

Description

This invention is concerned with new thermal ink-jet inks that are useful for marking a wide range of plastics. The aqueous component of prior art inks can be largely or entirely replaced by organic components in which the dye-stuff is soluble and which can adhere to, dissolve, swell, or penetrate the plastic material. Markings on plastics with these inks have good water-fastness, smear resistance, and a high degree of indelibility.

Recording inks, comprising a dye, a large proportion of water, and water-miscible solvents, have been used in thermal ink-jet printers. Such inks, however, must meet rather stringent requirements. For example, they should be stable over a prolonged period, have the correct viscosity, conductivity, and surface tension, and also rapidly fix onto the recording surface. Further, the resultant image should be clear and have good fastness to light and water.

The vehicles used in the foregoing formulations are generally mixtures containing significant amounts of water. Such formulations, however, cannot be used effectively to mark plastics; they smear, blur, and/or wash off easily. Presently, plastics used in keyboard keycaps are either marked by printing a template, pressing the template against a plastic substrate, and heating the combination to a temperature from about 150° to about 250°C, or by sublimation method. All these require plastics that retain their dimensionality at the elevated temperature. In contrast, the present invention involves direct printing and avoids heating and the need for a template.

In accordance with the present invention, a new class of printing inks has been formulated. These inks are particularly effective in printing on a wide range of plastic materials with ink-jet printers. The inks are homogeneous solutions comprising by weight, from 1% to 10% dyestuff, from 1% to 25% jetting agent which is water and/or an organic liquid having a boiling point from 50°C to 200°C, and the balance being substantially an organic solvent for the dyestuff which is capable of dissolving, swelling or penetrating the plastic material. The organic solvent preferably contains two to four components. The printed inks evidence water-fastness, are smear resistant, and are indelible.

The dyestuff is present in an amount ranging from 1 to 10 wt%, and preferably 2 to 4 wt%; a level of about 2.5 wt% is particularly effective. A wide range of dyestuffs is useful, both black and other colors. For example, Morfast Ink Black B, solvent Black 46, Morfast Red 102, Endorsing Ink, Morfast Yellow 102, Morfast Blue 100, Morfast Red 106, Automate Green 1, Artificial Cochineal Color (food dye) and Morfast Automate Red B can be employed. Many of these dyestuffs are available commercially as 50% dyestuff and 50% solvent, such as 1-propanol or ethylene glycol phenyl ether.

There should be enough jetting agent in the final formulation to provide bubbles of ink at the printhead to cause the ink to jet onto the printing medium. Jetting behavior is a complex function of the critical pressure, volume, temperature characteristics, and mole fraction of the agent in the ink solution. The jetting agent is water and/or an organic liquid, which has a boiling point from 50°C to 200°C, preferably from 50°C to 150°C. If the jetting agent is an organic liquid, it should be miscible with the water-miscible organic solvent for the dyestuff. Examples of organic jetting agents are methanol, ethanol, n-propanol, isopropanol, ethyl acetate, methyl ethyl ketone, methyl isobutyl ketone, ethoxyethanol, and propylene glycol methyl ether.

If the jetting agent is water, up to 25 wt% may be used, but from 1 wt% to 10 wt%, preferably from 4 wt% to 6 wt%, is desirable. If more than 10 wt% water is employed, it tends to interfere with the penetration of the ink into the plastic, and the indelibility of the ink is adversely affected.

If the jetting agent is organic, 1 wt% to 25 wt%, preferably from 5% to 15%, may be employed. Mixtures of organic agent and water are also within the scope of this invention.

The vehicle solvents are chosen with certain characteristics in mind. It is not necessary that each possible pair of vehicle solvents be water-miscible, only that the final mixture be a homogeneous solution. In addition, the organic solvent should be a solvent for the dyestuff. Most importantly, the organic solvent should be capable of adhering to, dissolving, swelling, or penetrating the plastic printing medium. Since it is intended to print a wide range of plastics with the inks of this invention, the organic solvent must be selected with the particular plastic in mind.

