Nissin Chemical Industry Co., Ltd.

Functional Materials for Inkjet Ink
Functional Materials for Inkjet Ink

We manufacture and sell products that can be applied to various kinds of ink. We offer a wide lineup of products designed to improve functions of inkjet ink.

### OLFINE

**EXP. Series**
These acetylenic surfactants have the ability to lower the dynamic surface tension and the dynamic contact angle.

**PD-600 Series**
These acetylenic surfactants can, in small amounts, quickly disperse water insoluble pigments.

### SILFACE

**SAG Series**
These silicone surfactants have the ability to lower the static surface tension and to wet materials, particularly non-absorbable materials.

### VINYBLAN

**700 Series**
These vinyl chloride emulsions are made using acrylic aqueous solution as protective colloid in polymerization. These emulsions exhibit excellent pigment dispersibility thanks to the fine particles and the dispersibility that is characteristic of vinyl chloride resins.

### CHALINE

**E Type**

### SOLBIN

**CLL3**
This vinyl chloride-vinyl acetate copolymer resin is soluble in eco solvent thanks to the technology of copolymerization with vinyl acetate. They also exhibit the excellent pigment dispersibility characteristic of vinyl chloride resins.

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**Inkjet Ink classification chart**

**Water-based**
- **Pigment type**
  - paper, film, fiber
- **Dye type**
  - paper, fiber

**Eco solvent-based**
- **Pigment type**
  - paper, film

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**List of products applicable to various types of inkjet ink**

<table>
<thead>
<tr>
<th>Product Line</th>
<th>OLFINE</th>
<th>SILFACE</th>
<th>VINYBLAN</th>
<th>CHALINE</th>
<th>SOLBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP. Series</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>PD-600 Series</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>SAG Series</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>700 Series</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>E Type</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>CLL3</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

#### Water-based pigment type

- **Dispersibility**
  - ○
- **Nozzle suitability**
  - ○
- **High-speed printability**
  - ○
- **Wettability**
  - ○
- **Adhesion**
  - ○
- **Abraision resistance**
  - ○

#### Water-based disperse dye type

- **Dispersibility**
  - ○
- **Nozzle suitability**
  - ○
- **High-speed printability**
  - ○
- **Wettability**
  - ○
- **Adhesion**
  - ○
- **Abraision resistance**
  - ○

#### Eco-solvent-based pigment type

- **Dispersibility**
  - ○
- **Nozzle suitability**
  - ○
- **Adhesion**
  - ○
- **Heat stability**
  - ○
- **Solubility**
  - ○

Eco-solvents: Acetate-based solvents and glycol-based solvents

For more information about each product or product series, please contact us. We can provide catalogs, technical data sheets, safety data sheets, etc.
Water-based pigment type

Features of OLFINE

OLFINE is an acetylenic surfactant that has the ability to lower the dynamic surface tension and the dynamic contact angle. The OLFINE EXP. Series is superior in said ability compared to conventional types and is therefore suitable for high-speed printing.

- Results of wettability and defoaming tests with pigment ink

<table>
<thead>
<tr>
<th>A Competitor’s Wetting Agent</th>
<th>A Competitor’s Defoaming Agent</th>
<th>OLFINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wettabiltiy Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhibits high wettability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>but foams</td>
<td></td>
</tr>
<tr>
<td>Defoaming Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defoams but repels liquid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhibits high wettability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and foams a little</td>
<td></td>
</tr>
</tbody>
</table>

- Conventional grade

<table>
<thead>
<tr>
<th>Effective ingredients (%)</th>
<th>Solubility in water (%)</th>
<th>Dynamic surface tension (mN/m)</th>
<th>Contact angle (°)</th>
<th>Foaming property (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1Hz</td>
<td>10Hz</td>
<td>SUS304</td>
</tr>
<tr>
<td>E1010</td>
<td>100</td>
<td>&gt;1</td>
<td>41</td>
<td>45</td>
</tr>
</tbody>
</table>

- OLFINE EXP. Series

This series is suitable for high-speed printing.

