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(54) Title: SHIPPING, HANDLING, AND TESTING FLUIDS FOR INK DISPENSING SYSTEMS

(57) Abstract: Shipping, handling, and testing fluids, ink dispensing systems and the like are disclosed.

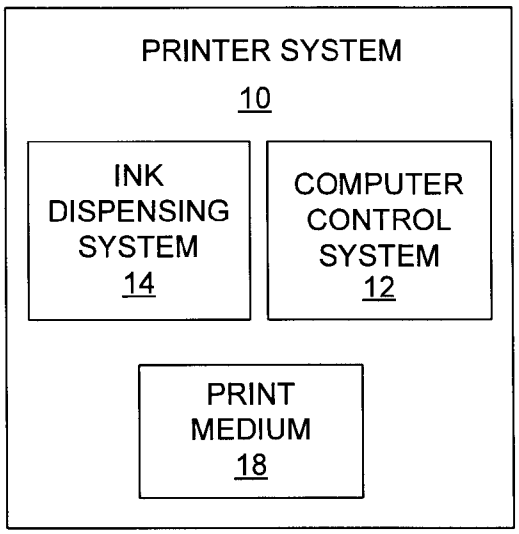

FIG. 1

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SHIPPING, HANDLING, AND TESTING FLUIDS FOR INK DISPENSING SYSTEMS

BACKGROUND

The use of inkjet printing systems in offices and homes has grown dramatically in recent years. The growth can be attributed to drastic reductions in cost of inkjet printers and substantial improvements in print resolution and overall print quality. The inkjet print heads can be shipped including ink or dry. However, both of these options pose problems. Namely, shipping the inkjet print heads including an ink can result in the inks congealing in the channels. In order for the ink not to congeal, the print head needs to be sealed properly to avoid water vapor loss and intermixing. This comes with additional cost to the print head. In addition, shipping the inkjet print head dry without any fluid in it does not allow the nozzles to be tested for nozzle health before shipment. During print head manufacturing processes, there are residues left on the print head that could interfere with firing. These residues need to be dissolved in order for the print head to function reliably. Thus, there is a need to overcome at least these deficiencies.

SUMMARY

Briefly described, embodiments of this disclosure include shipping, handling, and testing fluids, ink dispensing systems, and the like are disclosed. One exemplary shipping, handling, and testing fluid, among others, includes: a solvent mixture, wherein the solvents are selected from: glycols, aliphatic imides,

aromatic imides, and combinations thereof, wherein the solvent mixture is about 2 to 40 weight % of the shipping, handling, and testing fluid, and wherein the Hildebrand solubility parameters of the solvent mixture are about 20 to 49 $(MaPa)^{1/2}$.

An exemplary ink dispensing system, among others, includes a shipping, handling, and testing fluid disposed within the ink dispensing system, wherein the shipping, handling, and testing fluid includes a solvent mixture and water, a solvent mixture, wherein the solvent are selected from: glycols, aliphatic imides, aromatic imides, and combinations thereof, wherein the solvent mixture is about 2 to 40 weight % of the shipping, handling, and testing fluid, and wherein the Hildebrand solubility parameters of the solvent mixture is about 20 to 49 $(MaPa)^{1/2}$.

BRIEF DESCRIPTION OF THE DRAWINGS

Many aspects of this disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

FIG. 1 illustrates an embodiment of a printer system.

FIG. 2 illustrates the compatibility graph with an adhesive used in print head manufacturing.

DETAILED DESCRIPTION

Embodiments of the present disclosure will employ, unless otherwise indicated, techniques of synthetic organic chemistry, ink chemistry, solvent chemistry, and the like, that are within the skill of the art. Such techniques are explained fully in the literature.

The following examples are put forth so as to provide those of ordinary skill in the art with a complete disclosure and description of how to perform the methods and use the compositions disclosed and claimed herein. Efforts have been made to ensure accuracy with respect to numbers (*e.g.*, amounts, temperature, etc.) but some errors and deviations should be accounted for.

Unless indicated otherwise, parts are parts by weight, temperature is in °C, and pressure is at or near atmospheric. Standard temperature and pressure are defined as 20 °C and 1 atmosphere.

Before the embodiments of the present disclosure are described in detail, it is to be understood that, unless otherwise indicated, the present disclosure is not limited to particular materials, reagents, reaction materials, manufacturing and test processes, or the like, as such can vary. It is also to be understood that the terminology used herein is for purposes of describing particular embodiments only, and is not intended to be limiting. It is also possible in the present disclosure that steps can be executed in different sequence where this is logically possible.

