



Glycol Ethers for Inks

Pen Inks	When used in ball point and felt tip pen inks, glycol ethers allow the free flow of resin pigment and dye preventing clogging or drying out. The result is good flow, leveling and print detail. The higher evaporation rate of DOWANOL* PM, PnP, PnB and Butyl CELLOSOLVE™ products provides faster drying in writing pen ink applications.
Stamp Pad Inks	Due to their slow evaporation rates, DOWANOL TPM, PPh, EPh, Methyl CARBITOL™ and Hexyl CARBITOL™ provide penetrating properties required by the stamp pad inks.
Radiation Curable Inks	Radiation curable inks use glycol ether acrylates or methacrylates as reactive diluents instead of solvents for lowering viscosity. DOWANOL TPM, Butyl CELLOSOLVE, and DOWANOL EPh are glycol ethers used commercially to produce the acrylates or methacrylates.
Water-based Inks	DOWANOL DPM, Butyl CELLOSOLVE, Butyl CARBITOL™, DOWANOL PnP, and blends of PM, DPM, and PnB serve as coupling agents for resins and dyes in water-based inks for gravure, silk screen, and flexographic printing. All of these glycol ethers are effective solvents for the types of resins used in water-based inks, and are water soluble. These glycol ethers also control the evaporation rates of the inks and improve wettability by reducing surface tension.
Solvent-based Inks	Silk screen inks require slower evaporating solvents with high solvency to adequately dissolve the resin. It is important that the high strength of the solvent not be aggressive toward the substrate. DOWANOL DPM, PMA, DPMA, PnP, DPnP, Butyl CELLOSOLVE, and Methyl CARBITOL are excellent active solvents for the resins used in silk screen inks. Their high solvency provides good viscosity control for quality impressions and reduced ink clogging in the screen.
DOWANOL PM and DPM	<p>Propylene glycol methyl ether (PM) is a fast evaporator and allows for low viscosities. Dipropylene glycol methyl ether (DPM), with its slower evaporation rate, can be used to retard solvent evaporation and reduce surface tension in water-based systems. Used in tandem, DOWANOL PM and DPM allow ink formulators to adjust evaporation rates and ink viscosity to specific levels.</p> <p>By using DOWANOL PM, a formulator can retard the evaporation of a particularly fast gravure ink with precision, while a combination of DOWANOL PM and DPM is well suited for fine-tuning viscosity and evaporation rates of slower flexographic inks.</p>
Dow Glycol Ether Esters	<p>DOWANOL PMA, and Butyl CELLOSOLVE Acetate can be used when a glycol ether acetate is needed, and both are widely used in silk screen inks. Both have good resin compatibility and solubility characteristics and are particularly well suited for air-dry systems because of their evaporation rates.</p> <p>Formulators with heat cure systems can use PMA or Butyl CELLOSOLVE Acetate in combinations with Butyl CARBITOL Acetate or DOWANOL DPMA to control the evaporation rate.</p>

Water-based systems	In water-based systems, DOWANOL DPM glycol ether is used to reduce surface tension, slow the evaporation rate, and act as a coupling agent to aid compatibility of resin and water. In high humidity conditions, DOWANOL DPM glycol ether stays in the liquid phase to maintain its coupling role.
VOC Reduction	Using DOWANOL PM makes it possible to reduce the level of volatile organic compounds (VOCs) in some ink formulations. The high solvency and low viscosity of most resins in DOWANOL PM allow a formulator to increase resin solids and reduce solvent levels to reduce total VOCs in the formulation. The Dow Chemical Company markets a complete line of glycol ethers under the DOWANOL, CELLOSOLVE, CARBITOL trade names.
Formulation Program	CHEMCOMP†, a solvent selection services from The Dow Chemical Company, allows formulators to input component, performance and property variables unique to formulations, and arrive at alternative systems that provide economic and performance advantages.
Ink Formulation	<ul style="list-style-type: none"> • Black for Plastic Film • Gravure Ink: Food Wrapper & Metallic Inks • Metallic Gravure Ink • Ultra-Thin Film Screen Ink: On DOWANOL PM & DOWANOL DPM • Water-Based Continuous Jet Ink • Flexo Ink for Film Printing

Table 1: Black Ink for Plastic Films (Typical Starting Point Formulation)

	wt gms	wt%
Nitrocellulose	18.2	9.1
Plasticizer	25.0	12.5
Regal1 400 R Carbon Black	18.2	9.1
Anhydrous Ethanol	72.7	36.3
Toluene	25.0	12.5
Ethyl Acetate	25.0	12.5
DOWANOL PM	15.9	8.0
Total	200.0	100.0

Table 2: Gravure Ink for Food Wrapper (Typical Starting Point Formulation)

Component	Weight (%)
Pigment	10.0
Ethyl cellulose	15.0
Diocetyl phthalate	5.0
DOWANOL PM	25.0
DOWANOL DPM	5.0
Aromatic hydrocarbon	30.0
Total	100.0

Table 3: Metallic Gravure Ink (Typical Starting Point Formulation)

Component	Weight (%)
Bronze Powder	0.0
Acrylic Resin	16.0
Wax Dispersion	3.0
Stabilizer	1.0
Ethyl acetate	10.0
Isopropyl acetate	25.0
DOWANOL PM	5.0
Total	100.0

Table 4: Ultra-thin Film Screen Ink (Typical Starting Point Formulation)

Component	Weight (%)
Red Pigment	10.0
Nitrocellulose	15.0
Maleic Resin	5.0
Wax Dispersion	2.5
DOP	5.0
Ethanol	54.0
Ethyl acetate	5.0
DOWANOL PM	3.5
Total	100.0

Table 5: Water-based Continuous Jet Ink (Typical Starting Point Formulation)

Ingredient	Weight (%)
Ketone resin	2.5-20.0
Pigment	30.0-40.0
PVP (polyvinylpyrrolidone)	0.1-5.0
DOWANOL EPh	25.0-40.0
Oleic Acid	2.0-6.0

Table 6: Flexo Ink for Film Printing

Ingredient	Weight (%)
Ethanol	23.8
Ethyl acetate	12.0
Tri-butoxy-ethyl-phosphate	3.5
DOWANOL PM	1.2
Nitrocellulose	65.0
Acrylic Resin	7.0
Titanium Dioxide	28.0
Polyurethane	10.0
Wax	1.0
Ethanol	2.1
Wetting Agent	0.2
Ethanol	2.1
Organic Titanate	0.4

A typical flexo ink for film printing. This ink exhibits quick drying, low odor, excellent gloss and adhesion onto a large variety of packaging films and foils.

Table 7: Ball Point Pen Ink

Component	Weight (%)
Direct black dye	30
Distilled water	57
DOWANOL PPh	25
Surfactant	15

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