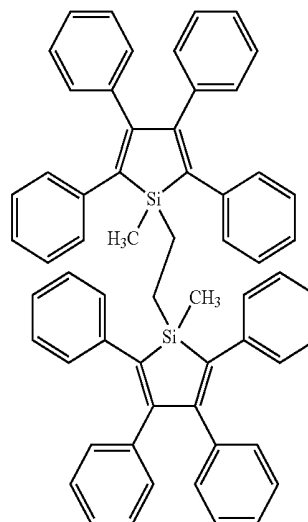


277

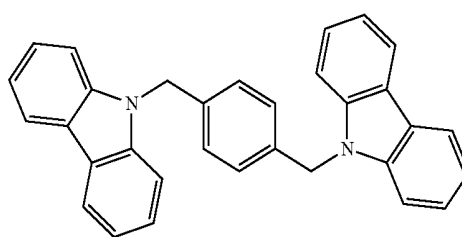
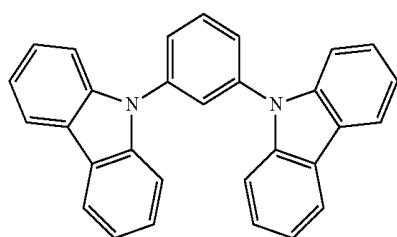
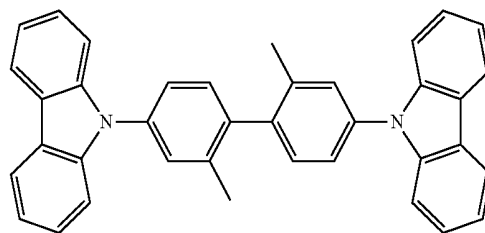
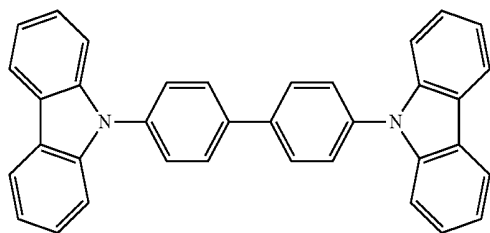
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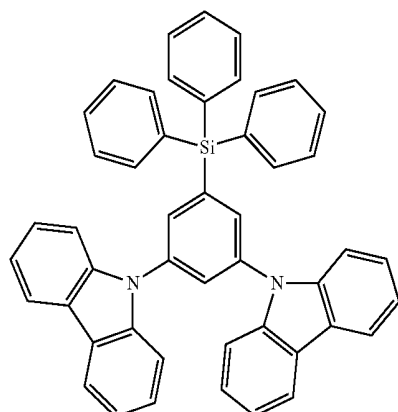
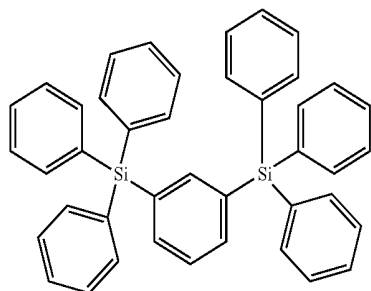
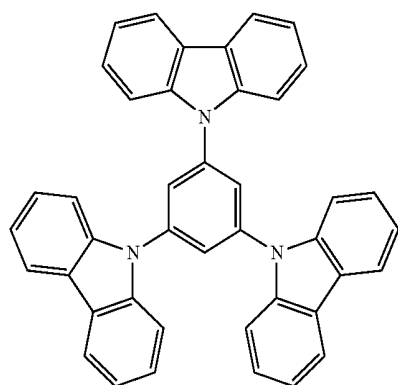
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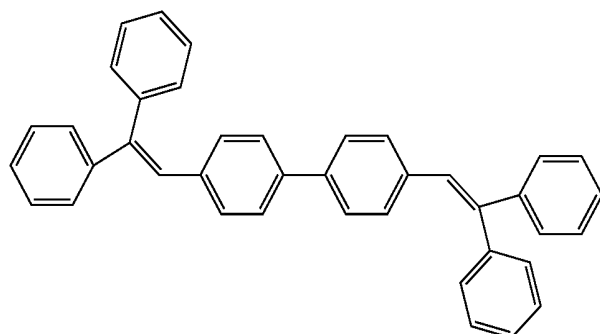
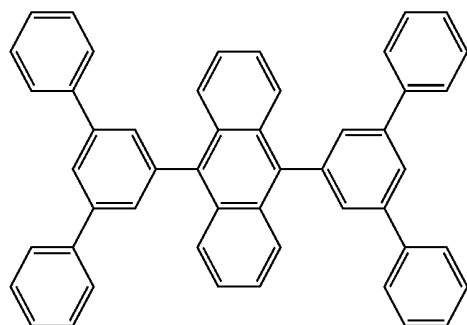
[Chem. 95]



279

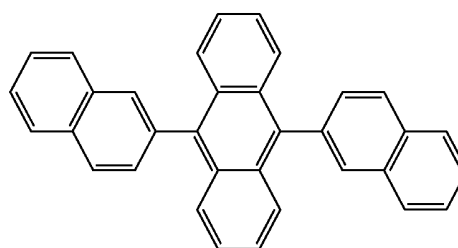
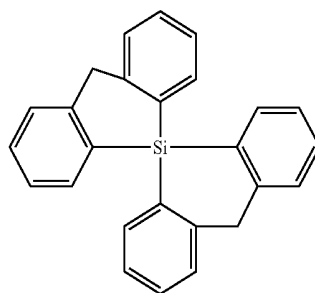
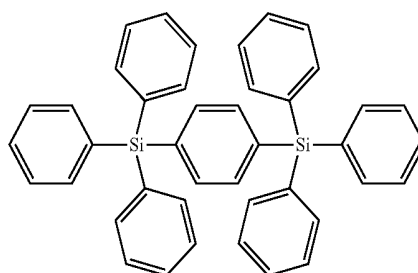


[Chem. 96]



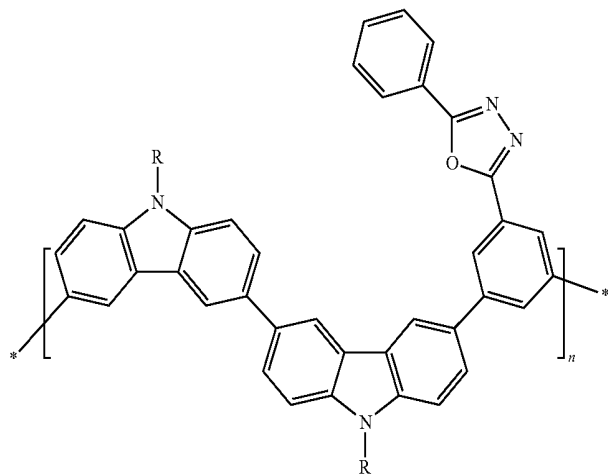
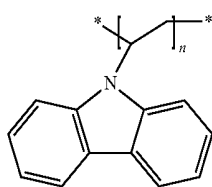
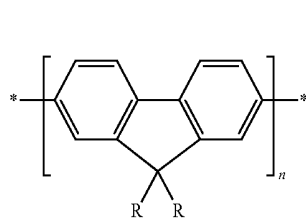
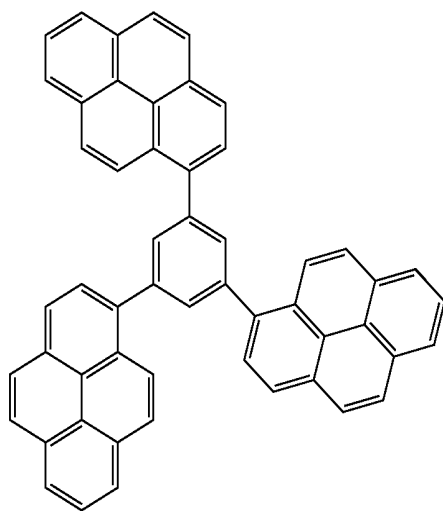
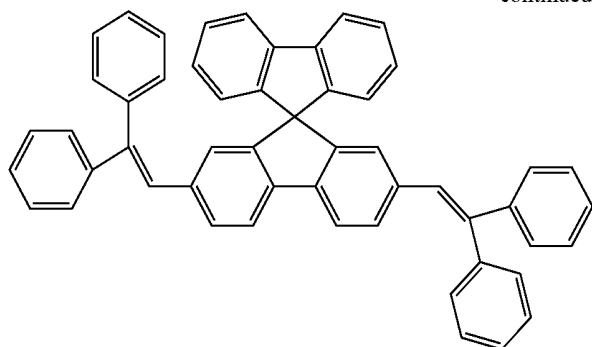
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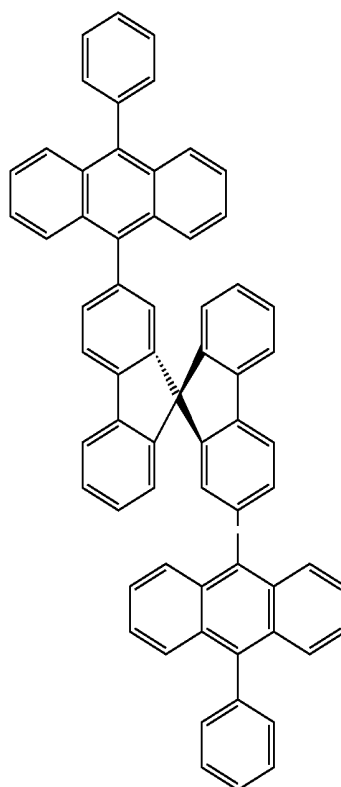


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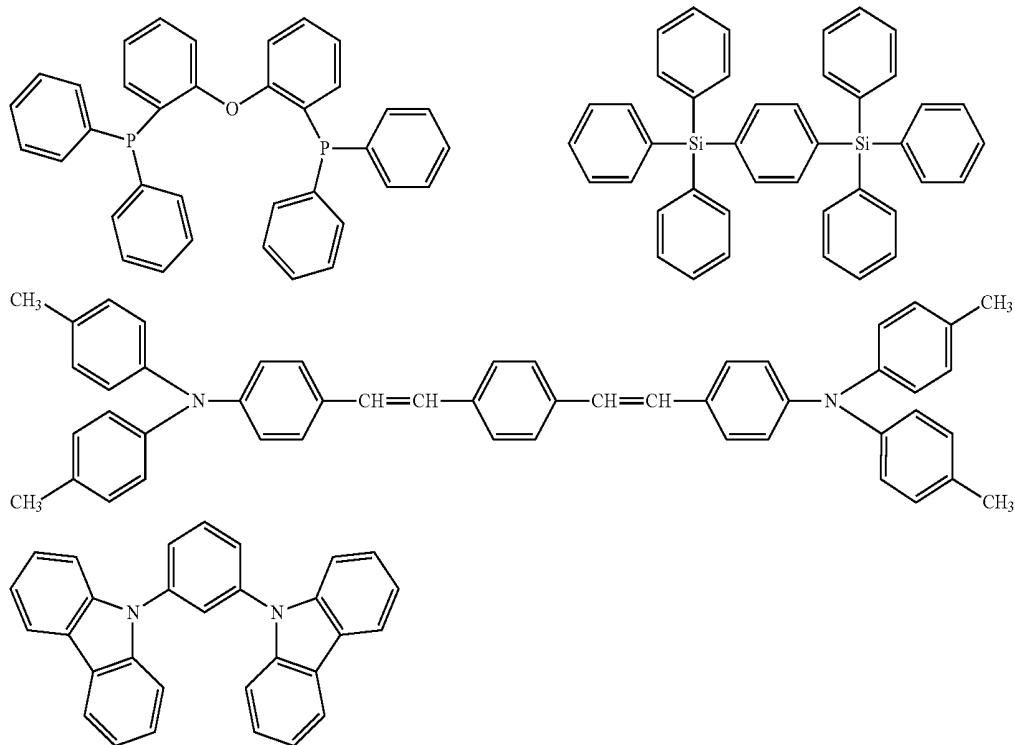