- Basic properties

<table>
<thead>
<tr>
<th>Effective ingredients (%)</th>
<th>Solubility in water (%)</th>
<th>Dynamic surface tension (mN/m)</th>
<th>Contact angle (°)</th>
<th>Foaming property (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1Hz</td>
<td>10Hz</td>
<td>SUS304</td>
</tr>
<tr>
<td>EXP.4001</td>
<td>80</td>
<td>0.01~0.05</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>EXP.4200</td>
<td>75</td>
<td>0.50~1.00</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>EXP.4123</td>
<td>40</td>
<td>5.00~10.00</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>EXP.4300</td>
<td>60</td>
<td>0.10</td>
<td>26</td>
<td>37</td>
</tr>
</tbody>
</table>

- Comparison of properties between 0.1% aqueous solutions of OLFINE EXP. 4300 and E1010

It’s very important for surfactants to migrate to the newly created surface as rapidly as possible and to reduce the surface tension particularly at the high speed printing such as inkjet ink.

- Suitability for high-speed printing

The EXP. 4300 exhibits low dynamic surface tension, thus enabling stable ejection of ink droplets even during high-speed printing.

Comparison of dynamic surface tension

- Wettability

Compared to the E1010, the EXP. 4300 is more effective for lowering the contact angle immediately after jetting ink onto a print surface. As a wetting agent, it is particularly suitable for providing wettability to substrate with low surface energy.

Comparison of dynamic contact angle

(Base material: SUS304)

- Images of the contact angle immediately after jetting ink onto SUS304

Some of our acetylenic surfactant products can be used not only as wetting agents but also as defoaming agents or dispersants.

For more information, please contact our sales representative.
SILFACE SAG Series

As wetting agents, this series of silicone surfactants has the ability to lower the static surface tension of water and organic solvent mixed ink and is highly effective for improving ink wettability, particularly on non-absorbable media.

Basic properties

<table>
<thead>
<tr>
<th></th>
<th>Appearance</th>
<th>Effective ingredients (%)</th>
<th>Ionicity</th>
<th>Solubility in water (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAG503A</td>
<td>Clear light brown</td>
<td>&gt;95</td>
<td>Non-ionic</td>
<td>&gt;10</td>
</tr>
</tbody>
</table>

Wettability

Comparison of static surface tension and contact angle provided by different types of solvents

- Evaluation method
  - Without SAG503A: Each type of solvent 30%, water 70.0%
  - With SAG503A: Each type of solvent 30%, water 69.5%, SAG503A 0.5%

Contact angle immediately after jetting ink onto SUS304

<table>
<thead>
<tr>
<th></th>
<th>After 1 second</th>
<th>After 10 seconds</th>
<th>After 30 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without SAG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(pure water only)</td>
<td>100'</td>
<td>98'</td>
<td>96'</td>
</tr>
<tr>
<td>SAG503A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.1% aqueous solution)</td>
<td>32'</td>
<td>14'</td>
<td>6'</td>
</tr>
</tbody>
</table>

Comparison of other grades in the SAG series

<table>
<thead>
<tr>
<th>Solvent used</th>
<th>Solvent SP value</th>
<th>Without SAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene glycol</td>
<td>15.9</td>
<td>2</td>
</tr>
<tr>
<td>Diethylene glycol</td>
<td>15.3</td>
<td>3</td>
</tr>
<tr>
<td>Ethylene glycol monoethyl ether</td>
<td>11.5</td>
<td>3</td>
</tr>
<tr>
<td>Ethylene glycol monopropyl ether</td>
<td>11.1</td>
<td>3</td>
</tr>
</tbody>
</table>

 Compatibility (appearance)

