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(54) **Toner and developer compositions with compatibilizer**

Toner und Entwicklerzusammensetzungen mit Kompatibilisierungsmittel

Compositions de toner et de développateur contenant un agent compatibilisant

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Description

[0001] This invention is generally directed to toner and developer compositions, and more specifically the present invention is directed to toner compositions, including magnetic, single component, two component and colored toner compositions wherein more than one polymer, including at least one wax component, can be selected.

[0002] US-A-4,795,689 discloses an electrostatic image developing toner comprising as essential constituents a nonlinear polymer, a low melting polymer, which is incompatible with the nonlinear polymer, a copolymer composed of a segment polymer, which is at least compatible with the nonlinear polymer, and a segment polymer, which is at least compatible with the low melting polymer, and a coloring agent, see the Abstract, and columns 3 to 10 for example. US-A-4,557,991 discloses a toner for the development of electrostatic images comprised of a certain binder resin, and a wax comprising a polyolefin, see the Abstract; also see columns 5 and 6 of this patent and note the disclosure that the modified component shows an affinity to the binder and is high in compatibility with the binder, column 6, line 25.

[0003] EP-A-421416 discloses a heat fixable toner comprising a binder resin and a release agent. Preferably, the resin includes a mixture of a linear polyester and a non-linear polyester resin. The release agent is a graft-modified polyolefin, wherein the polyolefin is usually graft-modified with an aromatic vinyl monomer and an unsaturated fatty acid (ester).

[0004] JP-A-63034550 discloses a toner composition comprising a styrene resin, a low molecular weight polyethylene wax and a styrene monomer graft polyethylene wax.

[0005] However, there are various problems observed with the inclusion of waxes such as polyolefins in toners. For example, when a polypropylene wax is included in toner to enhance the release of toner from a hot fuser roll, or to improve the lubrication of fixed toner image it has been observed that the wax does not disperse well in the toner resin. As a result, free wax particles are released during the pulverizing step in, for example, a fluid energy mill and the pulverization rate is lower. The poor dispersion of wax in the toner resin and, therefore, the loss of wax will then impair the release function it is designed for. Scratch marks, for example, on xerographic developed toner solid areas caused by stripper fingers were observed as a result of the poor release. Furthermore, the free wax remaining in the developer will build up on the detone roll present in the xerographic apparatus causing a hardware failure.

[0006] It is the object of the present invention to overcome these problems.

[0007] According to the present invention, there is provided a toner composition according to claim 1. The present invention also provides a developer composition as recited in claim 4.

[0008] All the problems mentioned above, and others can be eliminated, or minimized with the toner compositions of the present invention in embodiments thereof. The release of wax particles is, for example, a result of poor wax dispersion during the toner mechanical blending step. All additives should be dispersed well in the primary toner resin for them to impart their specific functions to the toner and thus the developer. For some of the additives, such as waxes like polypropylene, VISCOL 550P™ that become a separate molten phase during melt mixing, the difference in viscosity between the wax and the resin can be orders of magnitude apart, thus causing difficulty in reducing the wax phase domain size. A more fundamental reason for poor dispersion is due to the inherent thermodynamic incompatibility between polymers. The Flory-Huggins interaction parameter between the resin and the wax is usually positive (repulsive) and large so that the interfacial energy remains very large in favor of phase separation into large domains to reduce interfacial area. Some degree of success has been obtained by mechanical blending the toner formulation in certain types of mixers, such as the known Banbury mixer, where the temperature of melt can be maintained at a low level and polymer viscosities are not that far apart. However, it has been found difficult to generate an effective wax dispersion in compounding extruders where melt temperatures are typically higher. The inclusion of a compatibilizer of the present invention is designed to overcome the inherent incompatibility between toner resin and wax, thus widening the processing temperature latitude and enabling the toner preparation in a large variety of equipment, for example an extruder. The improvement in thermodynamic compatibility will also provide for a more stable dispersion of secondary polymer phase, such as wax, in the host resin against gross phase separation over time.

