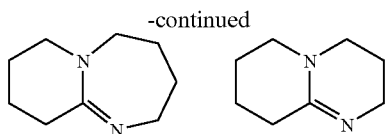


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Of these compounds, 1,8-diazabicyclo[5.4.0]undeca-7-ene and 1,5-diazabicyclo[4.3.0]nona-5-ene are preferred over the others.

As the nitrogen-containing basic compounds having at least two nitrogen atoms per molecule in different chemical environments, compounds containing in each molecule both a substituted or unsubstituted amino group and a nitrogen-containing cyclic structure and compounds having alkylamino groups are especially preferred. Examples of such especially preferred compounds include guanidine, 1,1-methylguanidine, 1,1,3,3-tetraguanidine, 2-aminopyridine, 3-aminopyridine, 4-aminopyridine, 2-dimethylaminopyridine, 4-dimethylaminopyridine, 2-diethylaminopyridine, 2-(aminomethyl)pyridine, 2-amino-3-methylpyridine, 2-amino-4-methylpyridine, 2-amino-5-methylpyridine, 2-amino-6-methylpyridine, 3-aminoethylpyridine, 4-aminoethylpyridine, 3-aminopyrrolidine, piperazine, N-(2-aminoethyl)piperazine, N-(2-aminoethyl)piperidine, 4-amino-2,2,6,6-tetramethylpiperidine, 4-piperidinopiperidine, 2-iminopiperidine, 1-(2-aminoethyl)pyrrolidine, pyrazole, 3-amino-5-methylpyrazole, 5-amino-3-methyl-1-p-tolylpyrazole, pyrazine, 2-(aminomethyl)-5-methylpyrazine, pyrimidine, 2,4-diaminopyrimidine, 4,6-dihydroxypyrimidine, 2-pyrazoline, 3-pyrazoline, N-aminomorpholine, N-(2-aminoethyl)morpholine, trimethylimidazole, triphenylimidazole, and methylphenylimidazole. However, these examples should not be construed as limiting the scope of the basic compounds usable in the invention.

These basic compounds are used alone or as combinations of two or more thereof. The proportion of the basic compounds used to the total solids in the resist composition is generally from 0.001 to 10% by weight, preferably from 0.01 to 5% by weight.

The addition of basic compounds in a proportion lower than 0.001% by weight cannot produce the intended effect, while the addition in proportions higher than 10% by weight tends to lower the sensitivity and cause deterioration of developability in unexposed areas.

Compounds usable in the invention for promoting dissolution into a developer are low-molecular-weight compounds containing at least two phenolic OH groups or at least one carboxyl group per molecule and having molecular weight of 1,000 or below. When the compounds have carboxyl groups, it is preferable that they are alicyclic or aliphatic compounds for the same reasons as mentioned above.

The suitable proportion of these dissolution-promoting compounds is from 2 to 50% by weight, preferably from 5 to 30% by weight, based on the polymers used in the invention. Those compounds added in a proportion greater than 50% by weight give rise to aggravation of development residue and a new defect that patterns are deformed at the time of development.

It is easy for persons skilled in the art to synthesize the foregoing phenolic compounds having molecular weight of 1,000 or below by reference to the methods as described in JP-A-4-122938, JP-A-2-28531, U.S. Pat. No. 4,916,210 and European Patent 2,192,294.

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Examples of such phenolic compounds include those recited below, but the compounds usable in the invention should not be construed as being limited to these examples.