It must be noted that, as used in the specification and the appended claims, the singular forms "a," "an" and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a support" includes a plurality of supports. In this specification and in the claims that follow, reference will be made to a number of terms that shall be defined to have the following meanings unless a contrary intention is apparent.

Discussion

Shipping, handling, and testing fluids for use in ink dispensing systems are described. The shipping, handling, and testing fluid is disposed into an ink dispensing system after manufacture. The ink dispensing system is tested for nozzle health and shipped to the customer while still including shipping, handling, and testing fluid therein, fully or partially. The shipping, handling, and testing fluid is designed to accomplish a number of diverse goals, some of which are described below. The shipping, handling, and testing fluid can be used on the manufacturing line for nozzle health tests before shipment. In order for the shipping, handling and testing fluid to afford nozzle health tests, it has to be detectable by light reflection, refraction, absorption, transmission, and/or diffraction systems or techniques. In embodiment, the shipping, handling and testing fluid has a certain level of UV-Visible absorption within a certain wavelength range.

In addition, the shipping, handling, and testing fluid is compatible with and jet-able from multiple types (*e.g.*, architectures) of ink dispensing systems (*e.g.*, components used to construct the ink dispensing systems). Each ink dispensing system has different requirements for the fluids that are jetted from the ink dispensing system and the shipping, handling, and testing fluid is able to be jetted from each of the different types of ink dispensing systems with different geometries. Further, the shipping, handling, and testing fluid provides reliable start-up for the customer who purchases the printer system including the ink dispensing system. This is possible since the shipping, handling, and testing fluid helps dissolve the residual contaminants from pen manufacturing, and prepare the in jet firing surfaces to ease customer startup.

Also, the shipping, handling, and testing fluid is compatible with multiple types of inks (*e.g.*, ink containing either dyes and/or pigments). Different types of dyes and pigments have different chemical and physical characteristics, and the shipping, handling, and testing fluid is chemically compatible with a plurality of types of dyes, pigments, and solvents that may be encountered in the ink dispensing system. In addition, the shipping, handling, and testing fluid is immune to bacterial growth.

Embodiments of the shipping, handling, and testing fluid are disposed in ink dispensing systems. The ink dispensing system is used in a printer system. FIG. 1 illustrates a block diagram of a representative printer system 10 that includes a computer control system 12, an ink dispensing system 14, and a print medium 18. The computer control system 12 includes a process control system that is operative to control the ink dispensing system 14. In particular, the computer control system 12 instructs and controls the ink dispensing system 14 to print characters, symbols, photos, *etc.* onto the print medium 18.

The ink dispensing system 14 includes, but is not limited to, ink-jet technologies and coating technologies, which dispense the ink (*e.g.*, dye-based ink and/or pigment-based ink formulations) onto the print medium 18. Ink-jet technology, such as drop-on-demand and continuous flow ink-jet technologies, can be used to dispense the ink. The ink dispensing system 14 can include at least one ink-jet print head system (*e.g.*, thermal ink-jet printhead and/or a piezo

ink-jet print head) operative to dispense (*e.g.*, jet) the inks through one or more of a plurality of nozzles in a print head. The print head system incorporates an array of firing chambers that receive a fluid disposed in the print head system or in reservoirs in fluid communication with print head system.

Prior to being disposed in the printer system 10, the ink dispensing system 14 is charged with the shipping, handling, and testing fluid. The ink dispensing system 14 can be tested online (during or just after the manufacturing process) for nozzle health. The shipping, handling, and testing fluid of the present disclosure is detectable and works as a fluid to be used to test nozzle health. After testing nozzle health, the ink dispensing system 14 may still includes some shipping, handling, and testing fluid within one or more portions of the ink dispensing system 14. The ink dispensing system 14 is shipped with or a small portion of the shipping, handling, and testing fluid disposed therein. The shipping, handling, and testing fluid will contact one or more portions of the ink dispensing system 14 during shipment, which may last weeks or months. Thus, the shipping, handling, and testing fluid is compatible with the components of the ink dispensing system 14 for long periods of time. The shipping, handling, and testing fluid also aids in cleaning and modifying the surface energy of ink dispensing system wherever the shipping, handling, and testing fluid is in contact

Once the printer system 10 reaches its destination (customer), the ink dispensing system 14 is placed in fluidic communication with one or more inks (*e.g.*, dye and/or pigment). The customer can activate the printer system 10 start-up program to test the ink dispensing system 14. The inks mix with the remaining shipping, handling, and testing fluid during these initial tests. The shipping, handling, and testing fluid is compatible (*e.g.*, chemically compatible so as to not clog the nozzles or channels of the ink dispensing system) with the components of the ink dispensing system 14 and is jet-able from the ink dispensing system 14. In addition, the shipping, handling, and testing fluid is compatible with the inks used in the printer system 10. As a result, the shipping, handling, and testing fluid in the ink dispensing system 14 provides a reliable

start-up for the customer and facilitates removing residues from manufacturing processes.