The solvents used in this invention will generally have boiling points from 50°C to 200°C, preferably from 50°C to 150°C. Among suitable organic solvents are alkyl glycol ethers, wherein the alkyl radical has up to 4 carbon atoms, aromatic hydrocarbons, alkyl pyrrolidones, ketones, and lactones. Particular examples of suitable solvents include dipropylene glycol and other common glycols, diethylene glycol methyl ether, dipropylene glycol methyl ether, N-methyl pyrrolidone, N-ethyl pyrrolidone, phenoxy ethanol, methyl ethyl ketone, methyl iso-butyl ketone, cyclohexanone, and γ -butyrolactone. The solubility parameters of the materials can be determined according to the Handbook of Solubility Parameters and Other Cohesion Parameters, Allen F.M. Barton, CRC Press, Inc., Boca Raton, FL (1983).

In determining the solvent mixture, it is important to characterize the surface of the plastic in terms of its

solubility parameter. Then, a solvent is selected which has a solubility parameter most like that of the plastic. This technique is well-known in the polymer and paint industries, and accordingly requires no undue experimentation.

The viscosity of the final formulation must be adjusted to meet the constraints of the printhead. The viscosity is preferably between about 1 cp and about 20 cps at 25°C. Drying time is primarily related to the vapor pressure-temperature characteristics of the solvent mixture. The larger the vapor pressure(s) of the vehicle solvents, the smaller the drying time. If, however, the drying time is too short, then the ink will dry in the nozzles of the printhead and clog them.

These vehicles carry the dye into the surface of the plastic. The solvent vehicles are determined by the plastic. After the solvent/plastic combination is resolved, a dyestuff that is compatible with the vehicle is selected.

In order to optimize the vehicle, the contact angle of the drops of ink on the plastic surface should be checked. At normal room temperature, the contact angle should be between about 40° and 70°. If the contact angle is less than about 40°, then the dots tend to have ragged edges and the print will have poor resolution. If the contact angle exceeds about 70°, the dots are very small and the printed characters have poor darkness and the permanence is impaired. Instruments for determining dot angles are available; for instance, Remem-Hart has a device that it calls NRL Contact Angle Goniometer.

The inks of the present invention are preferably used to mark thermoplastics, although they can also be used on thermosetting materials. Because of the cross-linking in thermosetting materials, the solvent penetration possibly will be more difficult and the indelibility somewhat less than with thermoplastics.

The ink compositions of the invention are expected to find use in marking a wide variety of plastics by ink-jet printing.

In order to further illustrate the invention, some practical illustrations are now set forth.

Example 1:

Polyethylene terephthalate glycol (PETG) film was printed with a Hewlett-Packard DeskJet ink cartridge pen (DeskJet is a trademark of Hewlett-Packard Company), using an ink of the following formulation:

dipropylene glycol	- 2.8 wt%
γ -butyrolactone	- 87.2 wt%
water	- 5.0 wt%
Morfast Ink Black B	- 5.0 wt%

Sharp, clear numbers and letters were obtained.

Example 2:

Polycarbonate film was printed with a Hewlett-Packard DeskJet ink cartridge pen, using an ink of the following formulation:

phenoxyethanol	- 4.3 wt%
γ -butyrolactone	- 85.7 wt%
water	- 5.0 wt%
Morfast Ink Black B	- 5.0 wt%

Sharp, clear numbers and letters were obtained.

Example 3:

In another run, ABS film was printed with a ThinkJet pen (ThinkJet is a trademark of Hewlett-Packard Company), using the following formulation:

N-methylpyrrolidone	- 79.55 wt%
N-cyclohexylpyrrolidone	- 10.45 wt%
water	- 5.00 wt%
Morfast Ink Black B	- 5.00 wt%

Sharp, clear characters were obtained.