[0009] A number of specific advantages are associated with the invention of the present application in embodiments thereof, including improving the dispersion of toner resin particles, i.e. a mixture of resins and wax; improving the dispersion of wax in the toner, thus eliminating the undesirable release of wax from the toner in the form of free wax particles during the pulverizing operation of the toner manufacturing process and the subsequent contamination of xerographic machine subsystems by these free wax particles; avoiding the pulverizing rate reduction resulting from the poor wax dispersion; maintaining the intended concentration of wax in the toner to provide enhancement during release from the fuser roll and avoiding the undesirable scratch marks caused by the stripper fingers; a wide process latitude can be provided during the mechanical blending operation of the toner manufacturing process; and enabling the effective mechanical blending of toner to be accomplished in a number of devices, including an extruder.

[0010] The toner compositions of the invention contains at least two polymers, and in embodiments from 2

to 10 polymers including the first resin, the second crosslinked resin, the wax component, and the compatibilizer component. There is also provided in accordance with the present invention positively or negatively charged toner compositions comprised of resin particles, pigment particles, the wax component, such as polypropylene wax, and the copolymer compatibilizer and charge enhancing additives. In addition, the present invention is directed to developer compositions comprised of the aforementioned toners, and carrier particles. Furthermore, in another embodiment of the present invention there are provided single component toner compositions comprised of resin particles, magnetic components, such as magnetites, the wax component, such as polypropylene wax, and the copolymer compatibilizer. The toner and developer compositions of the present invention are useful in a number of known electrostatographic imaging and printing systems, especially those systems wherein a wax is present in the toner. The developer compositions of the present invention in embodiments possess a wide fusing latitude, for example about 100°C, which is the temperature range between the minimum fixing temperature of, for example, from 100°C to 170°C required for fixing toner particles on paper and the hot, for example,from 180°C to 250°C, offset temperature. The developer compositions of the present invention also provide toner images with low surface energy and a low frictional coefficient, which properties enable the effective release of paper from the fuser roll and provide for a reduction in image smudging. Further, the developer compositions of the present invention possess stable electrical properties for extended time periods, and with these compositions, for example, there is no substantial change in the triboelectrical charging values.

[0011] In the present invention there are provided toner compositions comprised of first resin particles, second crosslinked resin particles, pigment particles, low molecular weight waxes, such as polyethylene, and polypropylene, such as those available from Sanyo Chemicals of Japan as VISCOL 550P™ and VISCOL 660P™ , and the compatibilizer . Furthermore, there are provided in accordance with the present invention positively charged toner compositions further comprising a charge enhancing additive. Another embodiment of the present invention is directed to developer compositions comprised of the aforementioned toners; and carrier particles.

[0012] In addition, in accordance with embodiments of the present invention there are provided developer compositions comprised of toner compositions containing first resin particles like a styrene butadiene resin, second crosslinked resins of, for example, a styrene methacrylate crosslinked with known components such as divinylbenzene, pigment particles such as magnetites, carbon blacks or mixtures thereof, low molecular weight waxes, such as polyethylene, and polypropylene, such as those available from Sanyo Chemicals of Japan as VISCOL 550P™ and VISCOL. 660P™, the compatibilizer , and an optional charge enhancing additive, particularly, for example, distearyl dimethyl ammonium methyl sulfate, reference US-A-4,560,635. As carrier components for the aforementioned compositions, there can be selected a number of known materials like steel, iron, or ferrite, particularly with a polymeric coating thereover.

[0013] Suitable amounts of toner resins for the toner and developer compositions of the present invention are, for example, from about 70 percent by weight to about 95 percent by weight.

[0014] The toner is comprised of a mixture of resins comprised of a first resin selected from styrene acrylate, styrene methacrylate, or styrene butadiene with a high styrene content of more than 80% by weight and a second polymer comprised of a crosslinked copolymer of styrene and butyl methacrylate. The aforementioned mixture of first and second resins can contain various effective amounts of each resin, for example from 50 to 90, and preferably 70 weight percent of the first resin, like styrene butadiene, and from 50 to 10, and preferably 30 weight percent of the second resin, like the resin crosslinked with, for example, divinylbenzene.

[0015] Numerous well known suitable pigments can be selected as the colorant for the toner particles including, for example, carbon black, like REGAL 330®, BLACK PEARLS®, VULCAN®, nigrosine dye, aniline blue, phthalocyanine derivatives, magnetites and mixtures thereof. The pigment, which is preferably carbon black, should be present in a sufficient amount to render the toner composition colored thereby permitting the formation of a clearly visible image. Generally, the pigment particles are present in amounts of from 2 to 20 percent by weight, and preferably from 5 to 10 weight percent, based on the total weight of the toner composition, however, lesser or greater amounts of pigment particles may be selected in embodiments.