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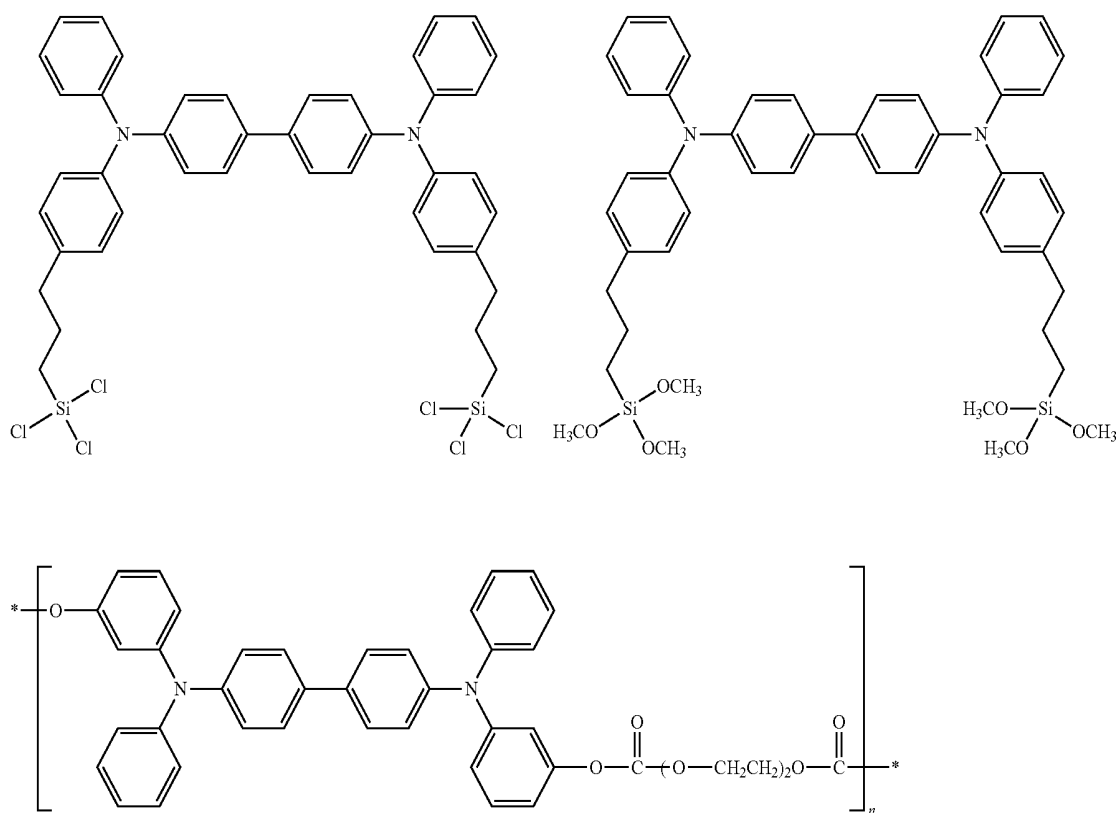
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[Chem. 97]

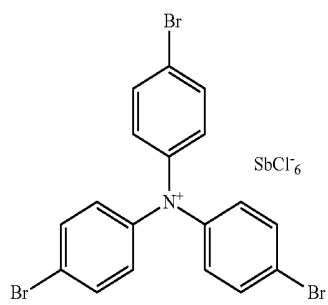


Preferred examples of compounds usable as a hole injection material are mentioned below.

[Chem. 98]

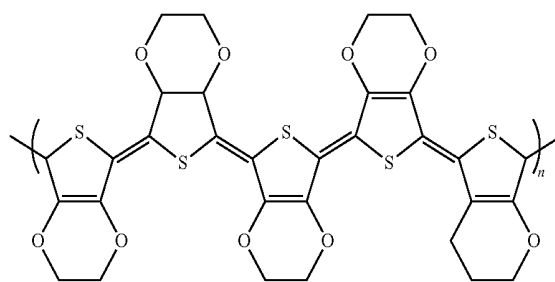
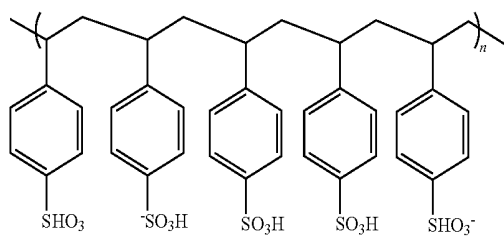
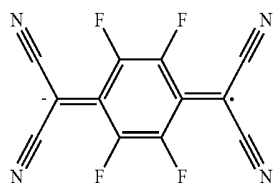
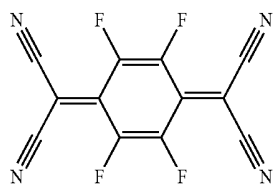
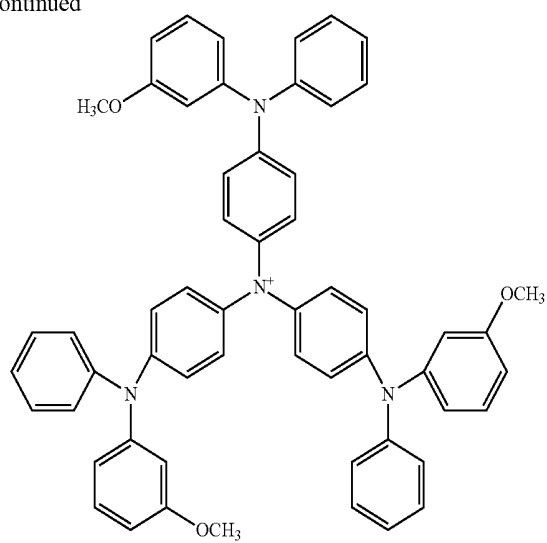


285



286

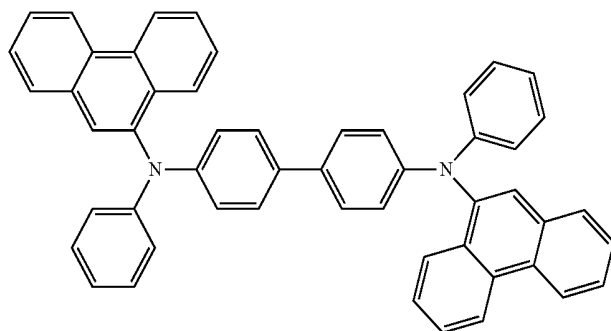
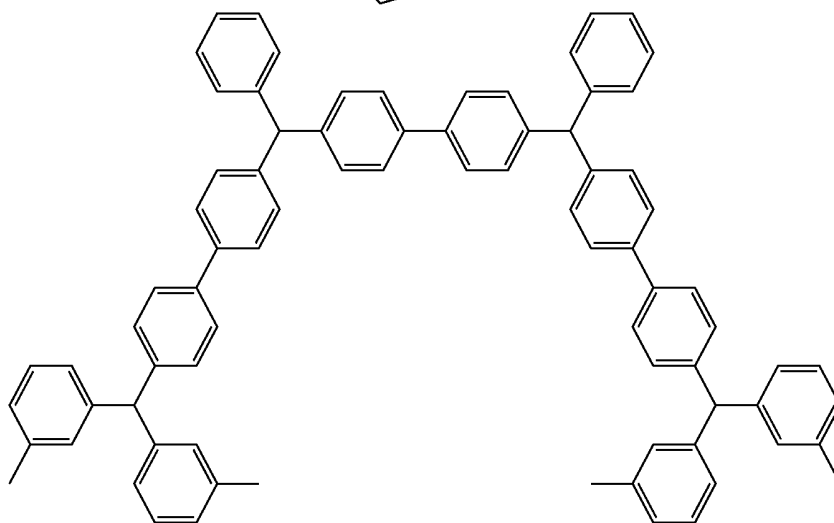
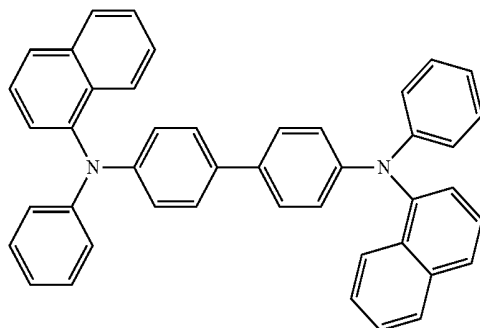
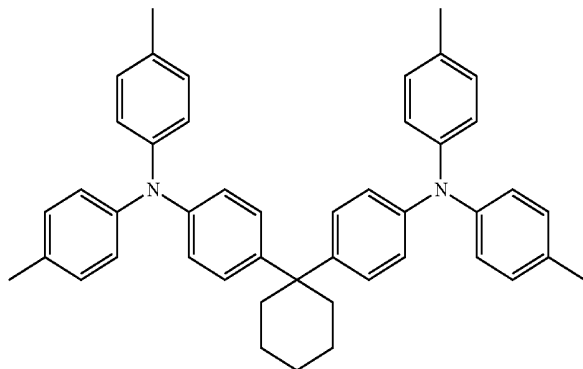
-continued



287

Next, preferred examples of compounds usable as a hole transport material are mentioned below.

[Chem. 99]

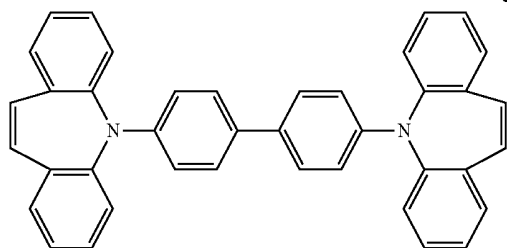


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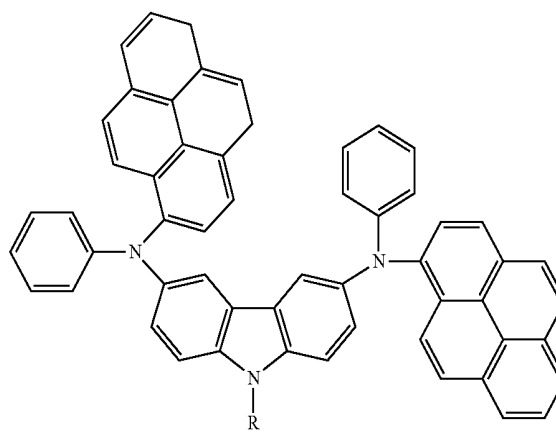
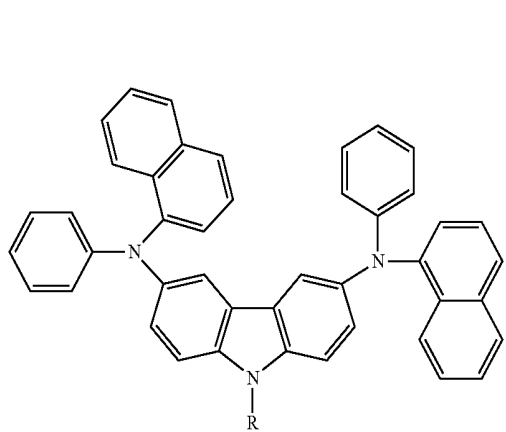
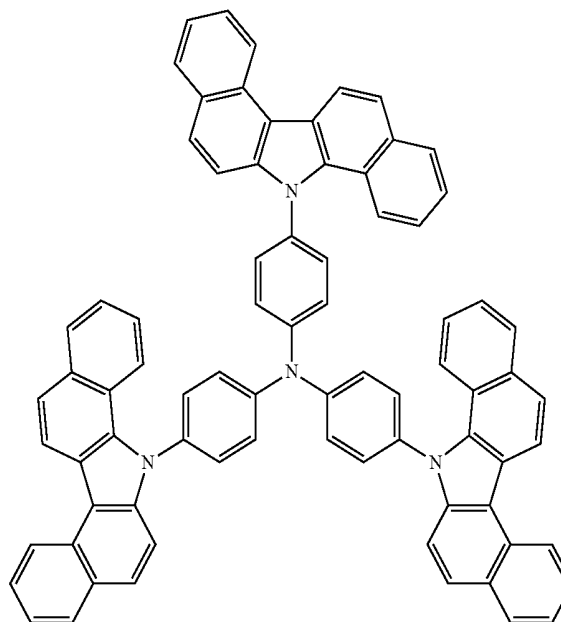
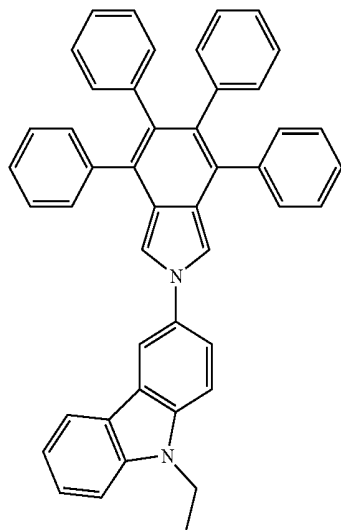
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290

