# Brilliant Soluble Toners for Solvent Systems

## BSTS SERIES

Brilliant® fluorescent soluble toners are high-strength, transparent colorants. They are suitable in flexographic and gravure printing inks used on flexible packaging papers, films, and foils, and UV-cure inks. Fluorescent inks made with these Brilliant® fluorescent soluble printing toners are excellent for gift wraps, label stocks, tissue coating, corrugated containers, plastics, glass, metal, wood and other specialty coatings.

All BSTS series Brilliant® fluorescent soluble toners dissolve easily in lacquer solvents, using high-speed mixers. They perform well for indoor applications, but should not be used on products exposed to direct sunlight.

| **Physical and Chemical Properties** | |
|---|---|
| **Form** | granular powder |
| **Melting Point** | 73 - 76°C |
| **Solubility** | |
| Ethyl acetate | excellent |
| Isopropyl acetate | excellent |
| N-propyl acetate | excellent |
| 2-Nitropropane | excellent |
| Diethylene glycol | excellent |
| Dipropylene glycol | excellent |
| Monochlorobenzene | good |
| Orthodichlorobenzene | good |
| Ethylene glycol monoethyl ether | use as cosolvent |
| Ethanol | use as cosolvent |
| Isopropanol | use as cosolvent |
| Propylene glycol | use as cosolvent |
| Ethylene glycol | nonsolvent |

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**Resin & Plasticizer Compatibility**

| | |
|---|---|
| Ketjenflex 8 (Axcentive) | excellent |
| Santicizer 141 (Monsanto) | excellent |
| Polyamide | limited |

**Film-former compatibility**

| | |
|---|---|
| SS™ nitrocellulose (Hercules) | excellent |
| Ethyl cellulose (Hercules) | excellent |
| Alcohol-soluble butyrate (Eastman) | excellent |

**Light stability**

| | |
|---|---|
| Indoors | good |
| Outdoors | poor |

The BSTS series of Brilliant® fluorescent colors may be used with most flexographic ink binders, including nitrocellulose, cellulose acetate butyrate, acrylics, ketone resins, and maleic resins. High-solids-content starting point formulations may be prepared as shown. Polyamide resins, because of their limited compatibility, have been blended with more compatible modifiers such as Ketjenflex 8 and Santicizer 141. Waxes and/or polyethylene dispersion additives at two percent based on total solids may be incorporated to improve mar-, rub-, water-, and slip-resistance. A formula for an unmodified gloss solution follows. Stir with a cowles-type disperser at high speeds to achieve a clear solution:

**BSTS Series Starting Point Formulations[1]**

| Formulation A<br>Unmodified Gloss Solution | Percent by Weight |
|---|---|
| Brilliant® BSTS soluble toner | 45.0 |
| Denatured ethyl alcohol | 33.0 |
| Ethyl acetate | 22.0 |
| **Total** | **100.0** |
| Viscosity (cps);<br>Brookfield, No. 1 spindle | 20 |

Formulation B

| Nitrocellulose Modification | Percent by Weight |
|---|---|
| Brilliant® BSTS soluble toner | 36.3 |
| SS nitrocellulose | 4.2 |
| Ketjenflex 8 (Axcentive) | 2.1 |
| Denatured ethyl alcohol | 37.3 |
| Ethyl acetate | 20.1 |
| **Total** | **100.0** |
| Viscosity (cps); Brookfield, No. 1 spindle | 110 |

Formulation C

| Polyamide Modification | Percent by Weight |
|---|---|
| Brilliant® BSTS soluble toner | 35.0 |
| Alcohol-soluble polyamide resin (Versamid 750) | 3.5 |
| SS nitrocellulose, 1/4 sec. | 3.5 |
| Denatured ethyl alcohol | 40.0 |
| Ethyl acetate | 18.0 |
| **Total** | **100.0** |
| Viscosity (cps); Brookfield, No. 1 spindle | 105 |