Example 4:

A formulation of N-methylpyrrolidone	- 80 wt%
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N-cyclohexylpyrrolidone - 10 wt%
 deionized water - 5 wt%
 Solvent Black 46 - 5 wt%

5 (50% dye and 50% 1-propanol)

was printed on low cost engineering thermoplastics with the following results:

polycarbonate acceptable to good
 polyvinyl chloride good to excellent
 ABS good to excellent
 10 ABS/polycarbonate blend good to excellent
 PBT acceptable to good
 PETG acceptable to good

ABS = acrylonitrile-butadiene-styrene;

PBT = polybutylene terephthalate;

15 ABS/polycarbonate blend = nominally 50/50 parts by weight mixture of ABS and polycarbonate.

Example 5:

A formulation of

20 N-ethylpyrrolidone - 75 wt%
 N-cyclohexylpyrrolidone - 15 wt%
 deionized water - 5 wt%
 Solvent Black 46 - 5 wt%

was printed on engineering grade thermoplastics with the following results:

25 polycarbonate acceptable
 polyvinyl chloride good
 ABS/polycarbonate blend good
 ABS good to excellent
 PBT and PETG unacceptable

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Example 6:

A formulation of

35 cyclohexanone - 71%
 N-cyclohexyl pyrrolidone - 24%
 Solvent Black 46 - 5%

was printed on engineering grade thermoplastics with the following results:

polycarbonate good
 polyvinyl chloride acceptable to good
 40 ABS good
 ABS/polycarbonate blend good to acceptable
 PBT and PETG unacceptable

Example 7:

A formulation of

45 cyclohexanone - 90%
 methyl ethyl ketone - 5%
 Solvent Black 46 - 5%

50 was printed on engineering grade thermoplastics with the following results:

polycarbonate acceptable
 polyvinyl chloride good
 ABS acceptable to good
 ABS/polycarbonate blend good
 55 PBT unacceptable

Example 8:

A formulation comprising, by weight,

Morfast Red 102 - 5%
 ethylene glycol phenyl ether - 5%
 γ -butyrolactone - 77%
 5 methyl ethyl ketone - 10%
 water - 3%
 was used to mark ABS plastic with excellent results.

Example 9:

10 A formulation comprising, by weight,
 Endorsing Ink - 5%
 ethylene glycol phenyl ether - 5%
 γ -butyrolactone - 77%
 15 methyl ethyl ketone - 10%
 water - 3%

Example 10:

20 A formulation comprising, by weight,
 Morfast Automate Red B - 5%
 ethylene glycol phenyl ether - 4%
 γ -butyrolactone - 81%
 25 isopropyl alcohol - 10%

Claims

- 30 1. An ink for marking plastic material, using an ink-jet printer, wherein said ink is a homogeneous solution comprising by weight:
 - (a) from 1% to 10% dyestuff;
 - (b) from 1% to 25% jetting agent, which is water and/or an organic liquid having a boiling point from 50°C to 200°C; and
 - (c) the balance being substantially at least one organic solvent which is capable of dissolving, swelling,
 - 35 or penetrating the plastic material and which is a solvent for said dyestuff.
2. An ink of Claim 1 wherein said dyestuff comprises 2 to 4 wt% of said ink.
3. An ink of Claim 2 wherein said dyestuff comprises about 2.5 wt% of said ink.
- 40 4. An ink of Claim 1 wherein said jetting agent is water and constitutes from 1 to 10 wt% of said ink.
5. An ink of Claim 4 wherein said jetting agent is water and constitutes from 4 to 6 wt% of the ink.
- 45 6. An ink of Claim 1 wherein said jetting agent constitutes from 5 to 15 wt% of the ink and is an organic liquid having a boiling point from 50°C to 200°C.
7. An ink of Claim 6 wherein said jetting agent constitutes from 5 to 15 wt% of the ink and is an organic solvent having a boiling point from 50°C to 150°C.
- 50 8. An ink of claim 1 wherein said jetting agent comprises at least one member selected from the group consisting of methanol, ethanol, 1-propanol, isopropanol, ethyl acetate, methyl ethyl ketone, methyl isobutyl ketone, ethoxyethanol, and propylene glycol methyl ether.
- 55 9. An ink of claim 1 wherein said jetting agent is a mixture of water and an organic liquid having a boiling point from 50°C to 200°C.
10. An ink of claim 9 containing about 5 wt% of an organic liquid which boils from 50°C to 150°C.
11. An ink of claim 1 wherein said organic solvent is a mixture of two to four components.