<table>
<thead>
<tr>
<th>Solvent used</th>
<th>Propylene glycol</th>
<th>Diethylene glycol</th>
<th>Ethylene glycol monoethyl ether</th>
<th>Ethylene glycol monopropyl ether</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAG005</td>
<td>15.9</td>
<td>15.3</td>
<td>11.5</td>
<td>11.1</td>
</tr>
<tr>
<td>SAG008</td>
<td>50</td>
<td>54</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>SAG016</td>
<td>29</td>
<td>28</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>SAG020</td>
<td>22</td>
<td>21</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Static surface tension (mN/m)

<table>
<thead>
<tr>
<th>Solvent used</th>
<th>Propylene glycol</th>
<th>Diethylene glycol</th>
<th>Ethylene glycol monoethyl ether</th>
<th>Ethylene glycol monopropyl ether</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.9</td>
<td>15.3</td>
<td>11.5</td>
<td>11.1</td>
</tr>
<tr>
<td>PVC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.9</td>
<td>15.3</td>
<td>11.5</td>
<td>11.1</td>
</tr>
<tr>
<td>Coated paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.9</td>
<td>15.3</td>
<td>11.5</td>
<td>11.1</td>
</tr>
</tbody>
</table>
**VINYBLAN 700 Series**

The VINYBLAN 700 Series consists of vinyl chloride emulsions in which acrylic aqueous solutions or the like serve as protective colloids. These water-based emulsions are made without any solvents or surfactants; thus, they exhibit excellent pigment dispersibility.

### Basic properties

<table>
<thead>
<tr>
<th>Solid content (%)</th>
<th>Viscosity (mPa·s)</th>
<th>PH</th>
<th>Average particle size (nm)</th>
<th>Tg(℃)</th>
<th>Acid value (KOH/mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>30</td>
<td>50</td>
<td>7.5</td>
<td>30</td>
<td>70</td>
</tr>
<tr>
<td>701</td>
<td>30</td>
<td>50</td>
<td>7.5</td>
<td>30</td>
<td>73</td>
</tr>
<tr>
<td>755</td>
<td>25</td>
<td>50</td>
<td>7.5</td>
<td>30</td>
<td>34</td>
</tr>
</tbody>
</table>

**Nozzle suitability**

Particle size distribution of VINYBLAN 701

Composed of fine particles without any coarse particles that may affect ink ejection.

### Solvent miscibility

Highly miscible with alcohol- or glycol-based solvents.

**Evaluation method:** VINYBLAN and each type of solvent were mixed in a ratio of 1:1 and the stability was checked.

<table>
<thead>
<tr>
<th>Type of solvent</th>
<th>Alcohol-based</th>
<th>Methanol, Ethanol, Isopropanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycol-based</td>
<td>Diethylene glycol, Triethylene glycol, Propylene glycol</td>
<td></td>
</tr>
<tr>
<td>Glycol-ether-based</td>
<td>Triethylene glycol monobutyl ether, Dipropylene glycol monomethyl ether</td>
<td></td>
</tr>
<tr>
<td>Diol-based</td>
<td>1,2-Hexanediol, 1,5-Pentanediol</td>
<td></td>
</tr>
</tbody>
</table>

### Dispersibility

- **Composition of dispersion liquid**
  - VINYBLAN 701: 10% Formula A, 0% Formula B
  - Polyurethane dispersion (poly carbonate-based): 79.5% Formula A, 89.5% Formula B
  - Carbon black (Mitsubishi Chemical MA-100): 10% Formula A, 10% Formula B
  - Wetting agent OLFINE EXP.4300: 0.5% Formula A, 0.5% Formula B

- **Dispersion method**
  - Composition ratio: 50 g of Formula A or B liquid was mixed with 5 g of beads.
  - Beads: Zirconia beads (dia. 5 mm)
  - Disperser: Paint shaker (2-hour dispersion)

**Microscopic photographs of dispersion liquids**

The dispersion liquid containing VINYBLAN enabled carbon black to disperse more uniformly than the other dispersion liquid.