[0016] When the pigment particles are comprised of known magnetites, including those commercially available as MAPICO BLACK®, they are usually present in the toner composition in an amount of from 10 to 70 percent by weight, and preferably in an amount of from 10 to 30 percent by weight. Alternatively, there can be selected as pigment particles mixtures of carbon black or equivalent pigments and magnetites, which mixtures, for example, contain from 6 percent to 70 percent by weight of magnetite, and from 2 percent to 15 percent by weight of carbon black.

[0017] In another embodiment of the present invention there are provided colored toner compositions containing as pigments or colorants known magenta, cyan, and/or yellow particles, as well as mixtures thereof. These pigments are generally present in the toner composition in an amount of from 2 to 15 weight percent, and preferably from about 2 to about 10 weight percent, based on the weight of the toner resin particles.

[0018] Examples of low molecular weight, for exam-

ple from 1,000 to 20,000, and preferably from 1,000 to 7,000, waxes include those as illustrated in GB-A-1,442,835, such as polyethylene, polypropylene, especially VISCOL 550P™ and VISCOL 660P™. The aforementioned waxes, which can be obtained in many instances from Sanyo Chemicals of Japan, are present in the toner in various effective amounts, such as for example from 0.5 to 10, and preferably from 3 to 7 weight percent. Examples of functions of the wax are to enhance the release of paper after fusing, and providing the fused toner image with lubrication. The release or separation of wax from the toner can reduce these functions. Also, toners with poor wax dispersion have a lower pulverizing rate and the free wax which can remain with the toner will build up on the internal parts of the xerographic cleaning device causing a machine failure.

[0019] The compatibilizers are comprised of block copolymers of the structure A-b(lock)-B, or A-b-B-b-A with the polymeric segments A and B each being defined below thereby permitting the compatibilizer to serve, for example, as a macromolecular surfactant. Examples of compatibilizers include block copolymers, such as the KRATON® copolymers, available from Shell Chemical Company, and STEREON® copolymers, available from Firestone Tire and Rubber Company. For example, KRATON G1701X®, a block copolymer of styrene-ethylene/propylene, KRATON G1726X®, a block copolymer of styrene-ethylene/butylene-styrene, KRATON G1652®, a block copolymer of styrene-ethylene/butylene-styrene, STEREON 730A®, a block copolymer of styrene and butadiene, are suitable for improving the wax dispersion in styrenic resins. With KRATON G1701X® the A segment could be the styrene block and the B segment could be an ethylene/propylene block. In embodiments of the present invention, there are provided toners wherein the compatibilizer is of the formula A-b-B or A-b-B-b-A wherein A-b-B is a block copolymer of 2 segments, A and B, A-b-B-b-A is a block copolymer of 3 segments, A, B and A, and wherein the polymeric segment A is identical or compatible to the toner resin present in the toner composition, whereas the polymeric segment B is identical or compatible to the wax component in the toner composition. Thus, in embodiments the aforementioned compatibilizer can be comprised of rigid units such as styrene with the polymeric segment B being comprised of flexible, rubber-like units such as ethylene/propylene. The molecular weight of polymeric segment A can be from 3,000 to 100,000, and the molecular weight of polymeric segment B can be from 10,000 to 200,000. The compatibilizer is present in various effective amounts, such as for example from 0.5 to 10, and preferably from 1 to 3 weight percent in embodiments.

[0020] Illustrative examples of optional charge enhancing additives present in various effective amounts, such as for example from 0.1 to 20, and preferably from 1 to 5 weight percent by weight, include alkyl pyridinium halides, such as cetyl pyridinium chlorides, reference US-A-4,298,672, cetyl pyridinium tetrafluoroborates, quaternary ammonium sulfate, and sulfonate charge control agents as illustrated in US-A-4,338,390, stearyl phenethyl dimethyl ammonium tosylates, reference US-A-4,338,390, distearyl dimethyl ammonium methyl sulfate, reference US-A-4,560,635, stearyl dimethyl hydrogen ammonium tosylate; and other known similar charge enhancing additives.