Embodiment of the shipping, handling, and testing fluid have certain physical properties or characteristics such as, but not limited to, viscosity, surface tension, pH and conductivity. In particular, the viscosity is about 1 to 3.5, about 1.5 to 2.5 and about 1.8 to 2.0 centipoise. The surface tension is about 30 to 48, about 35 to 44, and about 40 to 42 Dynes/cm. The pH is about 5.5 to 9, about 6.5 to 8.5, and about 7 to 8. The conductivity mS/cm (Milli-Siemens/cm) is about 0.01 to 16, about 0.02 to 5, and about 0.04 to 1. The UV-Visible absorption of 1 part shipping, handling and testing fluid mixed with 9 parts of water at 318 nm wavelength is about 0.2 to 1, about 0.4 to 0.8, and about 0.5 to 0.6.

The shipping, handling, and testing fluid can include, but is not limited to, a mixture of solvents. The solvents can include, but are not limited to, glycols (Polyols) (*e.g.* glycerol, propylene glycol, diethylene glycol (DEG), and the like), aliphatic imides, aromatic imides (*e.g.*, 2 pyrollidinone and imidazole), and combinations thereof. The Hildebrand solubility parameters of these solvents should be in the range of 20 to 49 $(MaPa)^{1/2}$.

The shipping, handling, and testing fluid can also include non-ionic surfactants (*e.g.*, Surfynols (from Air Products), secondary alchohol ethoxylates (Tergitols (from Union Carbide)), alkyldiphenyloxide disulfonates (Dowfax 8390 (from Dow)), and the like. The HLB (hydrophile lipophile balance) on a scale of 0-20 should be in the range of 10 to 18. The HLB parameter is used to determine the hydrophobicity or hydrophillicity characteristics of the surfactant. The shipping, handling, and testing fluid can also include biocides.

The solvent mixture can include two or more solvents such as, but not limited to: propylene glycol (also called "1,2-propanediol"); 2-methyl-1,3-propanediol; 2-pyrrolidinone (2P); diethylene glycol (DEG); 1-(2-hydroxyethyl) 2-pyrrolidinone; 1,5-pentanediol; 2-ethyl-2-(hydroxymethyl)-1,3-propanediol ; 1,6-hexanediol; imidazole; and combinations thereof. The solvent mixture is about 2 to 40 weight % of the shipping, handling, and testing fluid, about 6 to 30 weight % of the shipping, handling, and testing fluid, and about 20 weight % of the

shipping, handling, and testing fluid. The remaining balance of the shipping and handling fluid is water.

In an embodiment, the solvent mixture includes: propylene glycol; 2-methyl-1,3-propanediol; 2-pyrrolidinone; and diethylene glycol. The solvent mixture is about 2 to 40 weight % of the shipping, handling, and testing fluid, about 6 to 35 weight % of the shipping, handling, and testing fluid, and about 20 weight % of the shipping, handling, and testing fluid. The remaining balance of the shipping and handling fluid is water.

In particular, propylene glycol is about 0 to 15 weight % of the shipping, handling, and testing fluid, about 3 to 12 weight % of the shipping, handling, and testing fluid, and about 10 weight % of the shipping, handling, and testing fluid.

In particular, 2-methy-1,3-propanediol is about 0 to 10 weight % of the shipping, handling, and testing fluid, about 2 to 8 weight % of the shipping, handling, and testing fluid, and about 7 weight % of the shipping, handling, and testing fluid.

In particular, 2-pyrrolidinone is about 0 to 8 weight % of the shipping, handling, and testing fluid, about 1 to 5 weight % of the shipping, handling, and testing fluid, and about 1.5 weight % of the shipping, handling, and testing fluid.

In particular, diethylene glycol is about 0 to 8 weight % of the shipping, handling, and testing fluid, about 1 to 5 weight % of the shipping, handling, and testing fluid, and about 1.5 weight % of the shipping, handling, and testing fluid.

In particular, non-ionic surfactants (*e.g.*,Surfynols such as Surfynol 465) is 0 to 1 weight % of the shipping, handling, and testing fluid, about 0.01 to 0.5 weight % of the shipping, handling, and testing fluid, and about 0.1 weight % of the shipping, handling, and testing fluid.

In particular, imidazole is about 0 to 5 weight % of the shipping, handling, and testing fluid, about 0.2 to 4 weight % of the shipping, handling, and testing fluid, and about 1 weight % of the shipping, handling, and testing fluid.