- **Base material:** PET film
- **Coating condition:** Bar Coater No. 7 (wet, 6 g/m²)
- **Drying conditions:** 105℃ for 5 minutes

### CHALINE E Type

CHALINE E Type are silicone/acrylic hybrid resins. Thanks to the sliding property of silicone, the friction coefficients decrease and this CHALINE improves the abrastion resistance.

### Basic properties

<table>
<thead>
<tr>
<th>Composition</th>
<th>Solid content (%)</th>
<th>Viscosity (mPa·s)</th>
<th>PH</th>
<th>Average particle size (nm)</th>
<th>Ionicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-370</td>
<td>Acrylic modified</td>
<td>45</td>
<td>100 or less</td>
<td>7</td>
<td>300</td>
</tr>
<tr>
<td>LC-190</td>
<td>Specially modified</td>
<td>44</td>
<td>100 or less</td>
<td>7</td>
<td>300</td>
</tr>
<tr>
<td>E-790</td>
<td>Specially modified</td>
<td>44</td>
<td>100 or less</td>
<td>7</td>
<td>300</td>
</tr>
</tbody>
</table>

### Evaluation method

- **Base material:** PET film
- **Specimen:** Each grade of CHALINE was mixed with a urethane emulsion at a ratio of 10% (of the total solid content).
- **Drying temperature:** 80℃ for 2 minutes
- **Film thickness:** Approx. 10 μ (dry)

### Coefficients of static and kinetic friction

The friction coefficients of test pieces were measured using a surface property tester.

### Abrasion resistance

Using a JIS Type II (Gakushin-type) rubbing tester (with a load of 9.8N) and cotton cloth, the rubbing times were counted until partial peeling of coating was observed.

**Abrasion resistance provided by CHALINE**

**Photographs of the abrasion resistance test**

*Before the test*  
*After 50 strokes of rubbing*
Water-based disperse dye type

**OLFINE PD-600 Series**

The OLFINE PD-600 Series of acetylenic dispersants can, in small amounts, quickly disperse water insoluble dyes. The series can also prevent changes in properties over time after dispersion.

**Basic properties**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Effective ingredients (%)</th>
<th>Ionity</th>
<th>Solubility in water (%)</th>
<th>Melting point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD-611</td>
<td>Light yellow paste</td>
<td>100</td>
<td>Anion</td>
<td>&gt;10</td>
</tr>
<tr>
<td>PD-631</td>
<td>Light yellow paste</td>
<td>100</td>
<td>Anion</td>
<td>&gt;10</td>
</tr>
</tbody>
</table>

**Dispersibility**

Average particle size over dispersion time

- General prescription
- Prescription A
- Prescription B

*Formulation*

<table>
<thead>
<tr>
<th>General prescription</th>
<th>OLFINE modified</th>
<th>OLFINE modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.I. Disperse Red 60 (dye)</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Sodium ligninsulfonate</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>PD-611</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>PD-631</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>Pure water</td>
<td>70</td>
<td>83.5</td>
</tr>
</tbody>
</table>

*Dispersion method*

Composition ratio: Dispersion liquid and beads were mixed in a ratio of 1:3. Beads: Zirconia beads (dia. 0.3 mm) Dispenser: Paint shaker (640 rpm/min)

*Sodium ligninsulfonate: Dispersant commonly used for water-based dye-type ink*

The OLFINE PD600 Series exhibits good dispersibility in a smaller amount compared to sodium ligninsulfonate.

