Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Chromicolor® Gravure Ink NC Base
General Use: May be used for printing on paper.
Product Description: Gravure ink containing thermochromic microcapsules.
MSDS Number: US-0038-04

MANUFACTURER
Company Name: Matsui Shikiso Chemical Co., Ltd.
Address: 64 Kamikazansakuradani-cho, Yamashina-ku, Kyoto 607-8466, JAPAN
Telephone No.: +81 (75) 594-5612

AGENCY Matsui International Co., Inc.
Address: 1501 West 178th Street, Gardena, CA 90248, U.S.A.
Telephone No.: (310) 767-7812

EMERGENCY TELEPHONE NUMBER: +81 (75) 594-5612 / (310) 767-7812

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>No</th>
<th>Component(s)</th>
<th>CAS #</th>
<th>Approx. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Resin</td>
<td>Trade secret</td>
<td>28</td>
</tr>
<tr>
<td>B</td>
<td>Methylcyclohexane</td>
<td>108-87-2</td>
<td>11</td>
</tr>
<tr>
<td>C</td>
<td>Xylenes</td>
<td>1330-20-7</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>n- Heptane</td>
<td>142-82-5</td>
<td>10</td>
</tr>
<tr>
<td>E</td>
<td>Bisphenol A</td>
<td>80-05-7</td>
<td>2-4</td>
</tr>
<tr>
<td>F</td>
<td>Formaldehyde</td>
<td>50-00-0</td>
<td>&lt; 0.15</td>
</tr>
<tr>
<td>G</td>
<td>Non-hazardous and other ingredients below reportable levels</td>
<td>N/A</td>
<td>Balance</td>
</tr>
</tbody>
</table>

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200):
Component B, C, D, and F are hazardous components.

3. HAZARDS IDENTIFICATION

HMIS Ratings
Health: 2
Flammability: 3
Reactivity: 1
Protection: G
(0 = Minimal, 1 = Slight, 2 = Moderate, 3 = Serious, 4 = Severe)

EMERGENCY OVERVIEW:
May cause lung damage, nausea, headache, and dizziness. May cause irritation to eyes and skin.

POTENTIAL HEALTH EFFECTS

Inhalation:
May cause nausea, headache and dizziness.

Eye:
Product may cause irritation.
Skin:
Prolonged contact with skin or on people with sensitive skin may cause skin rash, dryness of skin, defatting, cracked hand or inflammation.

Ingestion:
May cause lung damage.
Chronic: Not available.

Carcinogenicity:

Formaldehyde has the potential to cause cancer in humans. Repeated or prolonged exposure increases the risk. In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages.

NTP: Listed. (R (gas): reasonably anticipated to be human carcinogens) (K: known to be Human Carcinogens)

OSHA: Not regulated.

IARC: Listed. (Group 1: carcinogenic to humans)

ACGIH: Listed. (A2: suspected human carcinogen)

POTENTIAL ENVIRONMENTAL EFFECTS:
Not available.

4. FIRST AID MEASURES

INHALATION:
Remove to fresh air and lie quiet. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed, and seek medical attention.

EYE: Remove contact lenses if easily possible. Immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting lower and upper lids, until no evidence of chemical remains. Seek medical attention.

SKIN: Take off contaminated clothing and shoes. Wash with mild soap and plenty of water until no evidence of chemical remains. If symptoms such as itch or irritation develop or persist, refer for medical attention.

INGESTION:
Do not induce vomiting. If mouth is contaminated, rinse thoroughly with water and keep at rest. Refer for medical attention.

PROTECTION TO FIRST-AIDERS:
Wear personal protective clothing and equipment.

NOTE TO PHYSICIAN:
Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

- Hazardous Combustion Products: Not available.
- Flash Point: -4°C / 24.8 °F (as n- Heptane)
- Lower Flammable Limit: Not available.
- Upper Flammable Limit: Not available.
- Autoignition: Not available.
- Conditions of Flammability: Contacting with heat, flame, or other source of ignition.
- Explosion Data:
  - Impact Sensitivity: Not sensitive to mechanical impact.
  - Static Discharge: Sensitive to static discharge.
  (See HANDLING AND STORAGE.)