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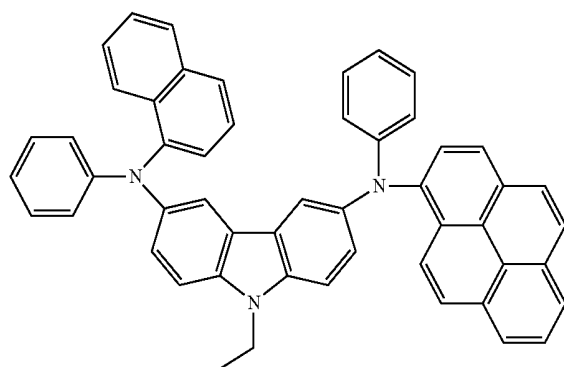
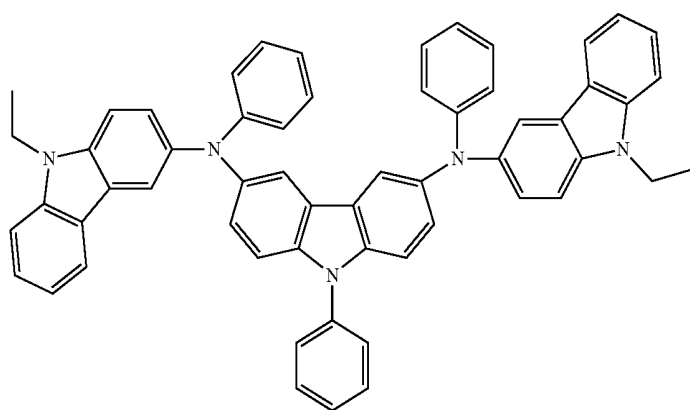
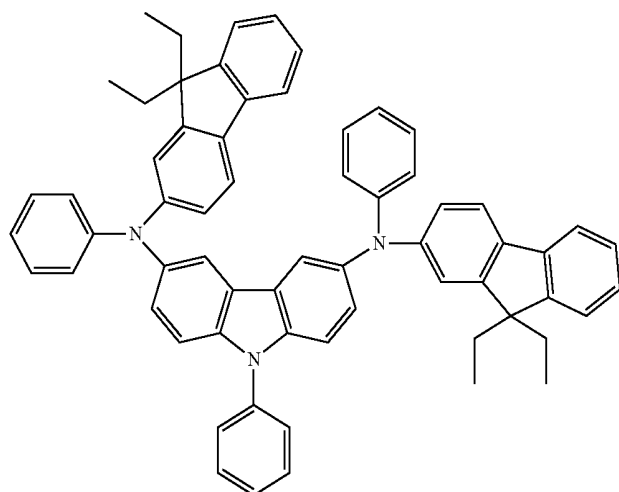
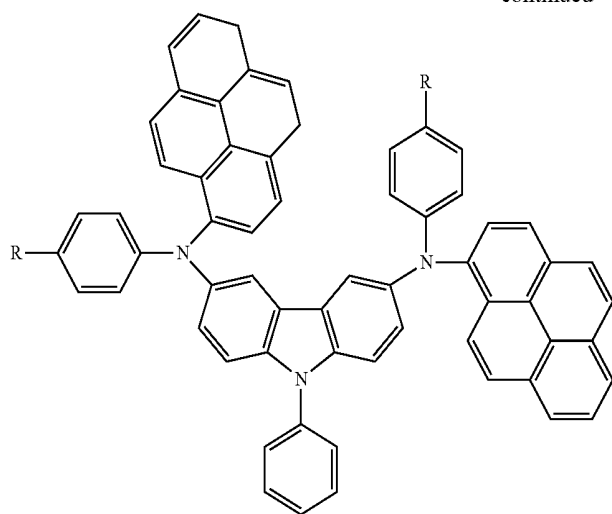
[Chem. 100]



291

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-continued

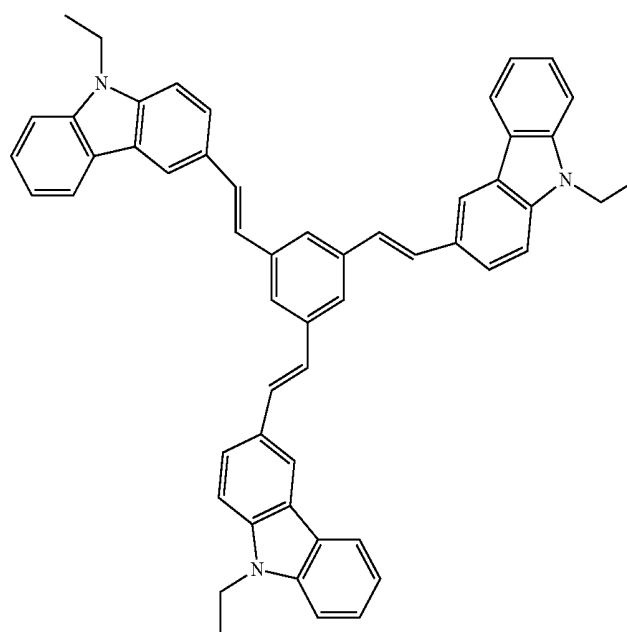
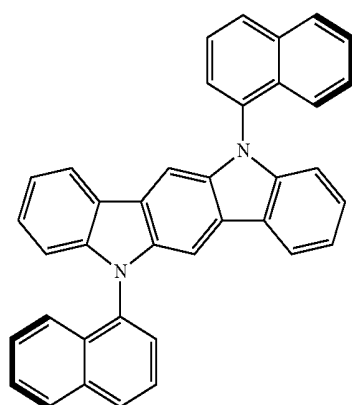
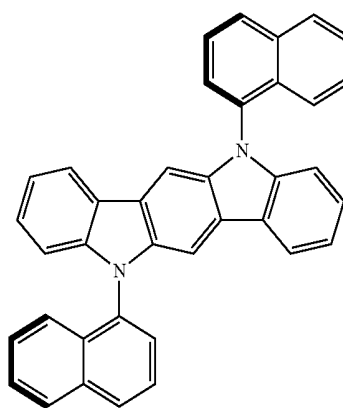
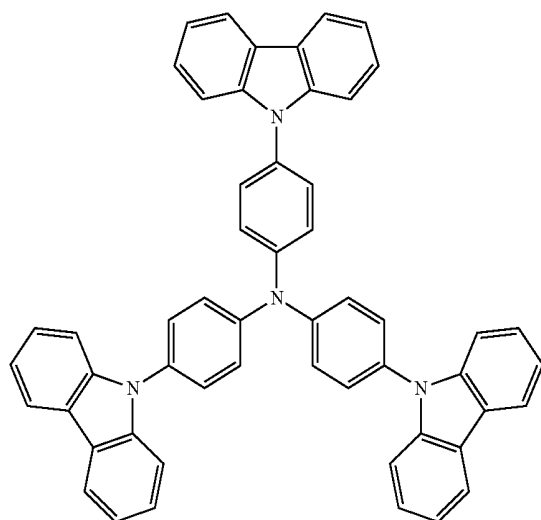
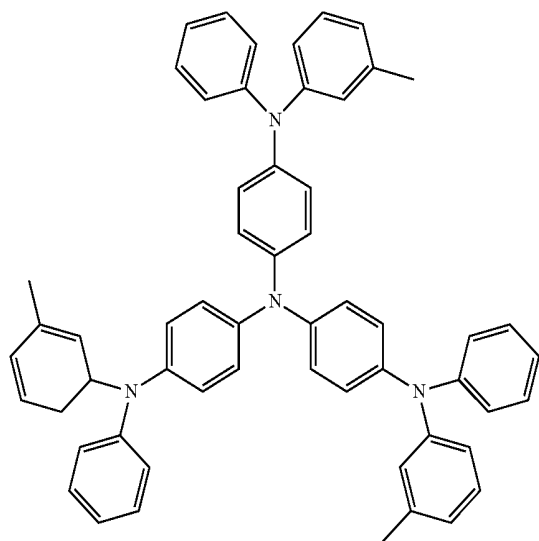


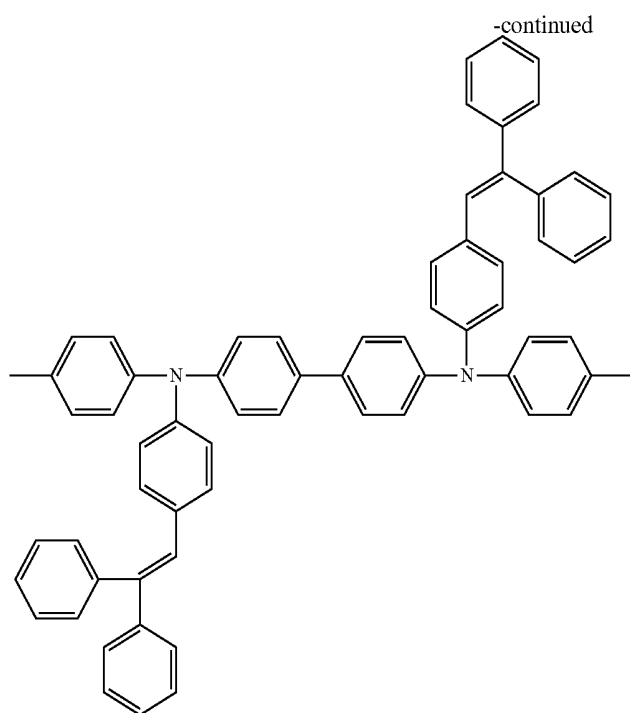
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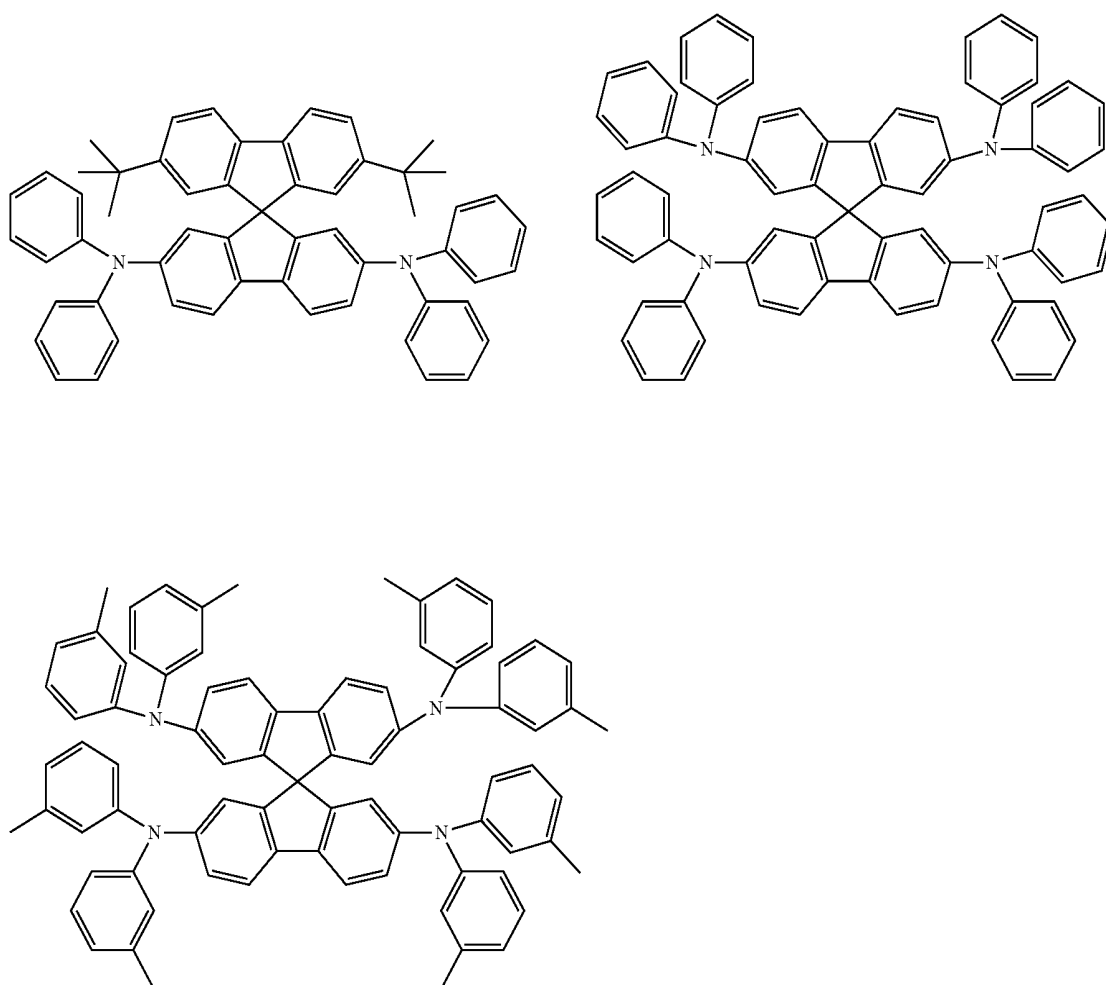
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[Chem. 101]





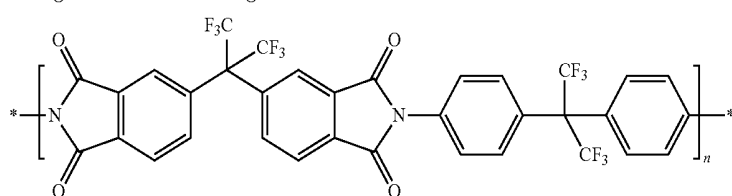
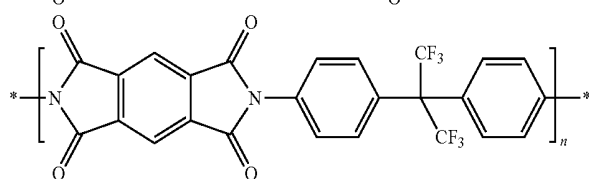
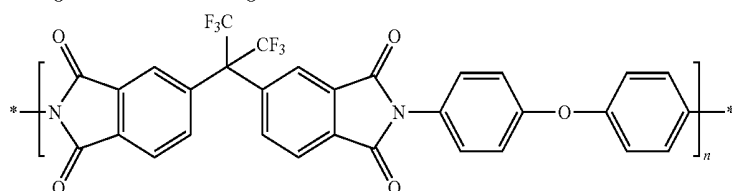
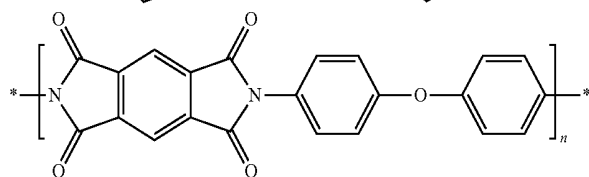
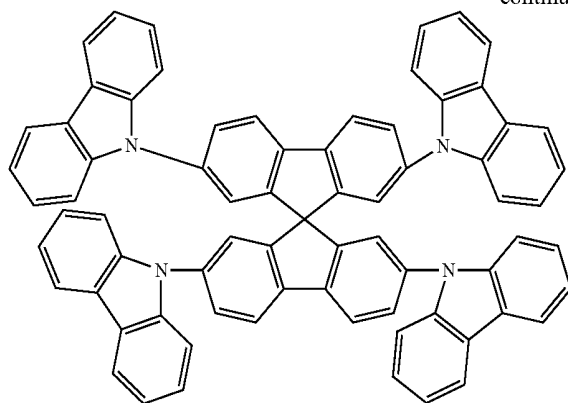
[Chem. 102]