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Claims

1. An ink for marking plastic material, using an ink-jet printer, wherein said ink is a homogeneous solution comprising by weight:
 - (a) from 1% to 10% dyestuff;
 - (b) from 1% to 25% jetting agent, which is water and/or an organic liquid having a boiling point from 50°C to 200°C; and
 - (c) the balance being substantially at least one organic solvent which is capable of dissolving, swelling, or penetrating the plastic material and which is a solvent for said dyestuff.
2. An ink of Claim 1 wherein said dyestuff comprises 2 to 4 wt% of said ink.
3. An ink of Claim 2 wherein said dyestuff comprises about 2.5 wt% of said ink.
4. An ink of Claim 1 wherein said jetting agent is water and constitutes from 1 to 10 wt% of said ink.
5. An ink of Claim 4 wherein said jetting agent is water and constitutes from 4 to 6 wt% of the ink.
6. An ink of Claim 1 wherein said jetting agent constitutes from 5 to 15 wt% of the ink and is an organic liquid having a boiling point from 50°C to 200°C.
7. An ink of Claim 6 wherein said jetting agent constitutes from 5 to 15 wt% of the ink and is an organic solvent having a boiling point from 50°C to 150°C.
8. An ink of claim 1 wherein said jetting agent comprises at least one member selected from the group consisting of methanol, ethanol, 1-propanol, isopropanol, ethyl acetate, methyl ethyl ketone, methyl isobutyl ketone, ethoxyethanol, and propylene glycol methyl ether.
9. An ink of claim 1 wherein said jetting agent is a mixture of water and an organic liquid having a boiling point from 50°C to 200°C.
10. An ink of claim 9 containing about 5 wt% of an organic liquid which boils from 50°C to 150°C.
11. An ink of claim 1 wherein said organic solvent is a mixture of two to four components.



12. An ink of claim 1 wherein said organic solvent is a member selected from the groups comprising alkyl glycols, wherein alkyl has from 1 to 4 carbon atoms, aromatic hydrocarbons, ketones, alkyl pyrrolidones, and lactones.
13. An ink of claim 1 comprising one member selected from the group consisting of:
 about 5 wt% Morfast Ink Black B, about 3 wt% dipropylene glycol, about 87 wt% γ -butyrolactone, and about 5 wt% water;
 about 5 wt% Morfast Ink Black B, about 4 wt% phenoxyethanol, about 86 wt% γ -butyrolactone, and about 5 wt% water;
 about 5 wt% Morfast Ink Black B, about 80 wt% N-methylpyrrolidone, about 10 wt% N-cyclohexylpyrrolidone, and about 5 wt% water;
 about 5 wt% Solvent Black 46, about 80 wt% N-methylpyrrolidone, about 10 wt% N-cyclohexylpyrrolidone, and about 5 wt% water;
 about 5 wt% Solvent Black 46, about 75 wt% N-ethylpyrrolidone, about 15 wt% N-cyclohexylpyrrolidone, and about 5 wt% water;
 about 5 wt% Morfast Red 102, about 5 wt% ethylene glycol phenyl ether, 77 wt% γ -butyrolactone, about 10 wt% methyl ethyl ketone, and about 3 wt% water;
 about 5 wt% of Endorsing Ink, about 5 wt% ethylene glycol phenyl ether, about 77 wt% γ -butyrolactone, about 10 wt% methyl ethyl ketone, and about 3 wt% water; and
 about 5 wt% Morfast Automate Red B, about 4 wt% ethylene glycol phenyl ether, about 81 wt% γ -butyrolactone, and about 10 wt% isopropyl alcohol.
14. An ink of claim 1 wherein said dyestuff is water soluble.
15. An ink of claim 1 wherein said dyestuff is soluble in an organic solvent.
16. Use of an ink according to any preceding claim for printing with an ink-jet printer on a plastic selected from the group consisting of polyethylene terephthalate glycol; acrylonitrile-butadienestyrene; polycarbonate; polyvinyl chloride; a blend of about 50% polycarbonate and about 50% acrylonitrile-butadienestyrene; and polybutylene terephthalate.

