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Guide to Making Optically Variable Chameleon Ink

1. Introduction

Optically variable color-shifting ink is a special effect ink that displays different colors depending on viewing angle and lighting conditions. This tutorial details two main types: transparent base ink and UV-curable ink.
Other name: Super chameleon ink, Color-shifting ink, Multichrome ink

2. Materials Preparation

2.1 Essential Materials

- Optically variable color-shifting pigments (chameleon/interference pigments)
- Transparent resin (polyurethane or acrylic)
- Solvents (esters or ketones)
- Dispersing agents
- Leveling agents
- UV resins (epoxy acrylate)
- Reactive diluents (TPGDA)
- Photoinitiators (TPO)

Purchasing Recommendations:

We recommend Merck Iriodin series, BASF Variocrom pigments, or iSuoChem related Chameleon series pigments. Use low-viscosity resins (e.g., PU-3950) for better flow properties.

3. Transparent Base Ink (for Screen/Gravure Printing)

Formula:

Component	Percentage	Notes
Color-shifting pigment	10-20%	Merck Iriodin, BASF Variocrom or iSuoChem effect pigment alternatives
Transparent resin	50-60%	Low viscosity type (e.g., PU-3950)

Solvent	20-30%	Esters/ketones (ethyl acetate, MEK), adjust for drying speed
Dispersant	1-2%	e.g., BYK-163
Leveling agent	0.5-1%	e.g., BYK-354

Production Steps:

1. **Premixing:** Add solvent to mixing container with dispersant, stir at 300-500rpm for 2-3 minutes
2. **Pigment addition:** Slowly add pigments to avoid clumping, continue mixing for 5 minutes
3. **Resin addition:** Add transparent resin, increase speed to 800-1000rpm for 15-20 minutes
4. **Leveling agent:** Add leveling agent at reduced speed (300rpm) for 5 minutes
5. **Filtration:** Filter through 200-300 mesh sieve
6. **Curing:** Seal container and let mature for 24 hours

Important Notes:

- Avoid excessive mixing speed to prevent damaging pigment platelets
- Adjust solvent ratio according to ambient humidity
- Always conduct small-scale tests before full production

4. UV-Curable Ink (for Offset/Flexo Printing)

Formula:

Component	Percentage	Notes
Color-shifting pigment	8-15%	Same as above recommendations
UV resin	60-70%	e.g., epoxy acrylate
Reactive diluent	15-20%	e.g., TPGDA
Photoinitiator	3-5%	e.g., TPO
Dispersant	1-2%	e.g., BYK-UV 3510

Production Steps:

1. **Predispersion:** Mix diluent and dispersant at 400rpm for 3 minutes
2. **Pigment addition:** Gradually add pigments at 600rpm for 10 minutes
3. **Resin addition:** Add UV resin at 1200rpm for 15-20 minutes

4. **Photoinitiator:** Reduce to 500rpm, add photoinitiator for 10 minutes
5. **Milling:** Process through triple-roll mill 2-3 times
6. **Filtration:** Filter through 400 mesh screen
7. **Storage:** Keep in amber containers away from light

Application Tips:

- Recommended UV energy: 800-1200mJ/cm²
- Optimal film thickness: 15-25μm
- Adjust curing parameters for different substrates

5. Troubleshooting Guide

Q1: Weak color-shift effect?

Solutions:

- Increase pigment percentage to maximum
- Extend dispersion time or use better equipment
- Switch to higher transparency resin

Q2: Slow drying?

Adjustments:

- Transparent ink: Modify solvent ratio or type
- UV ink: Check photoinitiator activity or increase dosage

Q3: Foaming during printing?

Remedies:

- Increase leveling agent percentage
- Allow standing time for defoaming
- Add 0.1-0.3% antifoam agent

6. Recommended Applications

- **Packaging:** Premium cosmetics, liquor/tobacco packaging
- **Security printing:** Anti-counterfeiting labels with special designs
- **Decorative:** Gift wrapping, artistic creations

Safety Precautions:

Always wear protective gloves and goggles. Ensure proper ventilation. UV components may cause skin irritation - avoid direct contact.