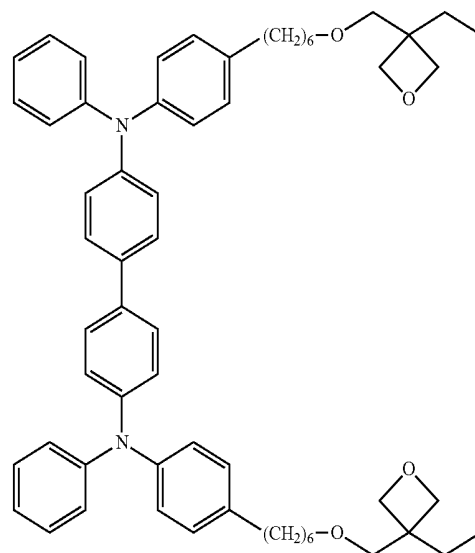
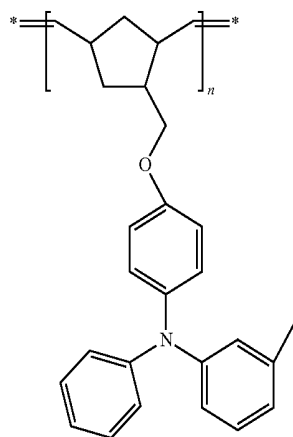
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298

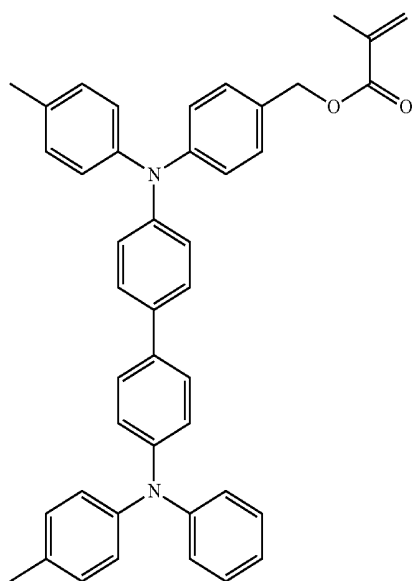
-continued



[Chem. 103]

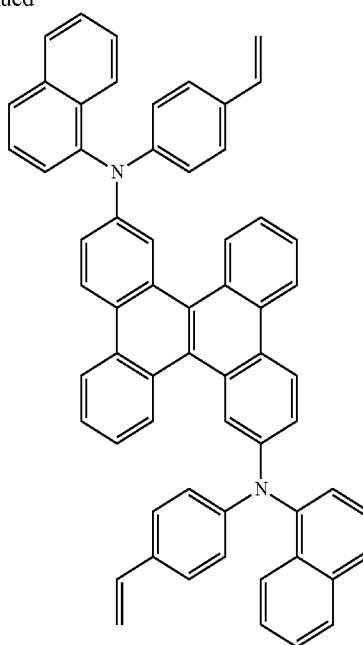


299

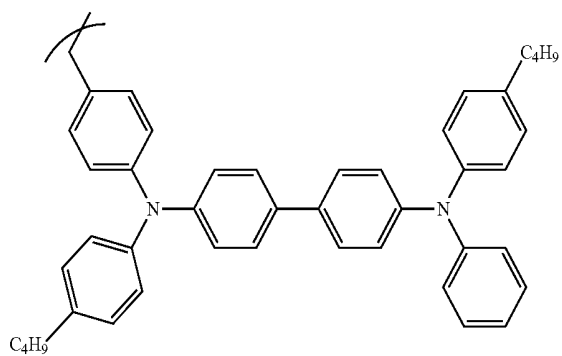


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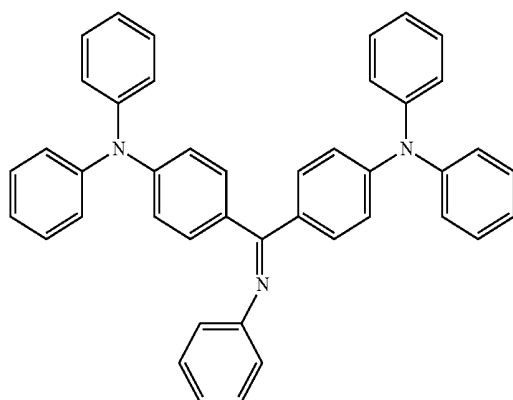
300



R =



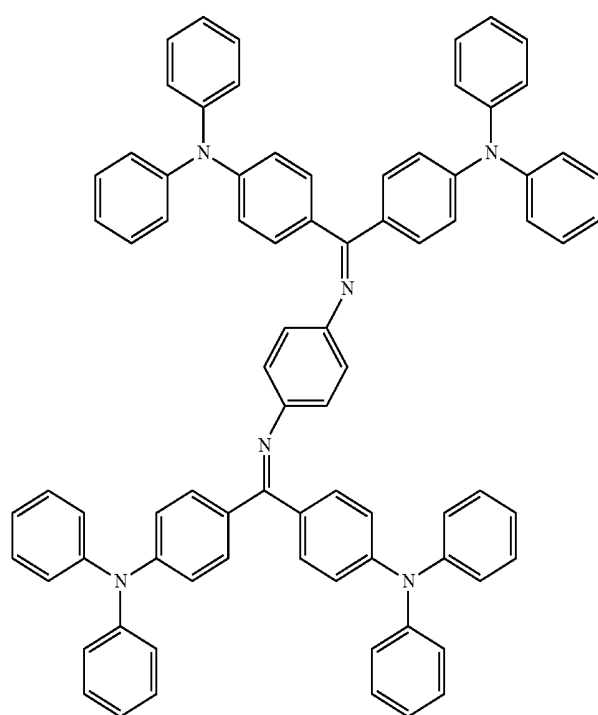
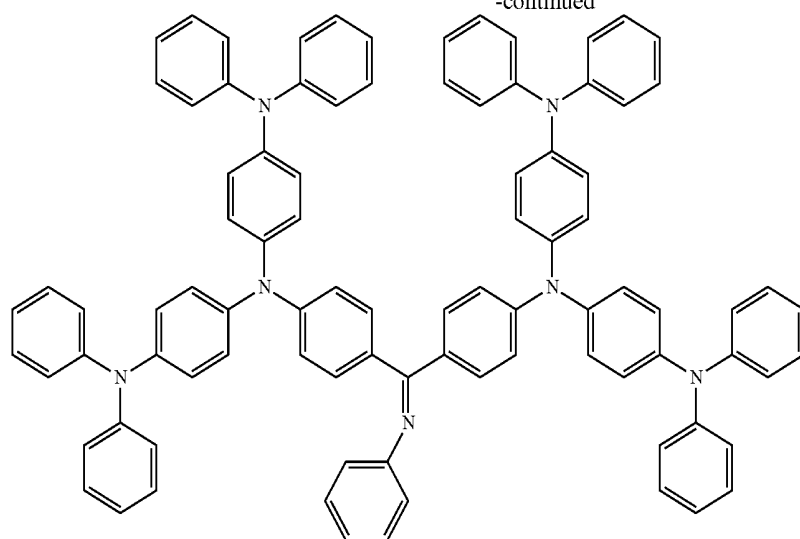
[Chem. 104]



301

302

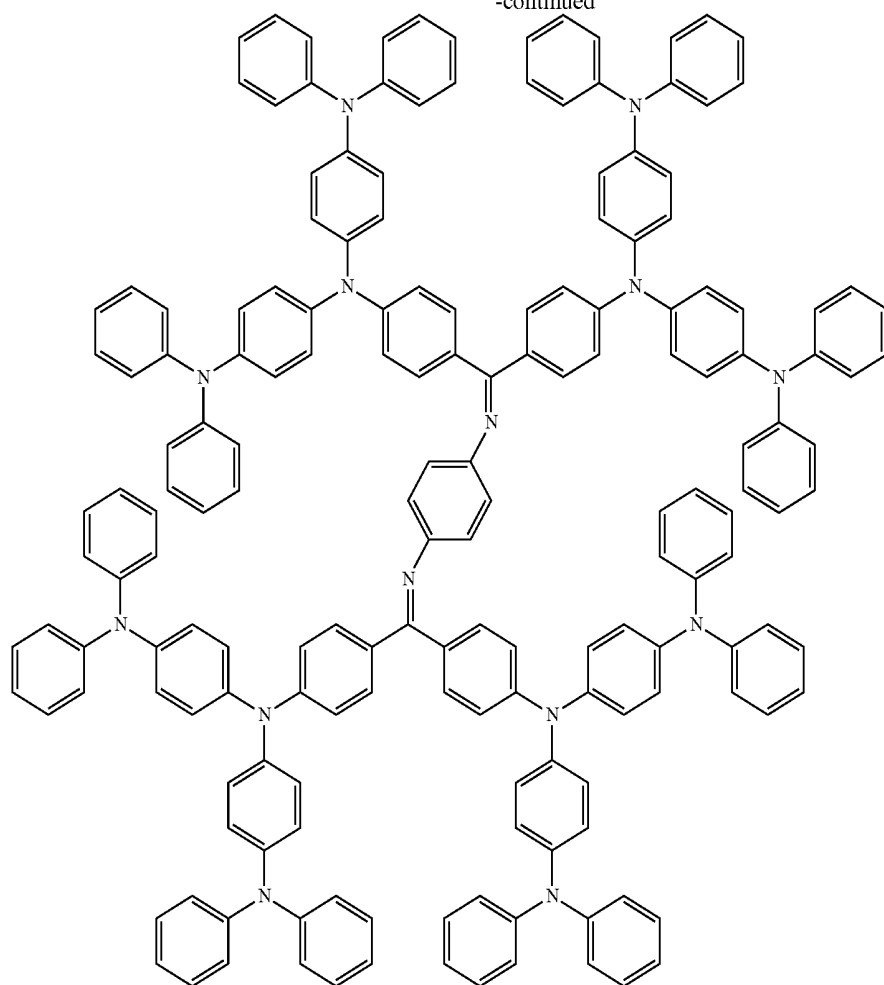
-continued



303

304

-continued

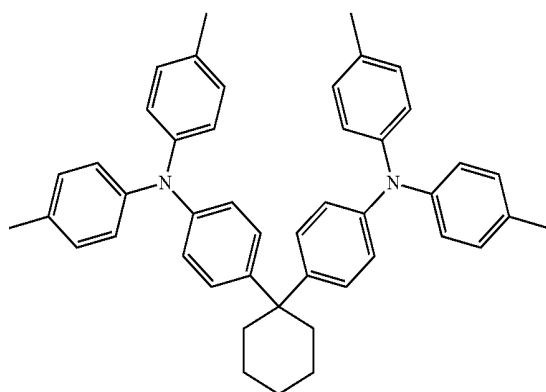


Next, preferred examples of compounds usable as a hole barrier material are mentioned below.