In particular, 1,5-pentanediol is about 0 to 10 weight % of the shipping, handling, and testing fluid, about 2 to 8 weight % of the shipping, handling, and testing fluid, and about 4 weight % of the shipping, handling, and testing fluid.

In particular, EHPD is about 0 to 14 weight % of the shipping, handling, and testing fluid, about 2 to 10 weight % of the shipping, handling, and testing fluid, and about 8 weight % of the shipping, handling, and testing fluid.

In particular, 1,2-hydroxyethy-2-pyrollidinone is about 0 to 12 weight % of the shipping, handling, and testing fluid, about 1 to 7 weight % of the shipping, handling, and testing fluid, and about 5 weight % of the shipping, handling, and testing fluid.

In particular, 1,6-hexanediol is about 0 to 10 weight % of the shipping, handling, and testing fluid, about 0.5 to 6 weight % of the shipping, handling, and testing fluid, and about 2 weight % of the shipping, handling, and testing fluid.

In particular, $MgNO_3 \cdot 6H_2O$ is about 0 to 6 weight % of the shipping, handling, and testing fluid (about 0 to 6000 ppm Mg), about 0.5 to 5 weight % of the shipping, handling, and testing fluid (about 500 to 5000 ppm Mg), and about 3 weight % of the shipping, handling, and testing fluid (about 3000 ppm Mg).

Various biocides can be used to inhibit growth of undesirable microorganisms. The biocides can include, but are not limited to, benzoate salts, sorbate salts, commercial products such as NUOSEPT™ (Nudex, Inc., a division of Huls America), UCARCIDE™ (Union Carbide), VANCIDE (RT Vanderbilt Co.), and PROXEL™ (ICI Americas), and other biocides.

The biocides can be about 0.01 to 0.2 weight % of the shipping, handling, and testing fluid, about 0.05 to 0.15 weight % of the shipping, handling, and testing fluid, and about 0.1 weight % of the shipping, handling, and testing fluid.

Surfactants are also present in the shipping, handling, and testing fluid to dissolve residues from manufacturing and to facilitate firing.

In particular, Tergitol 15 S7 (secondary alchohol ethoxylate) is about 0 to 3 weight % of the shipping, handling, and testing fluid, about 0.1 to 2 weight % of the shipping, handling, and testing fluid, and about 0.5 weight % of the shipping, handling, and testing fluid.

In particular, Tergitol 15-S-5 (secondary alchohol ethoxylate) is about 0 to 3 weight % of the shipping, handling, and testing fluid, about 0.1 to 2 weight %

of the shipping, handling, and testing fluid, and about 0.5 weight % of the shipping, handling, and testing fluid.

In particular, Dowfax 8390 (alkyldiphenyloxide disulfonate salt) is about 0 to 3 weight % of the shipping, handling, and testing fluid, about 0.1 to 2 weight % of the shipping, handling, and testing fluid, and about 0.4 weight % of the shipping, handling, and testing fluid.

As mentioned above, the ink dispensing system 14 includes one or more inks. The inks are in fluidic communication with one or more printheads of the ink dispensing system 14. The inks can include dyes and/or pigments. The inks can include dyes and/or pigments described in the pending application entitled "Pretreatment Fluid and Method of Making and Using the Same", the inventor named Marlene Ann McGorrin, HP200603405, and serial number 11/741,940, filed April 30, 2007.

The dyes may be nonionic, cationic, anionic, or mixtures thereof. The pigments can be artificially suspended (dispersed) in the ink vehicle by means of anionic or cationic dispersants. The pigments can also be self-dispersed by various groups that are chemically attached to the surface of the pigments, or artificially suspended by means of polymers physically attached to the pigments. The dyes for use in ink-jet printing may be employed in the practice of this disclosure. The dyes can include a large number of water-soluble acid and direct dyes. For the purposes of clarification only, and not for limitation, some exemplary colorants suitable for this purpose are set forth below.

Specific examples of such dyes include the Pro-Jet series of dyes available from Avecia Ltd., including Direct Yellow 86, Acid Red 249, Direct Blue 199, Direct Black 168, and Direct Yellow 132; Aminyl Brilliant Red F-B (Sumitomo Chemical Co.); the Duasyn line of "salt-free" dyes available from Hoechst, such as Reactive Black 31, Direct Yellow 157, Reactive Yellow 37, Acid Yellow 23, Reactive Red 180, Acid Red 52, and Acid Blue 9; mixtures thereof; and the like.

Yellow dye examples include Y1189 and Y104. Cyan dye example include the dye having registry #: 569316-88-7, while the magenta dye examples includes the dye having registry numbers of RN: 650593-54-7, 473465-75-7.