Patentansprüche

1. Eine Tinte zum Markieren eines Kunststoffmaterials, unter Verwendung eines Tintenstrahldruckers, wobei die Tinte eine homogene Lösung ist, die gewichtsmäßig folgende Anteile umfaßt:
 (a) von 1 % bis 10 % Farbstoff;
 (b) von 1 % bis 25 % Ausspritzmittel, das Wasser und/oder eine organische Flüssigkeit mit einem Siedepunkt von 50°C bis 200°C ist; und
 (c) wobei der Rest im wesentlichen mindestens ein organisches Lösungsmittel ist, das fähig ist, das Kunststoffmaterial zu zersetzen, es anschwellen zu lassen oder es zu durchdringen, und das ein Lösungsmittel für den Farbstoff ist.
2. Eine Tinte nach Anspruch 1, wobei der Farbstoff 2 bis 4 Gewichts-% der Tinte umfaßt.
3. Eine Tinte nach Anspruch 2, wobei der Farbstoff etwa 2,5 Gewichts-% der Tinte umfaßt.
4. Eine Tinte nach Anspruch 1, wobei das Ausspritzmittel Wasser ist und 1 bis 10 Gewichts-% der Tinte bildet.
5. Eine Tinte nach Anspruch 4, wobei das Ausspritzmittel Wasser ist und 4 bis 6 Gewichts-% der Tinte bildet.
6. Eine Tinte nach Anspruch 1, wobei das Ausspritzmittel 5 bis 15 Gewichts-% der Tinte bildet und eine organische Flüssigkeit ist, die eine Siedetemperatur zwischen 50°C und 200°C hat.
7. Eine Tinte nach Anspruch 6, wobei das Ausspritzmittel 5 bis 15 Gewichts-% der Tinte bildet und ein organisches Lösungsmittel ist, das einen Siedepunkt zwischen 50°C und 150°C hat.
8. Eine Tinte nach Anspruch 1, wobei das Ausspritzmittel mindestens einen Bestandteil umfaßt, der aus der Gruppe ausgewählt ist, die aus Methanol, Ethanol, 1-Propanol, Isopropanol, Ethyl-Acetat, Methyl-Ethyl-

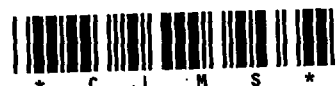


Keton, Methyl-Isobutyl-Keton; Äthoxyl-Glycol und Propylen-Glycol-Methyl-Äther besteht.