[0021] With further respect to the toner and developer compositions of the present invention, a component that may be present therein is the linear polymeric alcohol comprised of a fully saturated hydrocarbon backbone with at least 80 percent of the polymeric chains terminated at one chain end with a hydroxyl group, which alcohol is represented by the following formula

$$CH_3(CH_2)_nCH_2OH$$

wherein n is a number of from 30 to 300, and preferably of from 30 to 100, which alcohols are available from Petrolite Corporation.

[0022] Illustrative examples of carrier particles that can be selected for mixing with the toner compositions of the present invention include those particles that are capable of triboelectrically obtaining a charge of opposite polarity to that of the toner particles. Accordingly, the carrier particles can be selected so as to be of a negative polarity thereby enabling the toner particles which are positively charged to adhere to and surround the carrier particles. Alternatively, there can be selected carrier particles with a positive polarity enabling toner compositions with a negative polarity. Illustrative examples of known carrier particles that may be selected include granular zircon, granular silicon, glass, steel, nickel, iron and ferrites, like copper zinc ferrites, available from Steward Chemicals. The carrier particles may include thereon known coatings like fluoropolymers, such as KYNAR®, polymethylacrylate. Examples of specific coatings that may be selected include a vinyl chloride/trifluorochloroethylene copolymer, which coating contains therein conductive particles, such as carbon black.

[0023] Also, while the diameter of the carrier particles can vary, generally they are of a diameter of from 50 to 1,000 μm (microns), and preferably from 75 to 200 μm (microns), thus allowing these particles to possess sufficient density and inertia to avoid adherence to the electrostatic images during the development process. The carrier particles can be mixed with the toner particles in various suitable combinations, such as from 1 to 3 parts per toner to 100 to 200 parts by weight of carrier.

[0024] The toner compositions of the present invention can be prepared by a number of known methods, including mechanical blending and melt blending the toner resin particles, pigment particles or colorants, compatibilizer, optional additives, and polymeric waxes followed by mechanical attrition including classification. Other methods include those well known in the art such

as spray drying, mechanical dispersion, melt dispersion, dispersion polymerization, and suspension polymerization. The toner particles are usually pulverized, and classified, thereby providing a toner with an average volume particle diameter of from about 7 to 25, and preferably from 10 to 15 μm (microns) as determined by a Coulter Counter. The toner compositions of the present invention are particularly suitable for preparation in a compounding extruder such as a corotating intermeshing twin screw extruder of the type supplied by the Werner & Pfleiderer Company of Ramsey, New Jersey. The inclusion of compatibilizer improved the thermodynamic compatibility between the primary and the secondary polymer phases. As a result, the secondary polymer can be well dispersed into smaller domain size with improved adhesion to the primary resin. The smaller domain size and the better adhesion will then prevent the secondary polymer from separating into individual particles during the pulverization operation. Furthermore, the compatibilizing action can be functioning even at high melt temperatures, for example 50°C above the melting point of the wax component when mechanical blending is difficult because of a vast difference in polymer viscosity. This advantage increases the process latitude of the mechanical blending operation. The advantage of including a compatibilizer may not be limited to the mechanical blending process alone; thus, for example, improved dispersion and adhesion can be realized in other known preparation methods by using the toner compositions of the present invention. Also, high concentrations of a wax, can be effectively dispersed in a toner by including an effective amount of compatibilizer.

[0025] The toner and developer compositions of the present invention may be selected for use in developing images in electrostatographic imaging systems containing therein, for example, conventional photoreceptors, such as selenium and selenium alloys. Also useful, especially wherein there is selected positively charged toner compositions, are layered photoresponsive devices comprised of transport layers and photogenerating layers, reference US-A-4,265,990; 4,585,884; 4,584,253 and 4,563,408, and other similar layered photoresponsive devices.

[0026] The toner and developer compositions of the present invention can be particularly useful with electrostatographic imaging apparatuses containing a development zone situated between a charge transporting means and a metering charging means, which apparatus is illustrated in U.S. Patents 4,394,429 and 4,368,970. More specifically, there is illustrated in the aforementioned '429 patent a self-agitated, two-component, insulative development process and apparatus wherein toner is made continuously available immediately adjacent to a flexible deflected imaging surface, and toner particles transfer from one layer of carrier particles to another layer of carrier particles in a development zone.

[0027] The following examples are provided, wherein parts and percentages are by weight unless otherwise indicated. A comparative Example is also provided.