EXTINGUISHING MEDIA:
Use foam, dry chemical or CO_2 gas. Water may increase the risk.

FIRE FIGHTING INSTRUCTIONS:
In case of fire, wear respirator.

UNUSUAL FIRE AND EXPLOSION HAZARD:
Mixed gas with air causes inflammation and explosion.
6. ACCIDENTAL RELEASE MEASURES

**LAND SPILL:**
Remove source of ignition. Wear suitable personal protective equipment as needed. Evacuate downwind people to safe area and ventilate area. For small spill, absorb with dry sand, soil, saw dust, or rags. Collect into container for disposal. For large spill, dike with sandbags to prevent contaminating soil. Collect with sand or absorbent materials.

**WATER SPILL:**
Wear suitable personal protective equipment as needed. Avoid releasing spilled material into rivers and/or lakes. If material is released to public water, advise local authority.

7. HANDLING AND STORAGE

**HANDLING:**
No fire. Use in a well-ventilated area. Minimize vapor generation and avoid breathing vapor or mist. Wear suitable protective equipment and clothing. Prevent build-up of electrostatic charges. Use non-sparkling tools. Do not eat, drink or smoke during work. Wash thoroughly after handling. Handle and open containers with care – avoid rough handling or dropping.

**STORAGE:**
Keep container airtight. Store in a cool and dark place away from direct sunlight. Keep away from heat, spark, open flame and sources of ignition. Separate from strong oxidizers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**EXPOSURE LIMIT VALUES:**

- **Methylcyclohexane**
  - OSHA – TWA: 500 ppm / 2000mg/m³
  - ACGIH – TWA: 400 ppm

- **Xylenes**
  - OSHA – TWA: 100 ppm / 435mg/m³
  - ACGIH – TWA: 100 ppm
  - ACGIH – STEL: 150 ppm

- **n-Heptane**
  - OSHA – TWA: 500 ppm / 2000mg/m³
  - ACGIH – TWA: 400 ppm
  - ACGIH – STEL: 500 ppm

- **Formaldehyde**
  - OSHA – TWA: 0.75 ppm
  - OSHA – STEL: 2 ppm
  - ACGIH – TLV: 0.3 ppm (as ceiling limit)

**EXPOSURE CONTROLS**

- **Occupational Exposure Controls**
- **Engineering Controls:**
  Local exhaust ventilation is necessary during operation, especially when vapors or mists can be released in excess of established airborne exposure limits (TLVs).
Personal Protection

Respiratory Protection:
Wear chemical-cartridge respirator for organic gas.

Hand Protection:
Wear well insulated gloves.

Eye Protection:
Wear safety glasses with side shields or chemical goggles.

Skin Protection:
Wear long pants, long sleeves, and boots when applicable.

Environmental Exposure Controls:
Not available.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Reversible thermochromic paste.</td>
</tr>
<tr>
<td>Odor</td>
<td>Slight pungent odor.</td>
</tr>
<tr>
<td>pH</td>
<td>Not available.</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>98.4°C / 209.1°F (as n-Heptane)</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flash Point</td>
<td>-4°C / 24.8°F (as n-Heptane)</td>
</tr>
<tr>
<td>Auto-Ignition Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability</td>
<td>If this product contact with heat, flame, or other source of ignition, it is flammable.</td>
</tr>
<tr>
<td>Explosive Properties</td>
<td>Not available.</td>
</tr>
<tr>
<td>Oxidizing Properties</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not available.</td>
</tr>
<tr>
<td>Specific Gravity (water = 1)</td>
<td>0.92 ± 0.05</td>
</tr>
<tr>
<td>Solubility</td>
<td>Insoluble.</td>
</tr>
<tr>
<td>Partition Coefficient (n-octanol/water)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available.</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Avoid contact with heat, flame, or other sources of ignition.

STABILITY: Stable under recommended conditions of storage and handling.

MATERIALS TO AVOID: Strong oxidizer.

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS: Not available.
11. TOXICOLOGICAL INFORMATION

Acute Toxicity
Product: Not available.