Further examples include Tricon Acid Red 52, Tricon Direct Red 227, and Tricon Acid Yellow 17 (Tricon Colors Incorporated), Bernacid Red 2BMN, Pontamine Brilliant Bond Blue A, BASF X-34, Pontamine, Food Black 2, Catodirect Turquoise FBL Supra Conc. (Carolina Color and Chemical), Direct Blue 86, (Mobay Chemical), Reactive Red 4, Aldrich Chemical), Reactive Red 56, Pylam, Inc., Levafix Brilliant Red E-4B (Mobay Chemical), Levafix Brilliant Red E-6BA (Mobay Chemical), Pylam Certified D&C Red #28 (Pylam), Direct Brill Pink B Ground Crude (Crompton & Knowles), Cartasol Yellow GTF Presscake (Sandoz, Inc.), Tartrazine Extra Conc. (Sandoz, Inc.), Direct Yellow 86, Carolina Color and Chemical, Cartasol Yellow GTF Liquid Special 110 (Sandoz, Inc.), D&C Yellow #10 (Tricon), Yellow Shade 16948 (Tricon), Basacid Black X34 (BASF), Carta Black 2GT (Sandoz, Inc.), Neozapon Red 492 (BASF), Orasol Red G (Ciba-Geigy), Direct Brilliant Pink B (Crompton-Knolls), Aizen Spilon Red C-BH (Hodagaya Chemical Company), Kayanol Red 3BL (Nippon Kayaku Company), Levanol Brilliant Red 3BW (Mobay Chemical Company), Levaderm Lemon Yellow (Mobay Chemical Company), Aizen Spilon Yellow C-GNH (Hodagaya Chemical Company), Spirit Fast Yellow 3G, Sirius Supra Yellow GD 167, Cartasol Brilliant Yellow 4GF (Sandoz), Pergasol Yellow CGP (Ciba-Geigy), Orasol Black RL (Ciba-Geigy), Orasol Black RLP (Ciba-Geigy), Savinyl Black RLS (Sandoz), Dermacarbon 2GT (Sandoz), Pyrazol Black BG (ICI Americas), Morfast Black Conc A (Morton-Thiokol), Diazol Black RN Quad (ICI Americas), Orasol Blue GN (Ciba-Geigy), Savinyl Blue GLS (Sandoz, Inc.), Luxol Blue MBSN (Morton-Thiokol), Sevron Blue 5GMF (ICI Americas), and Basacid Blue 750 (BASF); Levafix Brilliant Yellow E-GA, Levafix Yellow E2RA, Levafix Black EB, Levafix Black E-2G, Levafix Black P-36A, Levafix Black PN-L, Levafix Brilliant Red E6BA, and Levafix Brilliant Blue EFFA, all available from Bayer; Procion Turquoise PA, Procion Turquoise HA, Procion Turquoise Ho5G, Procion Turquoise H-7G, Procion Red MX-5B, Procion Red H8B, Procion Red MX 8B GNS, Procion Red G, Procion Yellow MX-8G, Procion Black H-EXL, Procion Black P-N, Procion Blue MX-R, Procion Blue MX-4GD, Procion Blue MX-G, and Procion Blue MX-2GN, all available from ICI Americas; Cibacron Red F-B, Cibacron Black BG, Lanasol Black B, Lanasol Red 5B, Lanasol Red B, and Lanasol Yellow 46, all available

from Ciba-Geigy; Baslien Black P-BR, Baslien Yellow EG, Baslien Brilliant Yellow P-3GN, Baslien Yellow M-6GD, Baslien Brilliant Red P-3B, Baslien Scarlet E-2G, Baslien Red E-B, Baslien Red E-7B, Baslien Red M-5B, Baslien Blue E-R, Baslien Brilliant Blue P-3R, Baslien Black P-BR, Baslien Turquoise Blue P-GR, Baslien Turquoise M-2G, Baslien Turquoise E-G, and Baslien Green E-6B, all available from BASF; Sumifix Turquoise Blue G, Sumifix Turquoise Blue H-GF, Sumifix Black B, Sumifix Black H-BG, Sumifix Yellow 2GC, Sumifix Supra Scarlet 2GF, and Sumifix Brilliant Red 5BF, all available from Sumitomo Chemical Company; Intracron Yellow C-8G, Intracron Red C-8B, Intracron Turquoise Blue GE, Intracron Turquoise HA, and Intracron Black RL, all available from Crompton and Knowles, Dyes and Chemicals Division; mixtures thereof, and the like. This list is intended to be merely exemplary, and should not be considered limiting.