Namely, examples of phenolic compounds usable in the invention include resorcinol, phloroglucine, 2,3,4-trihydroxybenzophenone, 2,3,4,4'-tetrahydroxybenzophenone, 2,3,4,3',4',5'-hexahydroxybenzophenone, acetone-pyrogallol condensation resin, phloroglucoside, 2,4,2',4'-biphenyltetraol, 4,4'-thiobis(1,3-dihydroxy)benzene, 2,2',4,4'-tetrahydroxydiphenyl ether, 2,2',4,4'-tetrahydroxydiphenyl sulfoxide, 2,2',4,4'-tetrahydroxydiphenyl sulfone, tris(4-hydroxyphenyl)methane, 1,1-bis(4-hydroxyphenyl)cyclohexane, 4,4'- α -methylbenzylidenebisphenol, α,α',α'' -tris(4-hydroxyphenyl)-1,3,5-triisopropylbenzene, α,α',α'' -tris(4-hydroxyphenyl)-1-ethyl-4-isopropylbenzene, 1,2,2-tris(hydroxyphenyl)propane, 1,1,2-tris(3,5-dimethyl-4-hydroxyphenyl)propane, 2,2,5,5-tetrakis(4-hydroxyphenyl)hexane, 1,2-tetrakis(4-hydroxyphenyl)ethane, 1,1,3-tris(hydroxyphenyl)butane, and para [α,α',α'' -tetrakis(4-hydroxyphenyl)]xylene.

As dyes used in the invention, fat dyes and basic dyes are suitable. Examples of such dyes include Oil Yellow #101, Oil Yellow #103, Oil Pink #312, Oil Green BG, Oil Blue BOS, Oil Blue #603, Oil Black BY, Oil Black BS, Oil Black T-505 (all of which are products of Orient Chemical Industries, Ltd.), Crystal Violet (CI42555), Methyl Violet (CI42535), Rhodamine B (CI45170B), Malachite Green (CI42000) and Methylene Blue (CI52015).

For the purpose of enhancing the rate of acid generation by exposure to light, photo-sensitizers as recited below can be added. Examples of photo-sensitizers suitable for such a purpose include benzophenone, p, p'-tetramethyldiaminobenzophenone, p,p'-tetraethylethylaminobenzophenone, 2-chlorothioxanthone, anthrone, 9-ethoxyanthracene, anthracene, pyrene, perylene, phenothiazine, benzil, Acridine Orange, benzoflavin, Cetoflavin-T, 9,10-diphenylanthracene, 9-fluorenone, acetophenone, phenanthrene, 2-nitrofluorene, 5-nitroacenaphthene, benzoquinone, 2-chloro-4-nitroaniline, N-acetyl-p-nitroaniline, p-nitroaniline, N-acetyl-4-nitro-1-naphthylamine, picramide, anthraquinone, 2-ethylantraquinone, 2-tert-butylantraquinone, 1,2-benzanthraquinone, 3-methyl-1,3-diaza-1,9-benzanthrone, dibenzalacetone, 1,2-naphthoquinone, 3,3'-carbonyl-bis(5,7-dimethoxycarbonylcoumarin) and coronene, but photo-sensitizers usable in the invention should not be construed as being limited to these compounds.

Those photo-sensitizers can act also as absorbents of far ultraviolet rays of a light source used. In this case, the light absorbents can reduce reflected light from a substrate and lessen the influence of multiple reflections within the resist film, thereby producing an effect of standing-wave improvement.

To the present compositions, surfactants other than the foregoing fluorine- and/or silicon-containing surfactants can also be added. Examples of such surfactants include non-ionic surfactants, such as polyoxyethylene alkyl ethers (e.g., polyoxyethylene lauryl ether, polyoxyethylene stearyl ether, polyoxyethylene cetyl ether, polyoxyethylene oleyl ether), polyoxyethylene alkyl aryl ethers (e.g., polyoxyethylene octyl phenol ether, polyoxyethylene nonyl phenol ether), polyoxyethylene-polyoxypropylene block copolymers, sorbitan fatty acid esters (e.g., sorbitan monolaurate, sorbitan monopalmitate, sorbitan monostearate, sorbitan monooleate, sorbitan trioleate, sorbitan tristearate), and polyoxyethylene-sorbitan fatty acid esters (e.g., polyoxyethylene sorbitan monolaurate, polyoxyethylene sorbitan monopalmitate,