**Table of compatibility with various dyes**

<table>
<thead>
<tr>
<th>Color</th>
<th>Yellow</th>
<th>Red</th>
<th>Blue</th>
<th>Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.I. Name</td>
<td>DY-54</td>
<td>DR-60</td>
<td>DB-359</td>
<td>DB-360</td>
</tr>
<tr>
<td>Dye</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Required amount of the PD Series</td>
<td>1.5</td>
<td>1.5</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Pure water</td>
<td>83.5</td>
<td>83.5</td>
<td>82.0</td>
<td>82.0</td>
</tr>
</tbody>
</table>

**PD-611**

Preservation stability

- 25°C x 7 days: 3
- 60°C x 7 days: 3

**PD-631**

Preservation stability

- 25°C x 7 days: 3
- 60°C x 7 days: 3

(}{rate of change in particle size): less than 10%, 2: 10 to 15%, 3: 15% or more

Ink that contains the OLFINE PD-600 Series exhibits excellent preservation stability, regardless of dye type.

**OLFINE EXP. Series**

The OLFINE EXP. Series of dispersion aids that can reduce the dispersion time when used with sodium ligninsulfonate. Dispersions containing OLFINE exhibit excellent stability.

**Basic properties**

<table>
<thead>
<tr>
<th>Effective ingredients (%)</th>
<th>Solubility in water (%)</th>
<th>Dynamic surface tension (mN/m)</th>
<th>Contact angle (°)</th>
<th>Foaming property (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP.4123</td>
<td>40</td>
<td>5~10</td>
<td>56</td>
<td>3</td>
</tr>
</tbody>
</table>

**Dispensibility**

Use of OLFINE EXP. Series with sodium ligninsulfonate

**Average particle size over dispersion time**

- Without OLFINE
- Prescription OLFINE

| Dispersion method
|------------------|
| Composition ratio: Dispersion liquid and beads were mixed in a ratio of 1:3. Beads: Zirconia beads (dia. 0.3 mm) Dispenser: Paint shaker (640 rpm/min)

**Disperse dye ink manufacturing process diagram**

1. Disperse dye
2. Before dispersion
3. After dispersion
4. Ink-making

**Prime dispersants**

- PD Series prime dispersants
- PD-611
- PD-631

**Dispersion aids**

- EXP. Series dispersion aids
- EXP.4123

**Additives**

- EXP. Series wetting agents
- EXP.4200
- EXP.4300
- Defoaming agents
- D>10PG
SOLBIN CL3 is a vinyl chloride-vinyl acetate copolymer resin that is soluble in eco solvent thanks to the technology of copolymerization with vinyl acetate. It also exhibits the excellent pigment dispersibility characteristic of vinyl chloride resins.

# Basic properties

<table>
<thead>
<tr>
<th>Composition ratio(%)</th>
<th>Degree of polymerization</th>
<th>K-value</th>
<th>Molecular weight(Mn)</th>
<th>Glass transition point(°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>VAc</td>
<td>VC</td>
<td>VAc</td>
<td>VC</td>
</tr>
<tr>
<td>82</td>
<td>18</td>
<td>260</td>
<td>37</td>
<td>1.6 x 10⁴</td>
</tr>
</tbody>
</table>

# Nozzle suitability

**Filterability**

- **Conditioning method**
  1. 5 wt% SOLBIN was added to 10 wt% cyclohexanone (Anone).
  2. The mixture was stirred at 50°C for 60 minutes.
  3. The mixture stirred in step 2 was added to a mixed solution of 25 wt% propylene glycol monomethyl ether acetate (PMA) and 60 wt% ethylene glycol mono-n-butyl ether acetate (EBEA), and this mixed solution was stirred for approximately 15 minutes.

- **Evaluation method**
  A 4 kg load was applied to 100 ml of the solution, and the time was measured until all of the solution passed through the filter.

