PARALOID™ DM-55

Solid Grade Thermoplastic Acrylic Resin

Description

PARALOID DM-55 is a 100% solids acrylic resin, is a very efficient pigment grinding vehicle, with an excellent compatibility with a wide variety of other resins including acrylics, vinyls, epoxies and polyester. PARALOID DM-55 is soluble in a wide range of solvents having solubility parameters in the 8.5 to 11.5 range. It also possesses good tolerance to aliphatic solvents.

PARALOID DM-55 is supplied at 100% solids to provide a wide formulation latitude.

Typical Physical Properties

These properties are typical but do not constitute specifications.

Appearance	Pale yellow pellets
Solids content %	100
Bulk density (lb/US gal)	8.9
Flow point	70ºC

Suggested Uses

The main applications for PARALOID DM-55 are:

- Production of universal solventborne pigment concentrates which allow the formulator to reduce the number of pigment concentrates in his inventory. These can be used to produce a wide variety of solvent based paints. Table I shows a selection of the resin systems which have proven to be compatible with PARALOID DM-55. A much wider range of resins is expected to be fully compatible, but have not been specifically evaluated, yet.

- Grinding of difficult to disperse pigments such as carbon black, transparent iron oxide and quinacridoces. PARALOID DM-55 has excellent pigment wetting characteristics reducing grinding times and energy demand during the grinding process.

Table I
Resin Systems Compatible with PARALOID DM-55 (Resin Modified at 25% on Weight)

Short Oil Alkyd (soya)	Duraplex M-29[1]
Short Oil Alkyd (cotton seed)	Duraplex A-27
Medium Oil Alkyd (castor oil)	Duraplex C-55 X
Long Oil Alkyd (soya)	Duraplex D-65 A
Modified Castor Oil Alkyd	Amberlac 13-802[1]
Short/Medium Oil Alkyd (soya)	Goroc S-47-A2[2]
Alkyd Melamine/Butylated	Cymel 248-8 (70/30)
Alkyd Nitrocellulose/Phthlate	Duraplex A-27/0.5 sec RS/ Dioctyl (50/30/20) Duraplex ND 7713/0.5 sec RS/ Dioctyl (45/45/10)
Alkyd/Acrylic	Amberlac 13-802[1] PARALOID B-66 (75/25)
Nitrocellulose (not wetted with alcohol)/ Butylated Urea/Acrylic	0.5 sec RS/PARALOID AT-64/ U-formite F.240 N (70/30)
Alkyd/Acrylic/Melamine	Amberlac 13-802/PARALOID B-66/ U-formite MX-61
Thermoplastic Acrylic	PARALOID B-66/PARALOID B-50
Acrylic/Nitrocellulose/Vinyl	PARALOID B-82/0.5 sec HS (60/40) Vinylite VMCH-VYHH-VAGH[3]
Acrylic/Vinyl/Plasticizer	PARALOID A-101/Vinylite, VAGH/ Paraplex G-62 (15/70/15)
Acrylic/Vinyl	PARALOID A-101/Vinylite VAGH (50/50)
Acrylic/Methylated Melamine	PARALOID AT-64/Cymel 303 (70/30) PTSA
Epoxies	Epon 101, Epon 828[4]
Acrylic/Epoxy	PARALOID AT-70/Epon 1001 (60/40) PARALOID AT-70/Epon 828 (60/40)
Plasticizer*	Paraplex G-30
Acrylic/CAG/ Plasticizer*	PARALOID A-21 LV/0.5 sec/ Paraplex G-30 (60/20/20)
Acrylic/NC/DOP*	PARALOID A-21 LV/0.5 sec R.3/ Dicotyl (45/45/10)

[1] Reichhold Chemicals Inc.
[2] Cook Paint & Varnish Company
[3] Union Carbide Corporation
[4] Shell Chemical Company

Solubility of PARALOID DM-55

PARALOID DM-55 is soluble in alcohols, aromatics, esters and ketones. When dissolved in those solvents, PARALOID DM-55 has an excellent tolerance for aliphatic hydrocarbons and an infinite tolerance for solvents having a solubility parameter in the 8.5-11.5 range.

A 50% solids solution of PARALOID DM-55 was made with one of each of the following solvents: xylene, Cellosolve acetate and normal butyl acetate. The tolerance to various solvents for each of these solutions is listed in Table II.