The following black pigments are useful in the practice of this disclosure; however, this listing is merely illustrative and not intended to limit the disclosure. The following black pigments are available from Cabot: Monarch™ 1400, Monarch™ 1300, Monarch™ 1100, Monarch™ 1000, Monarch™ 900, Monarch™ 880, Monarch™ 800, and Monarch™ 700, Cab-O-Jet™ 200 and Cab-O-Jet™ 300. The following black pigments are available from Columbian: Raven 7000, Raven 5750, Raven 5250, Raven 5000, and Raven 3500. The following black pigments are available from Degussa: Color Black FW 200, Color Black FW 2, Color Black FW 2V, Color Black FW 1, Color Black FW 18, Color Black S 160, Color Black FW S 170, Special Black 6, Special Black 5, Special Black 4A, Special Black 4, Printex U, Printex 140U, Printex V, and Printex 140V. Tipure™. R-101 is available from DuPont.

Examples

Now having described the embodiments of the present disclosure, in general, the following Example describes some additional embodiments of the present disclosure. While embodiments of present disclosure are described in connection with the following example and the corresponding text and figures, there is no intent to limit embodiments of the present disclosure to this description. On the contrary, the intent is to cover all alternatives, modifications, and

equivalents included within the spirit and scope of embodiments of the present disclosure.

Example 1

Table 1 provides another exemplary embodiment of the present disclosure.

Table 1

Shipping, Handling and Testing Fluid Formulations

Ingredients	SHF	SHF-S	SHF-6.2	SHF-8.2
	Wt%	Wt. %	Wt. %	Wt. %
Propylene Glycol	10	10	10	10
2-methyl-1,3-Propanediol	7	7	7	7
2P	1.5	1.5	1.5	1.5
DEG	1.5	1.5	1.5	1.5
S-465	0.1	-	-	-
Proxel	0.1	0.1	0.1	0.1
Tergitol 15S7	-	-	0.45	0.45
Tergitol 15S5	-	-	0.45	0.45
Dowfax 8390	-	-	0.2	0.2
MES Na Buffer	-	-	0.1	-
Trizma Buffer	-	-	-	0.1
Water	79.8	79.9	78.7	78.7
Adjust ph to (with HNO3 or NaOH)		No Adjust	6.2	8.2

It should be noted that SHF-S (the shipping , handling, and testing fluid variant without surfynol 465 surfactant) performs relatively better than the other formulations with respect to nozzle health tests and cleaning processing residues within the nozzles. SHF-6.2 is the formulation with pH fixed at 6.2 with MES Na buffer. SHF8.2 is the formulation with pH 8.2 fixed with Trizma buffer.

Example 2

Table 2 provides another exemplary embodiment of the present disclosure.

Table 2

Component	SHF-WW Wt. %
1-(2-hydroxyethyl)-2-pyrrolidinone	4.29
1,5-pentanediol	5.39
EHPD (Trimethylol Propane)	8.68
1,6-hexanediol	2.00
Imidazole	0.90
Tergitol 15S-5	0.45
Tergitol 15S-7	0.45
Dowfax 8390	0.40
EDTA disodium salt	0.10
Mg(NO3)2*6H2O	3.00
Proxel GXL	0.10
DI Water	74.24
pH	7.20

It should be noted that ratios, concentrations, amounts, and other numerical data may be expressed herein in a range format. It is to be understood that such a range format is used for convenience and brevity, and thus, should be interpreted in a flexible manner to include not only the numerical values explicitly recited as the limits of the range, but also to include all the individual numerical values or sub-ranges encompassed within that range as if each numerical value and sub-range is explicitly recited. To illustrate, a concentration range of "about 0.1% to about 5%" should be interpreted to include not only the explicitly recited concentration of about 0.1 wt% to about 5 wt%, but also include individual concentrations (*e.g.*, 1%, 2%, 3%, and 4%) and the sub-ranges (*e.g.*, 0.5%, 1.1%, 2.2%, 3.3%, and 4.4%) within the indicated range. The term "about" can include ±1%, ±2%, ±3%, ±4%, ±5%, ±6%, ±7%, ±8%, ±9%, or ±10%, or more of the numerical value(s) being modified. In addition, the phrase "about 'x' to 'y'" includes "about 'x' to about 'y'".

Many variations and modifications may be made to the above-described embodiments. All such modifications and variations are intended to be included herein within the scope of this disclosure and protected by the following claims.