Xylene: Oral rat LD$_{50}$ 4,300mg/kg
Methylcyclohexane: Oral mouse LD$_{50}$ 2,250mg/kg

Eye Irritation: Not available.

Skin Irritation: Repeated exposure may cause skin rash, dryness of skin, defatting, cracked hand or inflammation.

Sensitization: May cause sensitization by skin contact.

Repeated Dose Toxicity: Not available.

Chronic Toxicity: Not available.

Mutagenicity: Not available.

Carcinogenicity:
Formaldehyde is carcinogenic to humans. Repeated or prolonged exposure increase the risk.
In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages.

Repeated Dose Toxicity: Not available.

12. ECOLOGICAL INFORMATION

ECOTOXICITY: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

MOBILITY: Not available.

PERSISTENCE AND BIODEGRADABILITY: Not available.

BIOACCUMULATIVE POTENTIAL: Not available.

OTHER ADVERSE EFFECTS: Not available.

13. DISPOSAL INFORMATION

Comply with all federal, state and local regulations.
Do not dump this product into sewers, on the ground or into any body of water.

14. TRANSPORT INFORMATION

US DEPARTMENT OF TRANSPORTATION (DOT)

Hazardous Materials: Yes.

Hazardous Materials Description and Proper Shipping Name:
PRINTING INK flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable

Hazard Class or Division: 3
Identification Number: 1210
Packing Group: II
Label(s) Required: 3
SEA TRANSPORT

IMDG
Class: 3 (Flammable liquid)
Packing Group (PG): II
UN Number: 1210
Proper Shipping Name: PRINTING INK flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable

Marine Pollutant: Not applicable.

AIR TRANSPORT

ICAO/IATA
Class: 3 (Flammable liquid)
Packing Group (PG): II
UN Number: 1210
Proper Shipping Name: PRINTING INK flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable

15. REGULATORY INFORMATION

OSHA STATUS:
This product is considered to be hazardous under 29 CFR 1910.1200.

TSCA STATUS:
All components on TSCA INVENTORY.

CERCLA REPORTABLE QUANTITY (40 CFR 117, 302):
Xylenes Reportable quantity 100 pounds.
Formaldehyde Reportable quantity 100 pounds.

SARA TITLE III
Section 302 (40 CFR 355) – Extremely hazardous substance:
Formaldehyde Reportable quantity 100 lbs
Threshold planning quantity 500 lbs

Section 311/312 (40 CFR 370) – Hazard categories:
Immediate (acute) health hazard N
Delayed (chronic) health hazard Y
Fire hazard Y
Sudden release of pressure N
Reactive N

Section 313 (40 CFR 372) – Toxic chemical:
Xylenes, Bisphenol A, and Formaldehyde

CONEG – Typical Metals present in ppm:
Cadmium (Cd) N
Hexavalent Chromium (Cr(VI)) N
Lead (Pb) N
Mercury (Hg) N

ENCS (Japan): Components listed.

Please refer to any other federal, state and local regulations.
For specific questions please call to Matsui International Co., Inc. USA 3107677812.
Chromicolor® Gravure Ink NC Base comes in various colors and types. However, they all represent equal characteristics.

ABBREVIATIONS
OSHA: The Occupational Safety and Health Administration
NTP: National Toxicology Program
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists, Inc.
IMDG: International Maritime Dangerous Goods
ICAO: International Civil Aviation Organization
IATA: International Air Transport Association
TSCA: Toxic Substances Control Act
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980
SARA: Superfund Amendments and Reauthorization Act of 1986
CONEG: the Coalition of Northeastern Governors
ENCS: Existing and New Chemical Substances

CHROMICOLOR is a registered trademark of MATSUI SHIKISO CHEMICAL CO., LTD.

New and updated MSDS are presented in the ANSI Z400.1-1998 Sixteen-section format. All available information is included in systematic update.

This information is furnished without warranty, express or implied, except that it is accurate to the best knowledge of MATSUI SHIKISO CHEMICAL CO., LTD. It relates only to the specific product designated herein, and does not relate to use in combination with any other material or in any process. MATSUI SHIKISO CHEMICAL CO., LTD. assumes no legal responsibility for use of or reliance upon this information.