9. Eine Tinte nach Anspruch 1, wobei das Ausspritzmittel eine Mischung aus Wasser und einer organischen Flüssigkeit ist, die einen Siedepunkt zwischen 50°C und 200°C hat.
10. Eine Tinte nach Anspruch 9, die etwa 5 Gewichts-% einer organischen Flüssigkeit enthält, die zwischen 50°C und 150°C siedet.
11. Eine Tinte nach Anspruch 1, wobei das organische Lösungsmittel eine Mischung aus zwei bis vier Komponenten ist.
12. Eine Tinte nach Anspruch 1, wobei das organische Lösungsmittel ein Bestandteil ist, der aus den Gruppen, die Alkyl-Glykole umfassen, ausgewählt ist, wobei Alkyl 1 bis 4 Kohlenstoffatome, aromatische Kohlenwasserstoffe, Ketone, Alkyl-Pyrolidone und Lactone hat.
13. Eine Tinte nach Anspruch 1, die einen Bestandteil umfaßt, der aus der Gruppe, die aus dem folgenden besteht, ausgewählt ist:
 etwa 5 Gewichts-% Morfast schwarze Tinte B, etwa 3 Gewichts-% Dipropylen-Glykol, etwa 87 Gewichts-% γ -Butyrolacton und etwa 5 Gewichts-% Wasser;
 etwa 5 Gewichts-% Morfast schwarze Tinte B, etwa 4 Gewichts-% Phenoxyethanol, etwa 86 Gewichts-% γ -Butyrolacton und etwa 5 Gewichts-% Wasser;
 etwa 5 Gewichts-% Morfast schwarze Tinte B, etwa 80 Gewichts-% N-Methylpyrrolidon, etwa 10 Gewichts-% N-Cyclohexylpyrrolidon und etwa 5 Gewichts-% Wasser;
 etwa 5 Gewichts-% schwarzes Lösungsmittel 46, etwa 80 Gewichts-% N-Methylpyrrolidon, etwa 10 Gewichts-% N-Cyclohexylpyrrolidon und etwa 5 Gewichts-% Wasser;
 etwa 5 Gewichts-% schwarzes Lösungsmittel 46, etwa 75 Gewichts-% N-Ethylenpyrrolidon, etwa 15 Gewichts-% N-Cyclohexylpyrrolidon und etwa 5 Gewichts-% Wasser;
 etwa 5 Gewichts-% Morfast rot 102, etwa 5 Gewichts-% Äthylen-Glycolphenyl-Äther, 77 Gewichts-% γ -Butyrolacton, etwa 10 Gewichts-% Methyl-Ethyl-Keton und etwa 3 Gewichts-% Wasser;
 etwa 5 Gewichts-% Stempelfarbe, etwa 5 Gewichts-% Äthylen-Glycolphenyl-Äther, etwa 77 Gewichts-% γ -Butyrolacton, etwa 10 Gewichts-% Methyl-Ethyl-Keton und etwa 3 Gewichts-% Wasser; und
 etwa 5 Gewichtsprozent Morfast Automate rot B, etwa 4 Gewichts-% Äthylen-Glycolphenyl-Äther, etwa 81 Gewichts-% γ -Butyrolacton und etwa 10 Gewichts-% Isopropyl-Alkohol.
14. Eine Tinte nach Anspruch 1, wobei der Farbstoff wasserlöslich ist.
15. Eine Tinte nach Anspruch 1, wobei der Wasserstoff in einem organischen Lösungsmittel löslich ist.
16. Verwendung einer Tinte gemäß irgendeinem vorangegangenen Anspruch zum Drucken mit einem Tintenstrahldrucker auf einem Kunststoffmaterial, das aus der Gruppe ausgewählt ist, die aus Polyethylen Terephthalate Glykol; Acrylnitril-Butadien-Styrol; Polycarbonat; Polyvinylchlorid; einer Mischung von etwa 50 % Polycarbonat und etwa 50 % Acrylnitril-Butadien-Styrol; und Polybutylen Terephthalate besteht.

Revendications

1. Encre pour marquer une matière plastique, en utilisant une imprimante à jet d'encre, dans laquelle ladite encre est une solution homogène comprenant en poids :
 (a) de 1 à 10% de teinture ;
 (b) de 1 à 25% d'un agent de jet qui est l'eau et/ou un liquide organique dont le point d'ébullition est compris entre 50 et 200°C ;
 et
 (c) le complément étant sensiblement au moins un solvant organique capable de dissoudre, gonfler ou pénétrer la matière plastique et qui est un solvant pour ladite teinture.
2. Encre selon la revendication 1, dans laquelle ladite teinture constitue de 2 à 4% en poids de ladite encre.
3. Encre selon la revendication 2, dans laquelle ladite teinture comprend environ 2,5% en poids de ladite encre.