-continued

50

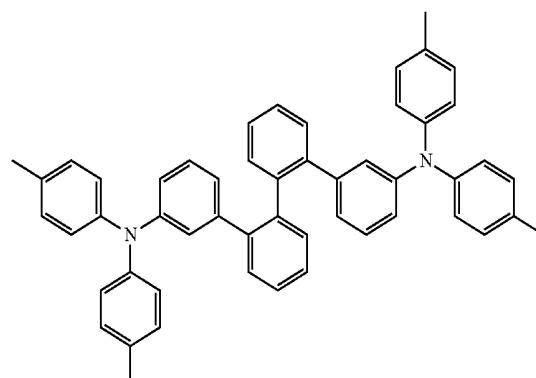
[Chem. 105]



55

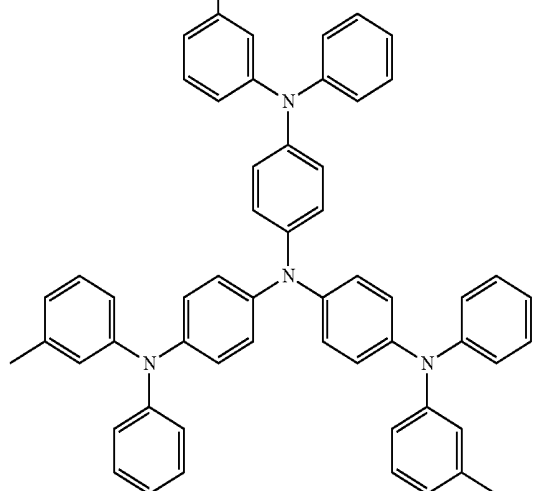
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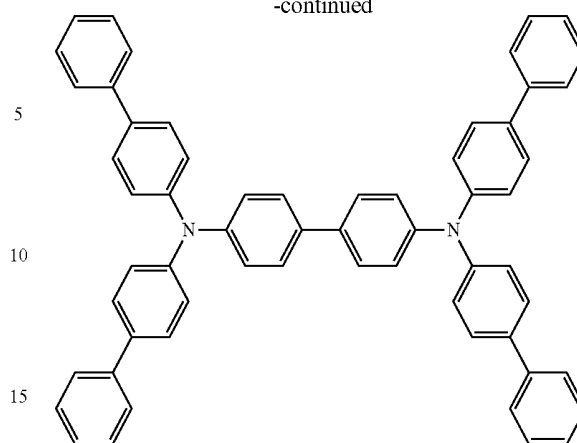


305

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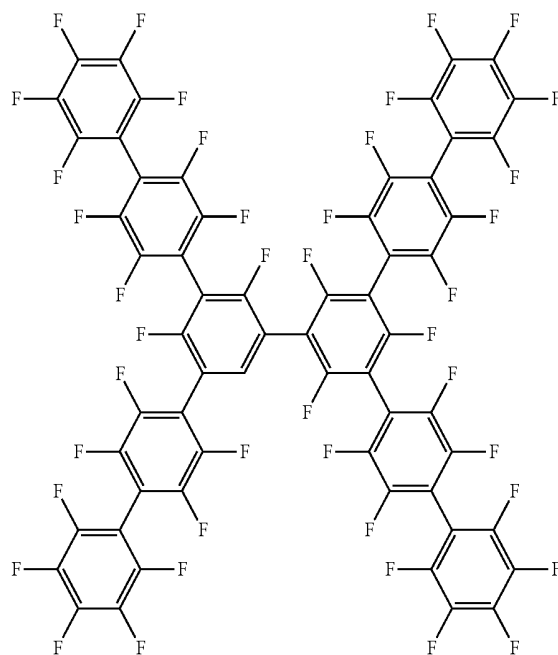
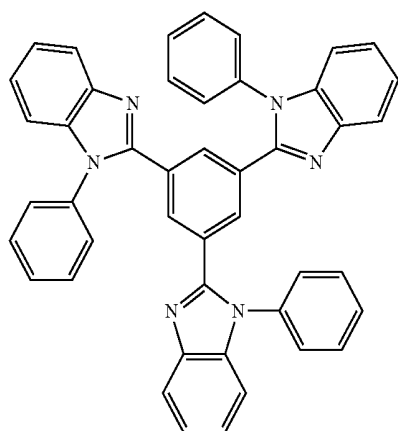
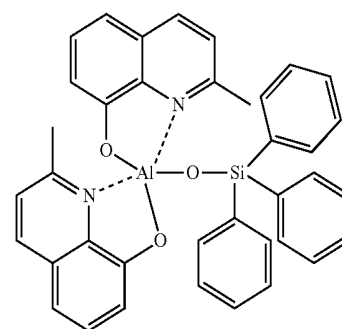
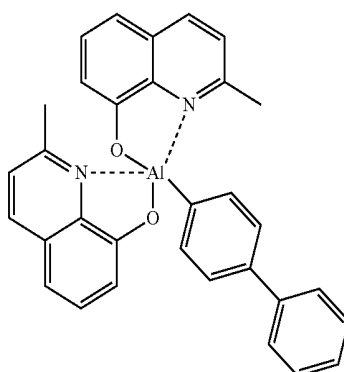
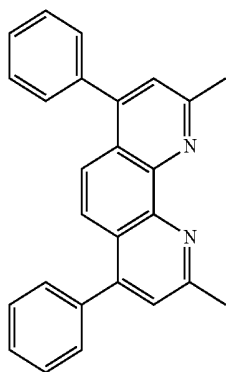
**306**

-continued



20 Next, preferred examples of compounds usable as a hole barrier material are mentioned below.

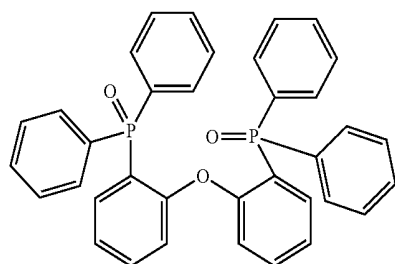
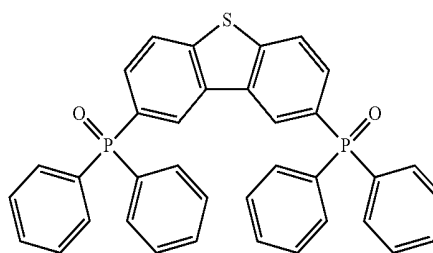
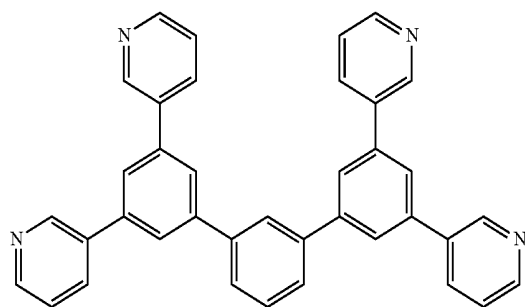
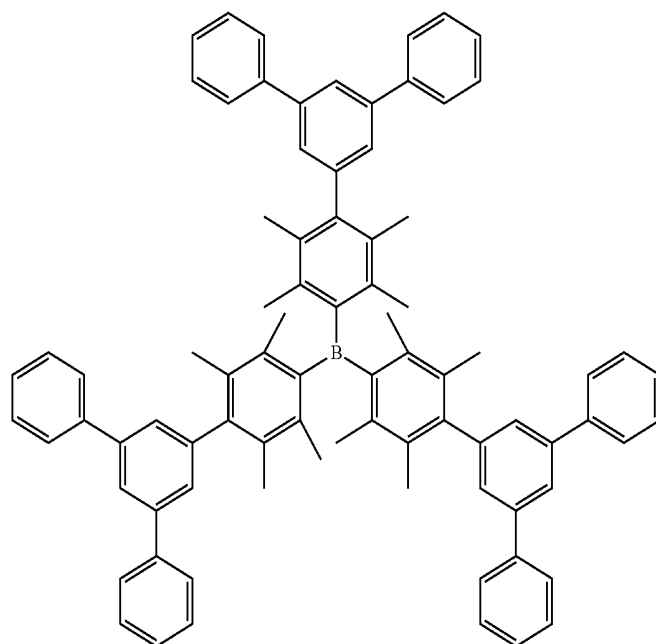
[Chem. 106]



307

308

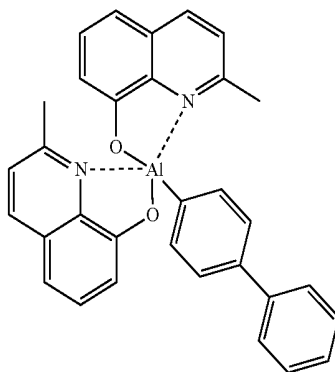
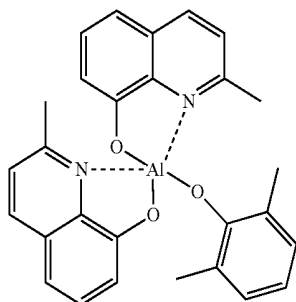
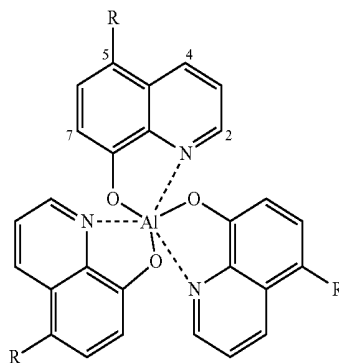
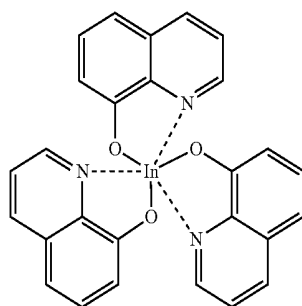
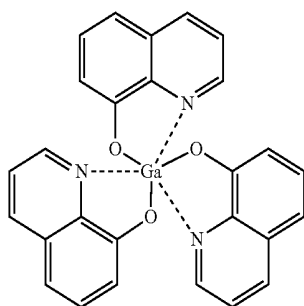
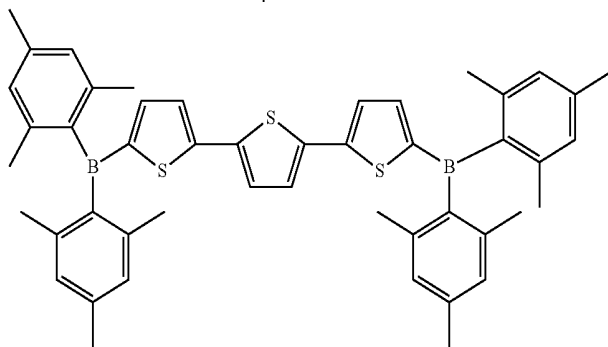
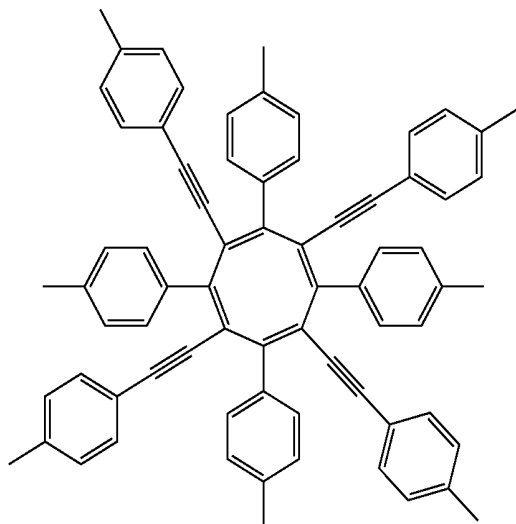
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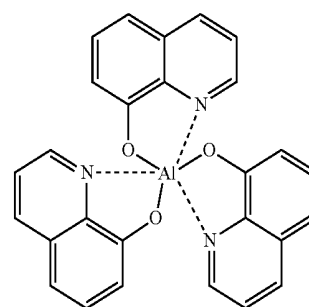
309

Next, preferred examples of compounds usable as a hole transport material are mentioned below.

[Chem. 107]

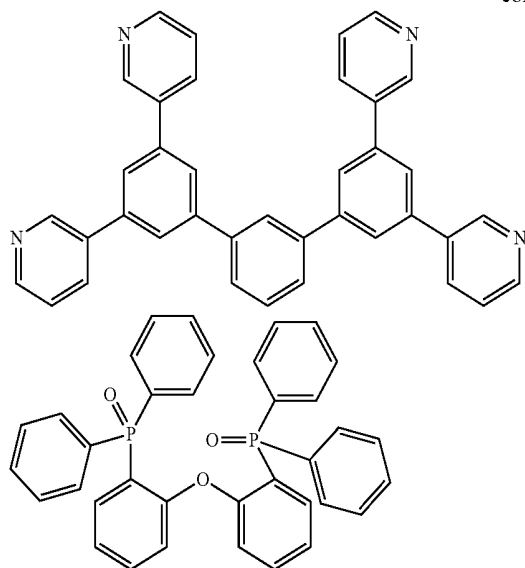


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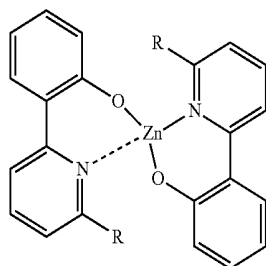


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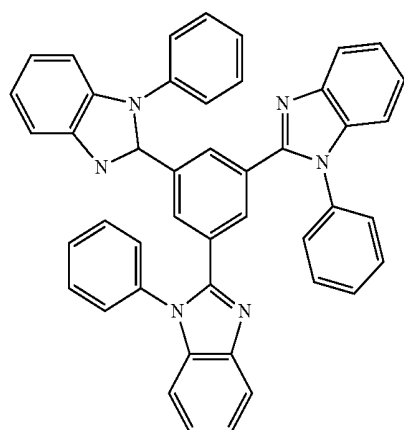
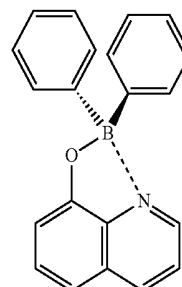
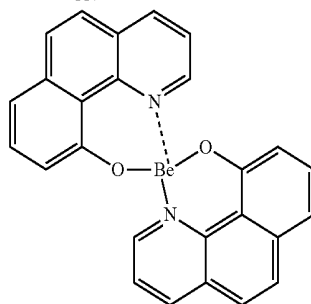
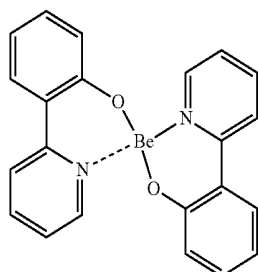
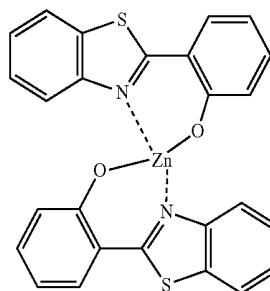
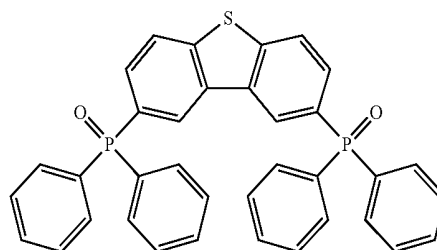
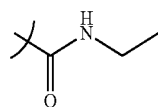
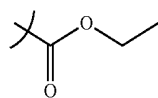