CLAIMS

At least the following is claimed:

1. A shipping, handling, and testing fluid, comprising:

a solvent mixture, wherein the solvent is selected from: glycols, aliphatic imides, aromatic imides, and combinations thereof, wherein the solvent mixture is about 2 to 40 weight % of the shipping, handling, and testing fluid, and wherein the Hildebrand solubility parameter of the solvent mixture is about 20 to 49 $(MaPa)^{1/2}$.

2. The shipping, handling, and testing fluid of claim 1, wherein the solvent is selected from: propylene glycol; 2-methy-1,3-propanediol; 2-pyrrolidinone; diethylene glycol; and combinations thereof.

3. The shipping, handling, and testing fluid of claim 2, wherein the solvent mixture includes: propylene glycol; 2-methy-1,3-propanediol; 2-pyrrolidinone; and diethylene glycol.

4. The shipping, handling, and testing fluid of claim 3, wherein propylene glycol is about 3 to 12 weight % of the shipping and handling fluid, wherein 2-methyl-1,3-propanediol is about 2 to 8 weight % of the shipping and handling fluid, wherein 2-pyrrolidinone is about 1 to 5 weight % of the shipping and handling fluid, and wherein diethylene glycol is about 1 to 5 weight % of the shipping and handling fluid.

5. The shipping, handling, and testing fluid of claim 1, further comprising a solvent selected from: 1-(2-hydroxyethyl)-2-pyrrolidinone; 1,5-pentanediol; 2-ethyl-2-(hydroxymethyl)-1,3-propanediol 2; 1,6-hexanediol; imidazole; and combinations thereof.

6. The shipping, handling, and testing fluid of claim 5, wherein imidazole is about 0.2 to 4 weight % of the shipping and handling fluid, wherein 1,5-pentanediol is about 2 to 8 weight % of the shipping and handling fluid, wherein 2-ethyl-2-(hydroxymethyl)-1,3-propanediol is about 2 to 10 weight % of the shipping and handling fluid, wherein 1,6- hexanediol is about 0.5 to 6 weight % of the shipping and handling fluid, and wherein 1-(2-hydroxyethyl)-2-pyrrolidinone is about 1 to 7 weight % of the shipping and handling fluid.

7. The shipping, handling, and testing fluid of claim 2, further comprising a solvent selected from: 1-(2-hydroxyethyl)-2-pyrrolidinone; 1,5-pentanediol; 2-ethyl-2-(hydroxymethyl)-1,3-propanediol ; 1,6-hexanediol; imidazole; and combinations thereof.

8. The shipping, handling, and testing fluid of claim 2, further comprising a non-ionic surfactant.

9. An ink dispensing system, comprising:

a shipping, handling, and testing fluid disposed within the ink dispensing system, wherein the shipping, handling, and testing fluid includes a solvent mixture and water, a solvent mixture, wherein the solvent is selected from: glycols, aliphatic imides, aromatic imides, and combinations thereof, wherein the solvent mixture is about 2 to 40 weight % of the shipping, handling, and testing fluid, and wherein the Hildebrand solubility parameters of the solvent mixture is about 20 to 49 $(MaPa)^{1/2}$.

10. The ink dispensing system of claim 9, wherein the solvent is selected from: propylene glycol; 2-methyl-1,3-propanediol; 2-pyrrolidinone; diethylene glycol; and combinations thereof.