4. Encre selon la revendication 1, dans laquelle l'agent de jet est l'eau et constitue de 1 à 10% en poids de ladite encre.
5. Encre selon la revendication 4, dans laquelle ledit agent de jet est l'eau et constitue de 4 à 6% en poids de l'encre.
6. Encre selon la revendication 1, dans laquelle ledit agent de jet constitue de 5 à 15% en poids de l'encre et est un liquide organique ayant un point d'ébullition de 50 à 200°C.
7. Encre selon la revendication 6, dans laquelle ledit agent de jet constitue de 5 à 15% en poids de l'encre et est un solvant organique ayant un point d'ébullition de 50 à 150°C.
8. Encre selon la revendication 1, dans laquelle ledit agent de jet comprend au moins un élément choisi parmi le méthanol, l'éthanol, le propanol-1, l'isopropanol, l'acétate d'éthyle, la méthyléthylcétone, la méthylisobutylcétone, l'éthoxyéthanol et l'éther méthyllique de propylène-glycol.
9. Encre selon la revendication 1, dans laquelle ledit agent de jet est un mélange d'eau et d'un liquide organique ayant un point d'ébullition de 50 à 200°C.
10. Encre selon la revendication 9, qui contient environ 5% en poids d'un liquide organique qui bout entre 50 et 150°C.
11. Encre selon la revendication 1, dans laquelle ledit solvant organique est un mélange de 2 à 4 composants.
12. Encre selon la revendication 1, dans laquelle ledit solvant organique est un élément choisi dans les groupes comprenant les alkyl-glycols dont le radical alkyle contient de 1 à 4 atomes de carbone, les hydrocarbures aromatiques, les cétones, les alkyldipyrrolidones et les lactones.
13. Encre selon la revendication 1, comprenant un élément choisi parmi :
 environ 5% en poids de Morfast Ink Black B, environ 3% en poids de dipropylène-glycol, environ 87% en poids de gamma-butyrolactone et environ 5% en poids d'eau;
 environ 5% en poids de Morfast Ink Black B, environ 4% en poids de phénoxyéthanol, environ 86% en poids de gamma-butyrolactone et environ 5% en poids d'eau;
 environ 5% en poids de Morfast Ink Black B, environ 80% en poids de N-méthylpyrrolidone, environ 10% en poids de N-cyclohexylpyrrolidone et environ 5% en poids d'eau;
 environ 5% en poids de Solvent Black 46, environ 80% en poids de N-méthylpyrrolidone, environ 10% en poids de N-cyclohexylpyrrolidone et environ 5% en poids d'eau;
 environ 5% en poids de Solvent Black 46, environ 75% en poids de N-éthylpyrrolidone, environ 10% en poids de N-cyclohexylpyrrolidone et environ 5% en poids d'eau;
 environ 5% en poids de Morfast Red 102, environ 5% en poids d'éther phénolique d'éthylène-glycol, 77% en poids de gamma-butyrolactone, environ 10% en poids de méthyléthylcétone et environ 3% en poids d'eau;
 environ 5% en poids de Endorsing Ink, environ 5% en poids d'éther phénolique d'éthylène-glycol, environ 77% en poids de gamma-butyrolactone, environ 10% en poids de méthyléthylcétone et environ 3% en poids d'eau; et
 environ 5% en poids de Morfast Automate Red B, environ 4% en poids d'éther phénolique d'éthylène-glycol, environ 81% en poids de gamma-butyrolactone et environ 10% en poids d'alcool isopropylique.
14. Encre selon la revendication 1, dans laquelle ladite teinture est hydrosoluble.
15. Encre selon la revendication 1, dans laquelle ladite teinture est soluble dans un solvant organique.
16. Utilisation d'une encre selon l'une quelconque des revendications précédentes pour imprimer à l'aide d'une imprimante à jet d'encre sur une matière plastique choisie parmi le téréphtalate de polyéthylène-glycol; l'acrylonitrile-butadiène-styrène; le polycarbonate; le chlorure de polyvinyle; un mélange d'environ 50% de polycarbonate et environ 50% d'acrylonitrile-butadiène-styrène; et le téréphtalate de polybutylène.