[Chem. 108]

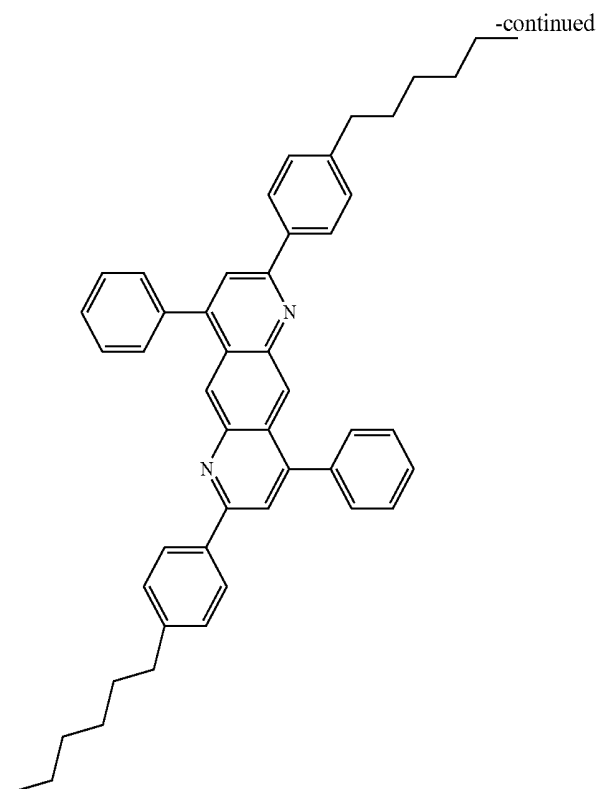


R = H

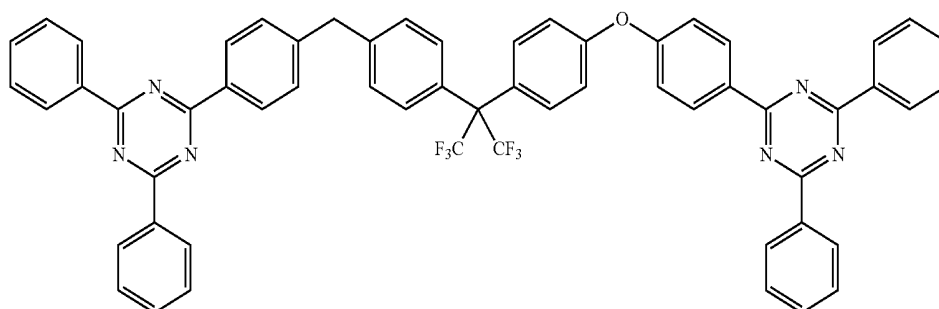
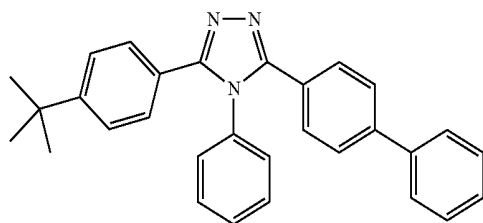
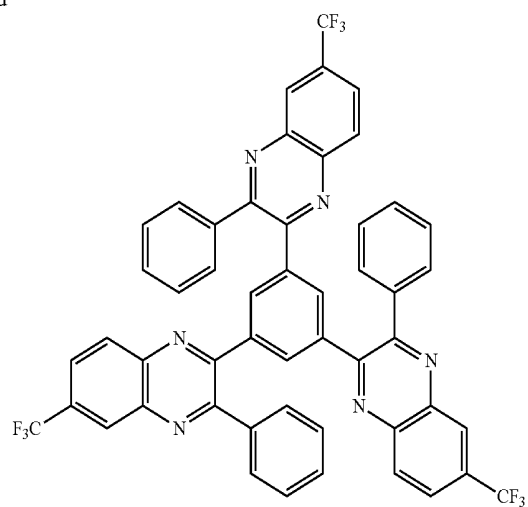
R = :



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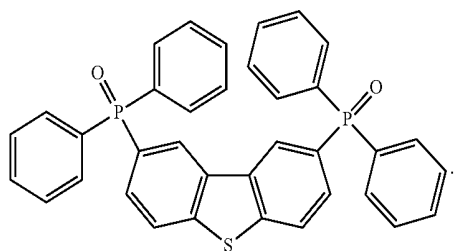
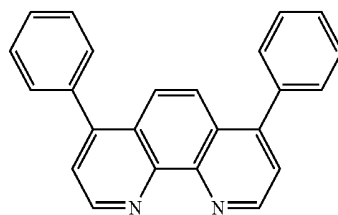
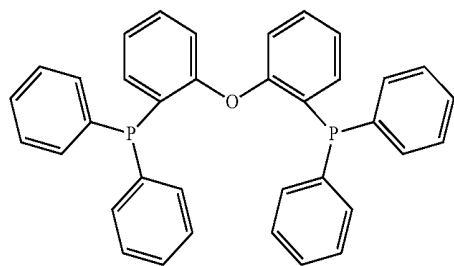
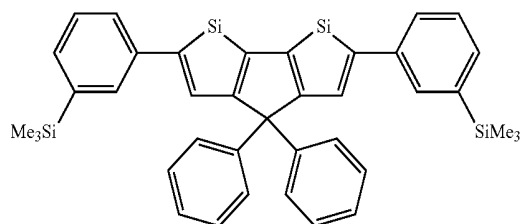
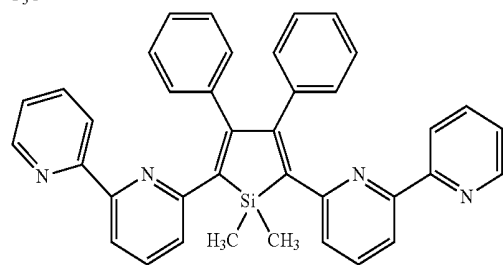
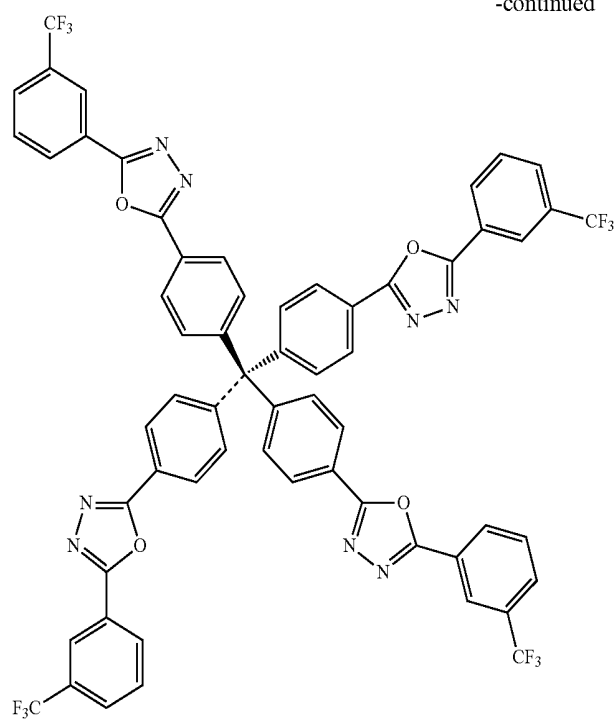
314



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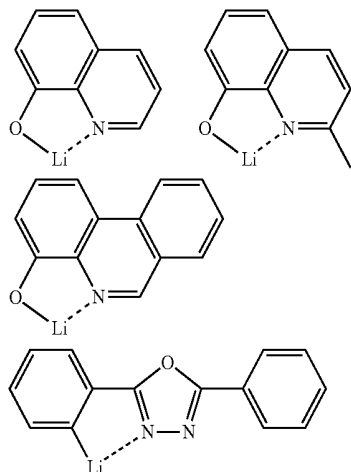
316



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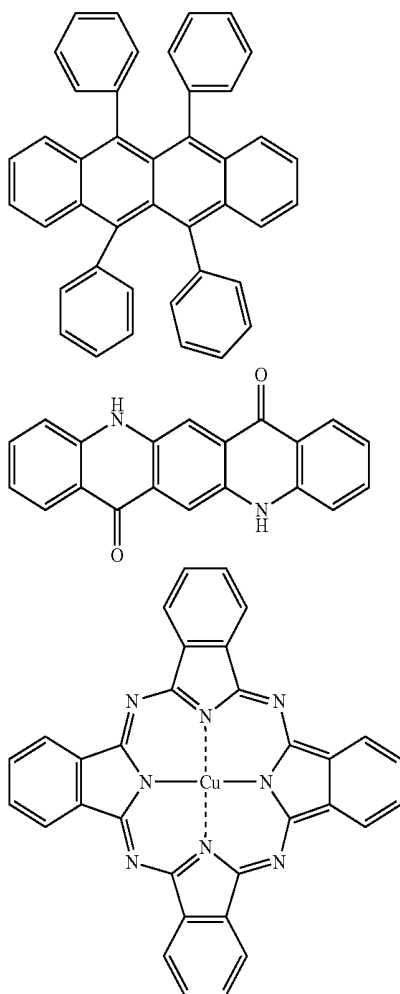
Next, preferred examples of compounds usable as an electron injection material are mentioned below.

[Chem. 110]



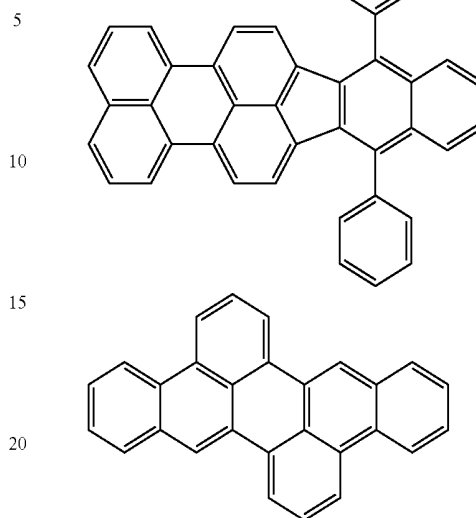
Further, preferred examples of additive compounds are mentioned below. For example, the compounds may be added as a stabilization material.

[Chem. 111]



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The organic electroluminescence device thus produced by the aforementioned method emits light on application of an electric field between the anode and the cathode of the device. In this case, when the light emission is caused by the excited singlet energy, light having a wavelength that corresponds to the energy level thereof may be confirmed as fluorescent light and delayed fluorescent light. When the light emission is caused by the excited triplet energy, light having a wavelength that corresponds to the energy level thereof may be confirmed as phosphorescent light. The normal fluorescent light has a shorter light emission lifetime than the delayed fluorescent light, and thus the light emission lifetime may be distinguished between the fluorescent light and the delayed fluorescent light.

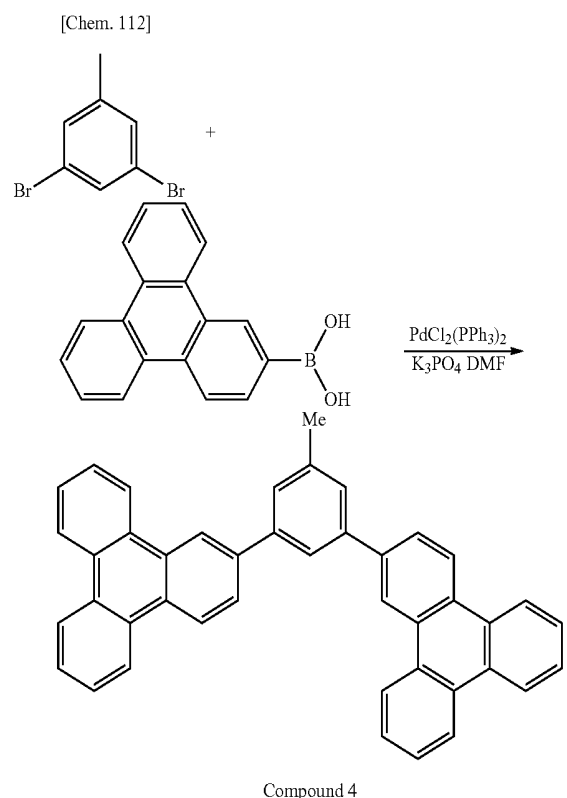
On the other hand, the phosphorescent light could not be substantially observed with a normal organic compound, such as the compound of the invention, at room temperature since the excited triplet energy is converted to heat or the like due to the instability thereof, and is immediately deactivated with a short lifetime. The excited triplet energy of the normal organic compound may be measured by observing light emission under an extremely low temperature condition.