Formulation D

| Alcohol-Souble Butyrate Modification | Percent by Weight |
|---|---|
| Brilliant® BSTS soluble toner | 34.0 |
| Alcohol-soluble butyrate | 6.0 |
| Denatured ethyl alcohol | 39.0 |
| Ethyl acetate | 21.0 |
| **Total** | **100.0** |
| Viscosity (cps); Brookfield, No. 1 spindle | 115 |

| Formulation E<br>UV-Cure Concentrate for Flexo | Percent by Weight |
|---|---|
| Brilliant® BSTS soluble toner | 35.0 |
| Ethoxylated Trimethylol Propane Triacrylate (TMPTA) | 65.0 |
| **Total** | **100.0** |

| Formulation F<br>UV-Cure Concentrate for Flexo | Percent by Weight |
|---|---|
| Brilliant® BSTS soluble toner | 40.0 |
| Ethoxylated Trimethylol Propane Triacrylate (TMPTA) | 25.0 |
| Urethane Acrylate Oligomer | 35.0 |
| **Total** | **100.0** |

Flexographic inks prepared with Brilliant® fluorescent soluble toners can be formulated with better cellophane tape resistant adhesion and crinkle resistance than a commercial control, as shown in Table I. Formulation 1 and 9, in particular, show substantial property improvement over both the commercial control and the other experimental ink formulations tested. The stir-in addition of 1 percent microcrystalline wax also has a beneficial effect on ink properties without loss of gloss. This improvement was most obvious in block and abrasion resistance. Moderate to poor performance usually improved to good performance.

## BRILLIANT® FLUORESCENT SOLUBLE TONERS IN FLEXOGRAPHIC INKS

| A) Various soluble toner formulations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FORMULATION # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Brilliant® BSTS | 35.0 | 36.3 | 35.0 | 36.3 | 36.3 | 35.0 | 35.0 | - | 35.0 |
| Commercial control | - | - | - | - | - | - | - | 100[a] | - |
| SS nitrocellulose 1/4 sec. | 3.0 | - | - | 4.2 | 8.4 | 3.5 | 2.0 | - | 6.0 |
| Santicizer 141 | 8.0 | 2.1 | - | 2.1 | 4.2 | - | 1.0 | - | 8.0 |
| Versamid 750 | 12.0 | 4.2 | 7.0 | - | - | 3.5 | 4.0 | - | 12.0 |
| Ethyl acetate | 12.6 | 17.2 | 17.4 | 17.2 | 15.3 | 17.4 | 17.4 | - | 22.9 |
| Ethanol | 29.4 | 40.2 | 40.6 | 40.2 | 35.8 | 40.6 | 40.6 | - | 53.4 |
| Nonvolatile, % | 50.2 | 42.6 | 42.0 | 42.6 | 34.8 | 42.0 | 42.0 | 53.3 | 44.3 |
| Viscosity (sec) No. 2 Zahn cup | 27.0 | 23.0 | 21.0 | 21.5 | 28.0 | 26.2 | 17.2 | 24.5 | 27.0 |

| B) Film tests: 1-mil corona-treated polyethylene film/No. 3 Meyer rod drawdown | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Crinkle adhesion[b] | 9 | 5 | 7 | 5 | 1 | 5 | 7 | 5 | 10 |
| Block - 2 psi Face to Face % removal | 10 | 30 | 50 | 90 | 100 | 20 | 50 | 25 | 0 |
| Block - 2 psi Face to Back % removal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cellophane tape[b] | 10 | 8 | 7 | 5 | 2 | 4 | 7 | 7 | 10 |
| Visual Gloss | E | G | E | E | E | E | E | E | E |
| Sutherland rub % removal after 120 cycles | 20 | 20 | -- | 40 | -- | 30 | -- | 50 | -- |
| Legend: E = Excellent G = Good | | | | | | | | | |
| [a]Composition unknown.<br>[b]Complete removal of coating - 0<br>No removal of coating - 10 | | | | | | | | | |

**Test Procedures**

Please refer to Flexography Principles and Practices, Fourth Edition, 2nd printing, 1992 for updated test procedures. This book is published by the Foundation of Flexographic Technical Association, 900 Marconi Avenue, Ronkonkoma, New York 11779-7212.

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**Storage**
When stored in a cool, dry environment, Brilliant® fluorescent BSTS soluble toners have an indefinite shelf life. Colorant containers should be kept closed to minimize contamination.

**Toxicity**
Test conducted through independent laboratories have found Brilliant® BSTS series fluorescent soluble toner to be "essentially non-toxic". A summary of test data is listed on the MSDS, which is available upon request. Good industrial hygiene and handling methods are essential in the use of all products whether or not they are determined to be hazardous.

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