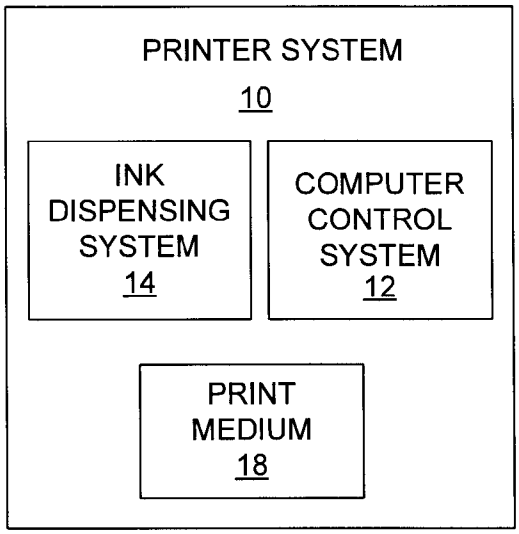
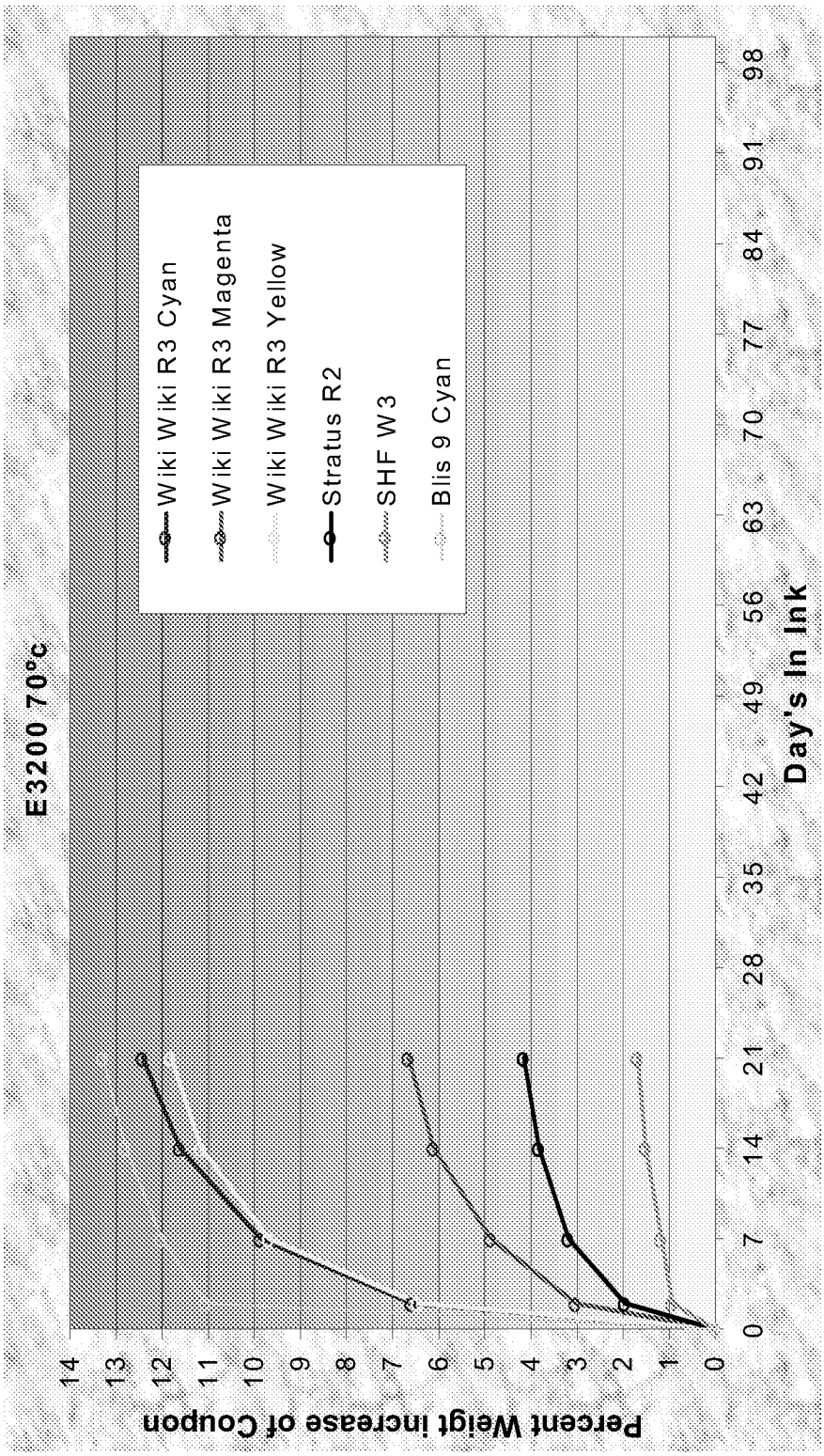

PRINTER SYSTEM
10
INK DISPENSING SYSTEM
14
COMPUTER CONTROL SYSTEM
12
PRINT MEDIUM
18

FIG. 1


E3200 70°c
Wiki Wiki R3 Cyan
Wiki Wiki R3 Magenta
Wiki Wiki R3 Yellow
Stratus R2
SHF W3
Blis 9 Cyan
Percent Weigt increase of Coupon
Day's In Ink
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98

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/061626

A. CLASSIFICATION OF SUBJECT MATTER

C09D 11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 C09D 11

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6077339 A, (Bayer Corporation), 20 June 2000 (20.06.2000) see the abstract, column 9 : line 1-53, claim 14.	1 - 10
A	US 2006-201383 A1, (Hewlett-Packard Development Company, L.P.), 14 September 2006 (14.09.2006) see the abstract, claims 1, 5, 19, 30 and 31.	1 - 10
A	US 5908495 A, (NOHR RONALD SINCLAIR & MACDONALD JOHN GAVIN), 01 June 1999 (01.06.1999) see the abstract, claims 1, 13 and 25.	1 - 10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 AUGUST 2008 (29.08.2008)	**29 AUGUST 2008 (29.08.2008)**

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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