Table II
PARALOID DM—55-Tolerance for Solvents

Added Co-solvent	Solubility Parameter	Xylene*	Solution of 50%Cellosolve* acetate	PARALOID DM-55 in: n. Butyl* acetate
Varsol No 1	7.0	37.4	39.1	56.0
VM&P Naphtha	7.6	39.0	52.3	55.3
Methyl Isobutyl Ketone	8.4	Inf.	Inf.	Inf.
n-Butyl acetate	8.6	Inf.	Inf.	Inf.
Xylene	8.8	Inf.	Inf.	Inf.
Toluene	8.9	Inf.	Inf.	Inf.
Butyl Cellosolve	8.9	Inf.	Inf.	Inf.
MEK	9.1	Inf.	Inf.	Inf.
Ethyl acetate	9.1	Inf.	Inf.	Inf.
Methyl Cellosolve	10.8	Inf.	Inf.	Inf.
n-Butanol	11.3	Inf.	Inf.	Inf.
iso-Propanol	11.5	Inf.	Inf.	Inf.
Ethanol (100%)	12.8	98.7	77.9	72.2
2-B Ethanol	13.2	40.1	35.2	45.2
Methanol	14.5	8.7	12.0	13.8

*mil of solvent required to cause turbidity in 10 grams of resin solution.

As a grinding resin PARALOID DM-55 was designed to give low viscosity in order to allow maximum pigment load. Some typical viscosities of solutions from PARALOID DM-55 in a variety of solvents are listed in Table III.

PARALOID DM-55 provides high dispersing efficiency which allows the formulator to minimize its use in order not to influence the film properties (provided by the main binder). In paints and coatings for exterior applications we recommend keeping the amount of pigment concentrate at a usage level which assures that the content of PARALOID DM-55 stays below 5% of the total resin content.

When grinding pigments with PARALOID DM-55, the viscosity of the pigment concentrate must be controlled by adjusting the total solids. Care must be taken with the addition of PARALOID DM-55 or other ingredients to avoid any coagulation.

Pigment to PARALOID DM-55 ratios are given in Table IV.

It may be necessary to adjust these ratios depending on the origin and quality of pigments.

The total solids also will change depending on the solvent system used.

Table III
Viscosity of PARALOID DM-55 as Function of Solids Content

Solvent	Viscosity (CPS)		
% Solids	40	50	60
Butyl acetate	20	100	1600
Butyl Cellosolve	100	950	19700
Xylene	20	100	2000
Ethanol/butyl acetate (80/20)	40	275	3700

Table IV
Typical Ratios of Pigment to PARALOID DM-55 for Pigment Dispersion

Pigment Type	Pigment (parts by weight)	PARALOID DM-55 (parts by weight)
Titanium Dioxide	70	7
Carbon Black	20	20
Transparent Iron Oxide	30	25
Red Iron Oxide	60	6
Phthalo blue	25	20
Phthalo green	25	20
Quinacridone red	15	20

Pigment Dispersion Characteristics

Good pigment dispersions are sometimes difficult to obtain with resins used to give important properties to the coatings.

PARALOID B-48-N, an acrylic resin with excellent adhesion to metal, is such a resin. When PARALOID DM-55 is used as a grinding vehicle, an excellent gloss is obtained, as shown in Table V. The coatings were applied over Bonderite 100 coated panels and stored for 30 minutes at 120ºC.

Table V
Effect of PARALOID DM-55 as Grinding Medium in a Black Coating Based on PARALOID B-48-N

Grinding Resin	PARALOID DM-55	PARALOID B-48-N
Appearance	Excellent	Very Poor
Gloss 20°	64	31
Gloss 60°	88	72
The following formulation was used to evaluate the above black lacquer:		
Excelsior Black		22.5
Grinding resin, DM-55 or B-48-N*		22.5
Butyl acetate		253.0
Sand 30 minute sand-mill		150.0
Filtered grind		300.0
PARALOID B-48-N		600.0
Butyl acetate		900.0
Formulation Constants:		
Solids contents		36.0
Pigment solids		3.5
Grinding resin (% of binder)		3.6

*The grinding resins, PARALOID B-48-N solid grade and PARALOID DM-55 are delivered at 100% solids and were premixed with a part of the Butyl acetate prior to the grinding.

Safe Handling Information

Based on its composition, PARALOID DM-55 is not expected to be toxic via single acute oral, dermal or inhalation exposure. Vapor from heated product can cause eye and skin irritation. Thus, it is important to wear safety glasses and gloves as recommended on our Material Safety Data Sheets and use good ventilation when handling this product.

The Dow Chemical Company Material Safety Data Sheets (MSDS) contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our

products. Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that you provide appropriate training and information to your employees and make sure they have available to them MSDS on any hazardous products in their workplace.

The Dow Chemical Company sends MSDS on non-OSHA-hazardous as well as OSHA-hazardous products to its customers upon initial shipment, including samples. If you do not have access to one of these MSDS, please contact your local Dow representative for a copy.

Updated MSDS are sent upon revision to all customers of record. In addition, MSDS are sent annually to all customers receiving products deemed hazardous under the Superfund Amendments and Reauthorization Act.

MSDS should be obtained from suppliers of other materials recommended in this bulletin.

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