The organic electroluminescence device of the invention may be applied to any of a single device, a structure with plural devices disposed in an array, and a structure having anodes and cathodes disposed in an X-Y matrix. According to the invention, an organic light-emitting device that is largely improved in light emission efficiency may be obtained by adding the compound represented by the general formula (1) to the light-emitting layer. The organic light-emitting device, such as the organic electroluminescence device, of the invention may be applied to a further wide range of purposes. For example, an organic electroluminescent display apparatus may be produced with the organic electroluminescence device of the invention, and for the details thereof, reference may be made to Seiji Tokito, Chihaya Adachi and Hideyuki Murata, "Yuki EL Display" (Organic EL Display) (Ohm-sha, Ltd.). In particular, the organic electroluminescence device of the invention may be applied to organic electroluminescent illumination and backlight which are highly demanded.

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EXAMPLES

The features of the invention will be described more specifically with reference to Synthesis Examples and Examples below. The materials, processes, procedures and the like shown below may be appropriately modified unless they deviate from the substance of the invention. Accordingly, the scope of the invention is not construed as being limited to the specific examples shown below. The light emission characteristics were evaluated by using a source meter (2400 Series, produced by Keithley Instruments Inc.), a semiconductor parameter analyzer (E5273A, produced by Agilent Technologies, Inc.), an optical power meter (1930C, produced by Newport Corporation), an optical spectrometer (USB2000, produced by Ocean Optics, Inc.), a spectroradiometer (SR-3, produced by Topcon Corporation), and a streak camera (Model C4334, produced by Hamamatsu Photonics K.K.).

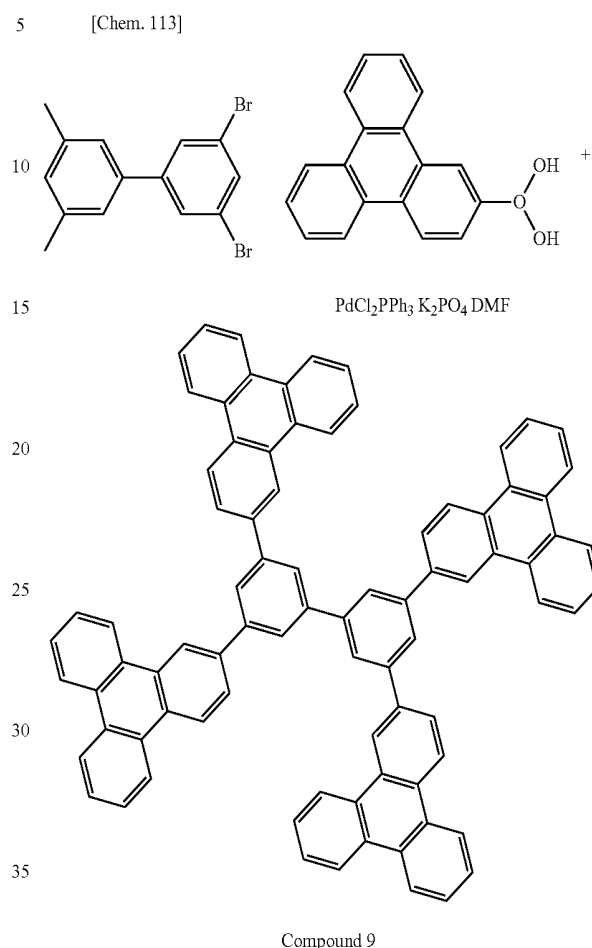
(Synthesis Example 1) Synthesis of Compound 4



A commercial product, 3,5-dibromotoluene (2.50 g, 10 mmol) was dissolved in 80 ml of dimethylformamide, tripotassium phosphate (12.74 g, 60 mmol), $\text{PdCl}_2(\text{PPh}_3)_2$ (dichlorobis(triphenylphosphine) palladium(II): 0.35 g, 0.5 mmol) and triphenylboronate (5.44 g, 20 mmol) were added, and stirred at room temperature for 24 hours, and then reacted at 60° C. for 24 hours. The reaction solution was left cooled, 100 ml of water was added, filtered, washed with 50 ml of acetone, and further washed with 80 ml of water and 80 ml of methanol to give the compound 4 with a yield of 4.90 g, 90%. The reaction product was purified by reduced-pressure sublimation. MS (70 eV, EI) $m/z=544$ (M^+).

320

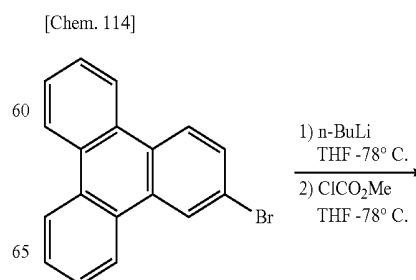
(Synthesis Example 2) Synthesis of Compound 9



A commercial product, 3,3',5,5'-tetrabromobiphenyl (1.41 g, 3 mmol) was dissolved in 120 ml of dimethylformamide, tripotassium phosphate (7.64 g, 36 mmol), $\text{PdCl}_2(\text{PPh}_3)_2$ (0.11 g, 0.2 mmol) and triphenylboronate (3.27 g, 12 mmol) were added, and stirred at room temperature for 24 hours, and then reacted at 80° C. for 24 hours. The reaction solution was left cooled, 240 ml of water was added, filtered, washed with 200 ml of acetone, and further washed with 100 ml of water and 200 ml of methanol to give the compound 9 with a yield, 2.45 g, 77%. The reaction product was purified by reduced-pressure sublimation.

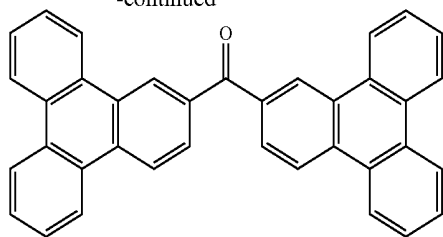
MS (MALDI) $m/z=1059$ ($\text{M}+1$).

(Synthesis Example 3) Synthesis of Compound 10



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-continued



Compound 10

A commercial product, Br-triphenylene (3.07 g, 10 mmol) was dissolved in 80 ml of dewatered tetrahydrofuran in a nitrogen stream atmosphere, and kept at an internal temperature of -85°C . in an ethanol bath with liquid nitrogen. A hexane solution of n-butyl lithium (7.5 ml, 12 mmol) was gradually added to the solution, while kept at an internal temperature of -80°C . or lower. After 1 hour, a solution prepared by dissolving methyl chloroformate (1.42 g, 15 mmol) in 20 ml of dewatered tetrahydrofuran was added while kept at an internal temperature of -80°C . or lower, then kept at -85°C . for 1 hour, and thereafter stirred overnight at room temperature. 100 ml of water was gradually added to the reaction solution, filtered, and then washed with methanol and water to give the compound 10 with a yield of 1.21 g, 42%. The reaction product was purified by reduced-pressure sublimation.

MS (70 eV, EI) $m/z=482$ (M⁺).

(Example 1) Production and Evaluation of Organic Electroluminescence Device Using Compound 1

On a glass substrate with an anode of indium-tin oxide (ITO) formed thereon to have a thickness of 100 nm, each thin film was laminated according to a vacuum evaporation method at a vacuum degree of 5.0×10^{-4} Pa. First, HAT-CN was formed on ITO in a thickness of 10 nm, and then Tris-PCZ was formed thereon in a thickness of 30 nm. Next, a layer having a thickness of 30 nm was formed through co-evaporation with HK13 and the compound 1 from different evaporation sources, thereby forming a light-emitting layer. At this time, the concentration of HK13 was 6.0% by weight. Next, T2T was formed in a thickness of 10 nm, Bpy-TP2 was formed in a thickness of 40 nm, and further lithium fluoride (LiF) was deposited through vacuum evaporation in a thickness of 0.8 nm, and thereafter aluminum (Al) was deposited in a thickness of 100 nm, thereby forming a cathode to provide an organic electroluminescence device. The lifetime characteristic of the produced organic electroluminescence device, as measured at an initial brightness of 1000 Cd/m² and at a current density of 54.5 mA/cm², is shown in FIG. 2.

(Comparative Example 1) Production and Evaluation of Organic Electroluminescence Device Using Comparative Compound A (CBP)

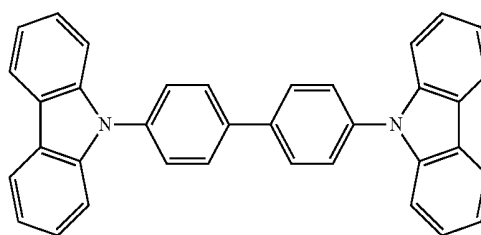
An organic electroluminescence device was produced in the same manner as in Example 1 except that CBP was used to form a light-emitting layer in place of the compound 1. The lifetime characteristic of the produced organic electroluminescence device, as measured at an initial brightness of 1000 Cd/m² and at a current density of 54.5 mA/cm², is shown in FIG. 2.

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The LT50 lifetime of the organic electroluminescence device using the comparative compound A was 12 days, but the LT50 lifetime of the organic electroluminescence device using the compound 1 was 277 days, that is, the latter device had a far longer lifetime.

[Chem. 115]

Comparative Compound A



(CBP)

(Example 2) Production and Evaluation of Organic Electroluminescence Device Using Composite Host Material of Compound 10 and CBP

An organic electroluminescence device was produced in the same manner as in Example 1 except that a light-emitting layer having a thickness of 30 nm was formed through co-deposition with HK13, the compound 10 and CBP from different evaporation sources, and the concentration of HK13 in the light-emitting layer was 1% by weight.

The voltage-current density characteristic of the produced organic electroluminescent device is shown in FIG. 3, the current density-external quantum efficiency characteristic thereof is in FIG. 4, the lifetime characteristic thereof is in FIG. 5, and the characteristic values thereof measured at 1000 Cd/m² are shown in Table 22.

(Comparative Example 2) Production and Evaluation of Organic Electroluminescence Device Using Comparative Compound A (CBP)

An organic electroluminescence device was produced in the same manner as in Example 1 except that CBP was used in place of the compound 1 to form a light-emitting layer and the concentration of HK13 in the light-emitting layer was 1% by weight.

The voltage-current density characteristic of the produced organic electroluminescent device is shown in FIG. 3, the current density-external quantum efficiency characteristic thereof is in FIG. 4, the lifetime characteristic thereof is in FIG. 5, and the characteristic values thereof measured at 1000 Cd/m² are shown in Table 22.

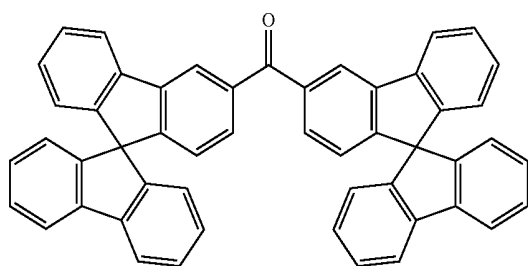
(Comparative Example 3) Production and Evaluation of Organic Electroluminescence Device Using Composite Host Material of Comparative Compound B and CBP

An organic electroluminescence device was produced in the same manner as in Example 1 except that a light-emitting layer having a thickness of 30 nm was formed through co-deposition with HK13, the comparative compound B and CBP from different evaporation sources, and the concentration of HK13 in the light-emitting layer was 1% by weight.

The voltage-current density characteristic of the produced organic electroluminescent device is shown in FIG. 3, the current density-external quantum efficiency characteristic thereof is in FIG. 4, and the characteristic values thereof measured at 1000 Cd/m² are shown in Table 22. The lifetime characteristic of the device was measured in the same manner as in Example 2, and LT50 thereof was 585 hours.

[Chem. 116]

Comparative Compound B



(Example 3) Production and Evaluation of Organic Electroluminescence Device Using Different Light-Emitting Material and Composite Host Material of Compound 10 and CBP

An organic electroluminescence device was produced in the same manner as in Example 2 except that YH016 was used in place of HK13.

The characteristic values of the produced organic electroluminescence device, as measured at 1000 Cd/m², are shown in Table 22.