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**Examples of formulations of water-based pigment-type ink**

- **Pigment dispersion (Pigment)**: 10~30 VINYBLAN 701 dispersion liquid with carbon black
- **Solvent A**: 5~20 Dipropylene glycol monomethyl ether
- **Solvent B**: 5~20 Isopropanol
- **Resin (binder)**: 10~30 VINYBLAN 755
- **Wetting agent**: 0.1~1.0 OLFINE EXP. 4300
  - **Additive to provide abrasion resistance**: 1~10 CHALINE LC-190
- **Defoaming agent**: 0.1~0.5 OLFINE D-10PG
- **Water**: Remainder
  - **Remainder Water**: 9.4

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**Coating method**

Each film was coated with the solution above using Bar Coater No. 6 (wet, approx. 14 g/m²) and dried at 80°C for 1 minute. Then the several evaluations were conducted.

**Evaluation**

- Rubbing test conditions: 30 strokes of rubbing with a 200 g load (Substrate: PET)

<table>
<thead>
<tr>
<th>Evaluation Item</th>
<th>Evaluation result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesion</td>
<td>PVC: 3, PET: 3, NYLON: 3</td>
</tr>
<tr>
<td>Abrasion resistance</td>
<td>Rubbing test using gauze</td>
</tr>
<tr>
<td>Water friction resistance</td>
<td>Rubbing test using gauze moistened with water</td>
</tr>
<tr>
<td>Alcohol resistance</td>
<td>Rubbing test using gauze moistened with ethanol</td>
</tr>
<tr>
<td>Acid resistance</td>
<td>Rubbing test using gauze moistened with 1% hydrochloric acid aqueous solution</td>
</tr>
</tbody>
</table>

3. No part of the coated surface peeled off. 2. Less than 50% of the coated surface peeled off. 1. 50% or more of the coated surface peeled off.

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**Examples of applicable materials**

- **Solvent A (glycol-based)**: Propylene glycol, Diethylene glycol, Triethylene glycol, 2-Pyrrolidone, Glycerin, Triethylene glycol monobutyl ether, Dipropylene glycol monomethyl ether, etc.
- **Solvent B (alcohol-based)**: Benzyl alcohol, Isopropanol, 2-Phenoxycethanol, etc.
- **Binder**: VINYBLAN 700 Series, various emulsions, various dispersions
- **Wetting agent**: OLFINE EXP. Series, OLFINE E Series, SILFACE
- **Agent for providing abrasion resistance**: CHALINE E-370, LC-190, E-790
- **Defoaming agent**: OLFINE D-10PG, E1004

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SOLBIN CL3 solutions have low viscosity and good filterability, enabling the design of ink with excellent nozzle suitability.

This is reference data; it does not guarantee inkjet ink performance.
**Glossary, Measuring method**

**Surface tension (static/dynamic)**
By reason of intermolecular forces, surface tension is the tendency of liquid surfaces to shrink into the minimum surface area possible.

⇒ This tendency is referred to as interfacial tension, and especially as surface tension at a liquid-air interface.

Surface tension that becomes equilibrated over time is referred to as "dynamic surface tension", while surface tension that is in equilibrium is referred to as "static surface tension".

⇒ Generally, dynamic surface tension tends to be higher than static surface tension and it is harder to wet a material in contact with a liquid.

**Dynamic Surface Tension**
Different from "Static Surface Tension" obtained by measuring the surface tension of a static interface, the dynamic surface tension represents surface tension of an interface in motion. Liquid is flowing due to agitation, circulation, application, etc. in many cases when "wetting" is actually considered; therefore, the dynamic surface tension is a more practical index of "wetting."

**Contact Angle**
A contact angle represents how easily liquid is wet to a solid surface. A surface that is easy to wet (liquid that easily wets a surface) has a low contact angle, and a surface that is hard to wet (liquid that has difficulty wetting a surface) has a high contact angle.

**Static surface tension Wilhelmy method (plate method or vertical plate method)**
When a plate touches a liquid surface, the liquid moves up and wets the plate, and the surface tension acts along the plate’s perimeter as a force pulling the plate into the liquid. To determine the surface tension, the magnitude of this force is measured.
For more information on functional materials for inkjet ink, please inquire.

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