

compound is preferably 0.01 to 8.0% by mass, more preferably 0.1 to 5.0% by mass, and particularly preferably 0.2 to 4.0% by mass, based on the total solid contents of the composition.

The molar ratio of the basic compound to the photo-acid generator is preferably from 0.01 to 10, more preferably from 0.05 to 5, and still more preferably from 0.1 to 3. When this molar ratio is excessively high, the sensitivity and/or resolution may decrease in some cases. When this molar ratio is excessively small, there is a possibility that tapering in the pattern occurs between the exposure and the heating (post-bake). The molar ratio is more preferably from 0.05 to 5, and still more preferably from 0.1 to 3. The photo-acid generator as used in the molar ratio is based on the total amount of the repeating unit (B) of the resin and the photo-acid generator which the resin may further contain.

Preferred examples of the basic compound include guanidine, aminopyridine, aminoalkylpyridine, aminopyrrolidine, indazole, imidazole, pyrazole, pyrazine, pyrimidine, purine, imidazoline, pyrazoline, piperazine, aminomorpholine, and aminoalkylmorpholine. These may further have a substituent.

Preferred examples of the substituent include an amino group, an aminoalkyl group, an alkylamino group, an aminoaryl group, an arylamino group, an alkyl group, an alkoxy group, an acyl group, an acyloxy group, an aryl group, an aryloxy group, a nitro group, a hydroxyl group, and a cyano group.

Particularly preferred examples of the basic compound include guanidine, 1,1-dimethyl guanidine, 1,1,3,3-tetramethyl guanidine, imidazole, 2-methylimidazole, 4-methylimidazole, N-methylimidazole, 2-phenylimidazole, 4,5-diphenylimidazole, 2,4,5-triphenylimidazole, 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 and N-(2-aminoethyl) morpholine.

[6] Surfactant

The composition of the present invention may further contain a surfactant. The surfactant is particularly preferably a fluorine-based and/or silicon-based surfactant.

Examples of the fluorine-based and/or silicone-based surfactant include Megaface F176 or Megaface R08 manufactured by DIC Corporation, PF656 and PF6320 manufactured by OMNOVA SOLUTIONS, INC., Troy Sol S-366 manufactured by Troy Chemical Co., Ltd., Fluorad FC430 manufactured by Sumitomo 3M Ltd., and polysiloxane polymer KP-341 manufactured by Shin-Etsu Chemical Co., Ltd.

Surfactants other than these fluorine-based and/or silicone-based surfactants may also be used. Examples of such other surfactants include nonionic surfactants such as polyoxyethylene alkyl ethers and polyoxyethylene alkylaryl ethers.

Moreover, other generally known surfactants may also be appropriately used. Examples of the useful surfactants include those described in 0273 et seq. of US 2008/0248425 A1.

These surfactants may be used alone or in combination of two or more kinds thereof.

In the case where the composition according to the present invention further contains a surfactant, the amount of surfactant used is preferably in the range of 0.0001 to 2% by mass, and more preferably 0.001 to 1% by mass, based on the total solid contents of the composition.

[7] Dye

The composition according to the present invention may further include a dye. Examples of suitable dyes include oil dyes and basic dyes. Specific examples thereof 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 and Oil Black T-505 (all manufactured by Orient Chemical Industries, Ltd.), Crystal Violet (CI42555), Methyl Violet (CI42535), Rhodamine B (CI45170B), Malachite Green (CI42000), and Methylene Blue (CI52015).

[8] Photo-Base Generator

The composition according to the present invention may further contain a photo-base generator. When a photo-base generator is contained, a more excellent pattern can be formed.

Examples of the photo-base generator include compounds described in JP1992-151156A (JP-H04-151156A), JP1992-162040A (JP-H04-162040A), JP1993-197148A (JP-H05-197148A), JP1993-5995A (JP-H05-5995), JP1994-194834A (JP-H06-194834), JP1996-146608A (JP-H08-146608A), and JP1998-83079 (JP-H10-83079A), and EP622,682B.

Specific preferred examples of the photo-base generator include 2-nitrobenzylcarbamate, 2,5-dinitrobenzylcyclohexylcarbamate, N-cyclohexyl-4-methylphenylsulfonamide, and 1,1-dimethyl-2-phenylethyl-N-isopropylcarbamate.

[9] Antioxidant

The composition according to the present invention may further contain an antioxidant. When an antioxidant is contained, the organic material can be prevented from oxidation in the presence of oxygen.

Examples of the antioxidant include a phenol-based antioxidant, an antioxidant composed of an organic acid derivative, a sulfur-containing antioxidant, a phosphorus-based antioxidant, an amine-based antioxidant, an antioxidant composed of an amine-aldehyde condensate, and an antioxidant composed of an amine-ketone condensate. Among these antioxidants, a phenol-based antioxidant or an antioxidant composed of an organic acid derivative is particularly preferably used. When such an antioxidant is used, the function as an antioxidant can be brought out without deteriorating the performance of the composition.

As the phenol-based antioxidant, for example, substituted phenols, and bis-, tris-, and poly-phenols may be used.

Examples of the substituted phenols include 1-oxy-3-methyl-4-isopropylbenzene, 2,6-di-tert-butylphenol, 2,6-di-tert-butyl-4-ethylphenol, 2,6-di-tert-butyl-4-methylphenol, 4-hydroxymethyl-2,6-di-tert-butylphenol, butylhydroxyanisole, 2-(1-methylcyclohexyl)-4,6-dimethylphenol, 2,4-dimethyl-6-tert-butylphenol, 2-methyl-4,6-dinonylphenol, 2,6-di-tert-butyl-dimethylamino-p-cresol, 6-(4-hydroxy-3,5-di-tert-butylanilino)-2,4-bis-octyl-thio-1,3,5-triazine, n-octadecyl-3-(4'-hydroxy-3',5'-di-tert-butylphenyl)propionate, octylated phenol, aralkyl-substituted phenols, alkylated-p-cresol, and hindered phenol.

Examples of the bis, tris or polyphenols include 4,4'-dihydroxydiphenyl, methylenebis(dimethyl-4,6-phenol), 2,2'-methylene-bis-(4-methyl-6-tert-butylphenol), 2,2'-methylene-bis-(4-methyl-6-cyclohexylphenol), 2,2'-methylene-bis-(4-ethyl-6-tert-butylphenol), 4,4'-methylene-bis-(2,6-di-tert-butylphenol), 2,2'-methylene-bis-(6- α -methyl-benzyl-p-cresol), methylene-bridged polyalkyl phenol, 4,4'-