EXAMPLE I

[0028] A toner composition comprised of 63.4 percent by weight of a styrene butadiene resin with 91 percent by weight of styrene and 9 percent by weight of butadiene, 19.1) percent by weight of a crosslinked, with 2 weight percent of divinyl benzene, styrene butylmethacrylate resin, 5 percent by weight of the polypropylene wax VISCOL 550P™, available from Sanyo Chemicals of Japan, 10 percent by weight of REGAL 330® carbon black, 2 percent by weight of a styrene-ethylene/butylene-styrene block copolymer (Shell KRATON G1726X®), and 0.5 percent by weight of the charge enhancing additive distearyl dimethyl ammonium methyl sulfate, was prepared by mechanically blending the aforementioned components using a Werner & Pfleiderer ZSK30 twin screw extruder at barrel set temperatures ranging from 90 to 140°C. After pulverization and classification, toner particles with volume average diameter of about 11 μm (microns) as measured by a Coulter Counter, were obtained. The percent by weight of the free wax particles was determined to be less than 0.01 for all toners prepared. (The free wax particles did not contain carbon black and, therefore, were lighter than the normal toner particles. A centrifugal separation technique based on the difference in specific gravity was then used to separate the lighter wax particles and determine the percent by weight of wax particles). Transmission electron microscope analysis of the above toner showed that domains of wax and crosslinked resin components were about μm 1 (micron), the longest projected dimension measured on a TEM photomicrograph; all particles or domains were nonspherical; or less in the styrene butadiene continuous phase. The total wax remained inside the toner particles as determined by a differential scanning calorimeter and was found to be about 5 percent by weight, indicating the retention of all wax in the toner.

[0029] Subsequently, there was prepared a developer composition by admixing the aforementioned formulated toner composition mechanically blended in an extruder at 130°C at a 4.5 percent toner concentration, that is 4.5 parts by weight of toner per 100 parts by weight of carrier with carrier comprised of a steel core with a coating, 0.8 weight percent thereover of a polyvinylidine flouride and polymethyl methacrylate. Thereafter, the formulated developer composition was incorporated into an electrostatographic imaging device with a toner transporting means, a toner metering charging means, and a development zone as illustrated in U.S. Patent 4,394,429. A test run of 20,000 copies was carried out. The copy quality was judged excellent with good solid area and lines and no background throughout the aforementioned imaging test. The paper was released easily

after the toner image was fused and no scratching was caused by stripper fingers present in the imaging device on developed solid areas as determined by visual examination.

EXAMPLE II

[0030] A toner was prepared by repeating the procedure of Example I with the exception that a styrene-ethylene/propylene block copolymer (Shell KRATON G1701X®) was selected as the compatibilizer instead of the styrene-ethylene/butylene-styrene block copolymer. The percent by weight of the free wax particles, determined by the same process as illustrated in Example I, was less than 0.01 weight percent for this toner.

[0031] Subsequently, there was prepared a developer composition by admixing the aforementioned formulated toner composition mechanically blended at 130°C at a 4.5 percent toner concentration. The prepared developer composition was then incorporated into the same electrostatographic imaging device of Example I, and a test run of 20,000 copies was accomplished. The copy quality for the developed images was excellent throughout the test. The paper was released easily after fusing and no scratching was caused by stripper fingers on developed solid areas as determined by visual examination.

EXAMPLE III (COMPARATIVE)

[0032] A toner composition comprised of 63.4 percent by weight of a styrene butadiene resin with 91 percent by weight of styrene and 9 percent by weight of butadiene, 21.1 percent by weight of the crosslinked styrene butylmethacrylate resin of Example I, 5 percent by weight of the polypropylene wax of Example I, 10 percent by weight of REGAL 330® carbon black, and 0.5 percent by weight of the charge enhancing additive distearyl dimethyl ammonium methyl sulfate was mechanically blended using a Werner & Pfleiderer ZSK30 twin screw extruder at barrel set temperature of 130°C. After pulverization and classification, toner particles with volume average diameter of about 11 μm (microns) were obtained. The separation technique as in Example I showed that the percent by weight of the free wax particles was 0.06. Transmission electron microscope analysis of toner showed that wax domains larger than 2 to 3 μm (microns) in the longest projected dimension were observed in the styrene butadiene continuous phase. The total wax remaining inside the toner particles as determined by a differential scanning calorimeter was found to be only 3.3 percent by weight.