TABLE 22

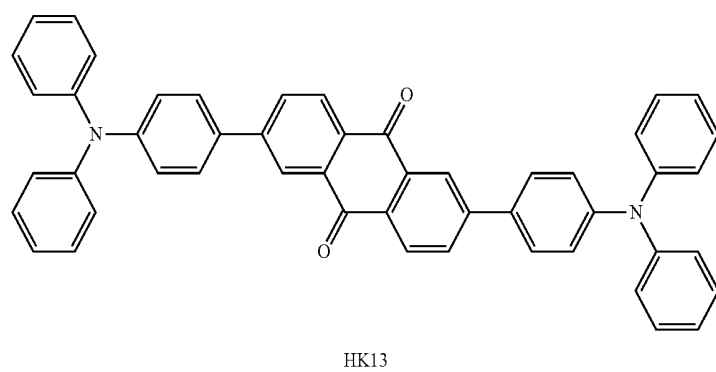
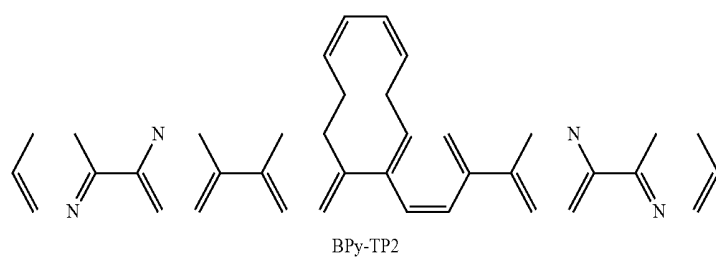
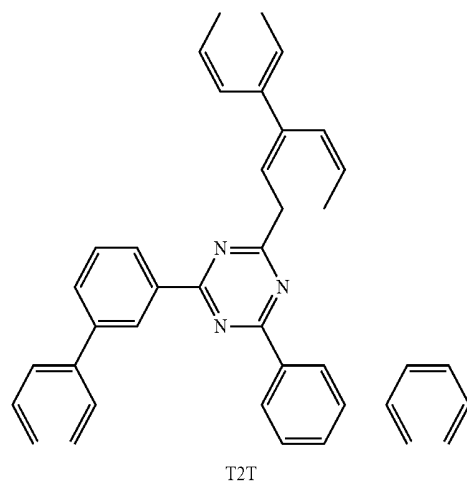
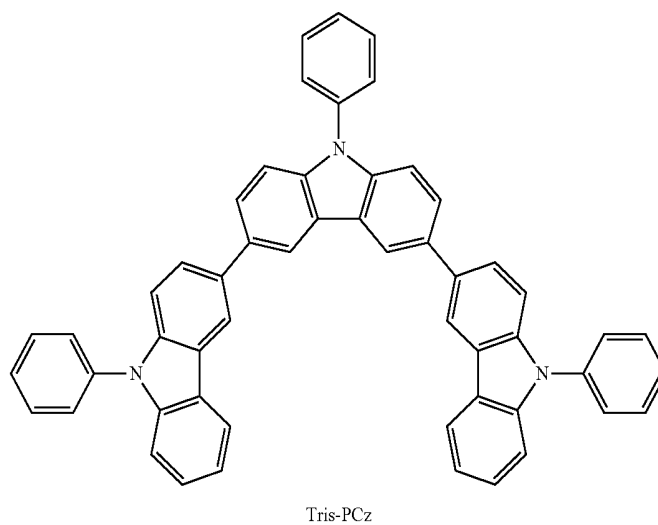
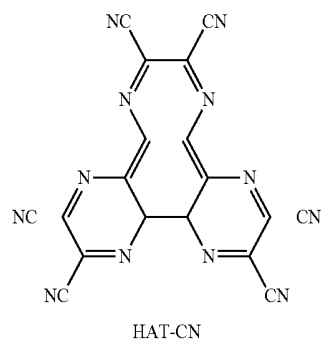
	Host Material	Light-Emitting Material	External Quantum Efficiency (%)	Current Density (mA/cm ²)	Drive Voltage (V)	Current Efficiency (Cd/A)	Power Efficiency (lm/W)	CIE (x, y)	Maximum Emission Wavelength (nm)	LT50 Lifetime (H)	ΔV
Example 2	50% CBP:50% compound 10	1% HK13	3.4	15.2	5.6	6.7	3.8	0.55, 0.44	598	1050	—
Comparative Example 2	CBP	1% HK13	1.6	29.6	8.5	3.3	1.3	0.53, 0.44	593	48	1.4
Comparative Example 3	50% CBP:50% comparative compound B	1% HK13	2.2	24.1	7.2	4.1	1.8	0.55, 0.44	599	585	0.84
Example 3	50% CBP:50% compound 10	1% YH016	4.5	14.3	5.3	7.0	4.2	0.58, 0.42	616	1550	—

The organic electroluminescence device using a composite host material of the compound 10 and CBP has a remarkably longer LT50 lifetime, as compared with the organic electroluminescence device using the comparative compound A (CBP) and the organic electroluminescence device using a composite host material of the comparative compound B and CBP, and can operate at a low drive voltage, and the current efficiency, the power efficiency and the external quantum yield thereof are all high values.

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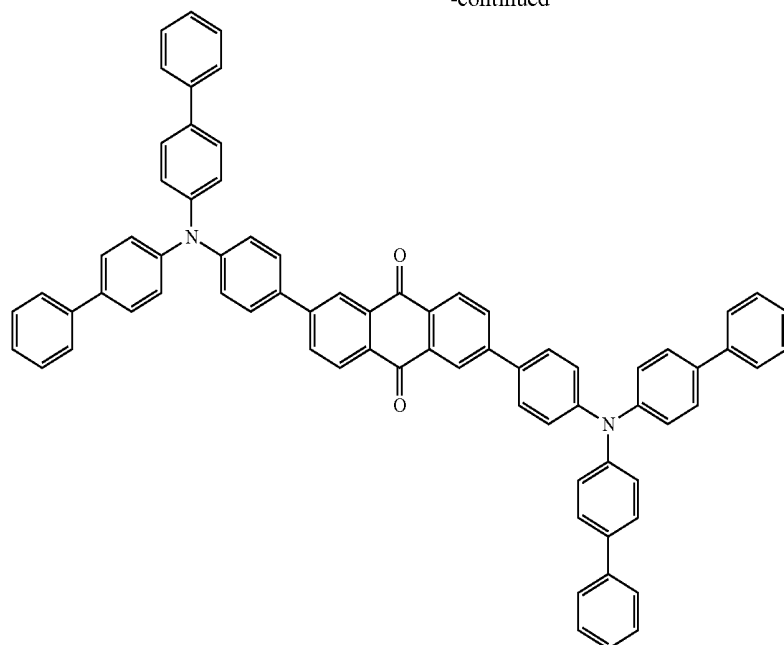
[Chem. 117]



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-continued



YH016

INDUSTRIAL APPLICABILITY

The compound of the invention is useful as a host material for delayed fluorescent materials. Accordingly, the compound of the invention may be effectively used as a host material for delayed fluorescent materials for organic light-emitting devices such as organic electroluminescence devices, etc. By using the host material for delayed fluorescent materials of the present invention, it is possible to provide an organic light-emitting device having a high efficiency, capable of operating at a low drive voltage and having a long lifetime. Thus, the invention has high industrial applicability.

REFERENCE SIGNS LIST

- 1 Substrate
- 2 Anode
- 3 Hole Injection Layer
- 4 Hole Transport Layer
- 5 Light-Emitting Layer
- 6 Electron Transport Layer
- 7 Cathode

The invention claimed is:

1. An organic light-emitting device comprising a layer that contains a delayed fluorescent material and a host material represented by the following general formula (1):



wherein:

Tr represents a substituted or unsubstituted triphenylenyl group, and plural Tr's existing in the general formula (1) may be the same as or different from each other; Z represents a carbonyl group or a substituted or unsubstituted, n-valent aromatic hydrocarbon group; n represents an integer of 2 to 6, but when Z is a carbonyl group, then n is 2; and the substituted n-valent aromatic hydrocarbon group is a n-valent aromatic hydrocarbon group substituted by a hydroxy group, a halogen atom,

a cyano group, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an alkylthio group having 1 to 20 carbon atoms, an alkyl-substituted amino group having 1 to 20 carbon atoms, an acyl group having 2 to 20 carbon atoms, an aryl group having 6 to 40 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms, an alkoxy carbonyl group having 2 to 10 carbon atoms, an alkylsulfonyl group having 1 to 10 carbon atoms, a haloalkyl group having 1 to 10 carbon atoms, an amide group, an alkylamide group having 2 to 10 carbon atoms, a trialkylsilyl group having 3 to 20 carbon atoms, a trialkylsilylalkyl group having 4 to 20 carbon atoms, a trialkylsilylalkenyl group having 5 to 20 carbon atoms, a trialkylsilylalkynyl group having 5 to 20 carbon atoms, a nitro group, or a substituent represented by the following general formula (2):



wherein Tr⁴ represents a substituted or unsubstituted triphenylenyl group,

provided that when Z is a substituted or unsubstituted, n-valent aromatic hydrocarbon group, then at least one of the following conditions is satisfied:

<1> at least one Tr is a substituted triphenylenyl group, and
<2> Z is the substituted aromatic hydrocarbon group, and provided that at least one of the following conditions is satisfied

<A> Z is an n-valent aromatic hydrocarbon group substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group,

 Z is a carbonyl group,

<C> at least one Tr has a substituent represented by the following general formula (2):



wherein Tr⁴ represents a substituted or unsubstituted triphenylenyl group, and

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<D> at least one Tr is a triphenylenyl group substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

2. The organic light-emitting device according to claim 1, wherein Z is a substituted or unsubstituted, n-valent aromatic hydrocarbon group.

3. The organic light-emitting device according to claim 2, wherein Z is an n-valent benzene residue.

4. The organic light-emitting device according to claim 3, wherein Tr bonds to the 1-position and the 3-position of the benzene residue.

5. The organic light-emitting device according to claim 2, wherein Z is an n-valent biphenyl residue.

6. The organic light-emitting device according to claim 2, wherein Z is an n-valent aromatic hydrocarbon group substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

7. The organic light-emitting device according to claim 1, wherein Z is a carbonyl group.

8. The organic light-emitting device according to claim 7, wherein at least one Tr has a substituent represented by the following general formula (2):



General Formula (2)

wherein Tr^4 represents a substituted or unsubstituted triphenylenyl group.

9. The organic light-emitting device according to claim 8, wherein two Tr's have, in total, 1 to 5 substituents each represented by the general formula (2).

10. The organic light-emitting device according to claim 7, which contains a partial structure with a carbonyl group bonding to the 2-position, the 3-position, the 6-position, the 7-position, the 10-position or the 11-position of the triphenylene ring inside the molecule.

11. The organic light-emitting device according to claim 10, wherein all the carbonyl groups bonding to the triphenylene ring existing inside the molecule bond to the 2-position, the 3-position, the 6-position, the 7-position, the 10-position or the 11-position of the triphenylene ring.

12. The organic light-emitting device according to claim 1, wherein at least one Tr in the general formula (1) is a triphenylenyl group substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

13. The organic light-emitting device according to claim 1, which is an organic electroluminescence device.

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14. A compound represented by the following general formula (3):



General Formula (3)

wherein Tr^1 and Tr^2 each independently represent a substituted or unsubstituted triphenylenyl group, and Tr^1 and Tr^2 may be the same as or different from each other.

15. A compound represented by the following general formula (4):



General Formula (4)

wherein Tr^3 represents a substituted or unsubstituted triphenylenyl group, and plural Tr^3 's existing in the general formula (4) may be the same as or different from each other; Z^1 represents a substituted or unsubstituted n-valent aromatic hydrocarbon group; $n1$ represents an integer of 2 to 6; at least one of Tr^3 and Z^1 is substituted with a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group; when Tr^3 is unsubstituted, then Z^1 is a benzene ring residue substituted with a phenyl group or a methyl group and bonds to Tr^3 at the 1-position and the 3-position, or is a biphenyl residue substituted with a phenyl group,

provided that when Tr^3 is a substituted triphenylenyl group, the triphenylenyl is substituted at at least one of 6-, 7-, 10- and 11-positions by a hydroxy group, a halogen atom, a cyano group, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an alkylthio group having 1 to 20 carbon atoms, an alkyl-substituted amino group having 1 to 20 carbon atoms, an acyl group having 2 to 20 carbon atoms, a heteroaryl group having 3 to 40 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms, an alkoxy-carbonyl group having 2 to 10 carbon atoms, an alkyl-sulfonyl group having 1 to 10 carbon atoms, a haloalkyl group having 1 to 10 carbon atoms, an amide group, an alkylamide group having 2 to 10 carbon atoms, a trialkylsilyl group having 3 to 20 carbon atoms, a trialkylsilylalkyl group having 4 to 20 carbon atoms, a trialkylsilylalkenyl group having 5 to 20 carbon atoms, trialkylsilylalkynyl group having 5 to 20 carbon atoms, a nitro group, or a substituent represented by the following general formula (2):



General Formula (2)

wherein Tr^4 represents a substituted or unsubstituted triphenylenyl group.

* * * * *

专利名称(译)	用于延迟荧光材料的主体材料，有机发光装置和化合物		
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[标]申请(专利权)人(译)	国立大学法人九州大学		
申请(专利权)人(译)	KYUSHU大学，国立大学公司		
当前申请(专利权)人(译)	KYULUX，INC.		
[标]发明人	KUWABARA HIROKAZU SHIBATA TAKUMI TAKAHASHI TAKEHIRO ADACHI CHIHAYA		
发明人	KUWABARA, HIROKAZU SHIBATA, TAKUMI TAKAHASHI, TAKEHIRO POTSCAVAGE, JR., WILLIAM JOHN ADACHI, CHIHAYA		
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CPC分类号	C09K11/06 C07C15/38 H01L51/0058 C09K11/025 H01L51/006 H01L51/0054 C07C49/788 H01L51/5012 H01L51/0052 H01L2251/5384 H01L51/0067 H01L51/0072 C09K2211/1007 C09K2211/1014 C09K2211/1011 H01L51/5016		
优先权	2014179589 2014-09-03 JP		
其他公开文献	US20170288146A1		
外部链接	Espacenet		

摘要(译)

由 (Tr) $\tilde{n}$ -Z表示的化合物可用作延迟荧光材料的主体材料。 Tr表示取代或未取代的三苯基，并且在通式 (1) 中存在的多个Tr可以彼此相同或不同。 Z代表羰基或取代或未取代的n价芳族烃基。 n表示2至6的整数，但是当Z为羰基时，n为2。