[0033] Subsequently, there was prepared a developer composition by admixing the aforementioned formulated toner composition at a 4.5 percent toner concentration with the carrier particles of Example I. The prepared developer composition was then incorporated into the same electrostatographic imaging device of Example I, and a test run was carried out. Scratch marks caused by stripper fingers were visible on the developed solid areas.

Claims

1. A toner composition comprising
   - first toner resin particles selected from styrene acrylate, styrene methacrylate or styrene butadiene with a styrene content of more than 80% by weight;
   - second crosslinked toner resin particles selected from a crosslinked copolymer of styrene and butyl methacrylate;
   - a pigment;
   - wax component particles selected from a polyolefin or a mixture of polyolefins; and
   - a compatibilizer comprised of a block copolymer; wherein said compatibilizer is of the formula A-b-B or A-b-B-b-A wherein A-b-B is a block copolymer of 2 segments A and B; A-b-B-b-A is a block copolymer of 3 segments; A is identical or compatible to the toner resin and B is identical or compatible to the wax component.

2. The toner composition in accordance with claim 1, wherein the compatibilizer is present in an amount of from about 0.5 to about 10 weight percent.

3. The toner composition in accordance with claim 1, wherein the compatibilizer is present in an amount of from about 1 to about 3 percent.

4. A developer composition comprising the toner composition in accordance with any one of claims 1 to 3 and a carrier.

Patentansprüche

1. Tonerzusammensetzung, umfassend
   - erste Tonerharzteilchen, ausgewählt aus Styrolacrylat, Styrolmethacrylat oder Styrolbutadien mit einem Styrolgehalt von mehr als 80 Gewichtsprozent;
   - zweite vernetzte Tonerharzteilchen, ausgewählt aus einem vernetzten Copolymer von Styrol und Butylmethacrylat;
   - ein Pigment;
   - Wachskomponententeilchen, ausgewählt aus einem Polyolefin oder einem Gemisch von Polyolefinen; und
   - einen Compatibilizer, umfassend ein Blockcopolymer, worin der Compatibilizer die Formel A-

b-B oder A-b-B-b-A aufweist, worin A-b-B ein Blockcopolymer von 2 Segmenten A und B ist; A-b-B-b-A ein Blockcopolymer von 3 Segmenten ist; A identisch oder kompatibel mit dem Tonerharz ist und B identisch oder kompatibel mit der Wachskomponente ist.

2. Tonerzusammensetzung nach Anspruch 1, wobei der Compatibilizer in einer Menge von etwa 0,5 bis etwa 10 Gewichtsprozent vorliegt.

3. Tonerzusammensetzung nach Anspruch 1, wobei der Compatibilizer in einer Menge von etwa 1 bis etwa 3 Prozent vorliegt.

4. Entwicklerzusammensetzung, umfassend die Tonerzusammensetzung nach einem der Ansprüche 1 bis 3 und einen Träger.

Revendications

1. Composition de toner comprenant

   - des premières particules de résine de toner choisies parmi un styrène-acrylate, un styrène-méthacrylate, ou un styrène-butadiène présentant une teneur en styrène supérieure à 80 % en poids,
   - des secondes particules de résine de toner réticulée choisies parmi un copolymère réticulé de styrène et de méthacrylate de butyle, et de
   - un pigment,
   - des particules de composant de cire choisies parmi une polyoléfine ou un mélange de polyoléfines, et
   - un agent de compatibilité constitué d'un copolymère séquencé, dans lequel ledit agent de compatibilité est de formule A-b-B ou A-b-B-b-A dans laquelle A-b-B est un copolymère séquencé de 2 segments A et B, A-b-B-b-A est un copolymère séquencé de 3 segments, A est identique à la résine de toner ou est compatible avec celle-ci et B est identique au Composant de cire ou est compatible avec celui-ci. identique au composant de

2. composition de toner selon la revendication 1, dans laquelle l'agent de compatibilité est présent dans une proportion d'environ 0,5 à environ 10 pour cent en poids.

3. Composition de toner selon la revendication 1, dans laquelle l'agent de compatibilité est présent dans une proportion d'environ 1 à environ 3 pour cent.

4. Composition de développateur comprenant la composition de toner selon l'une quelconque des revendications 1 à 3 et un support.