SUPERCHLON®

SUPERCHLON® 822 S

Chlorinated polyolefine (Pellet-type)

Introduction

SUPERCHLON 822S is a chlorinated polyolefine which was developed by NIPPON PAPER CHEMICALS CO., LTD. as "Primer coating for polypropylene substrates".

Polypropylene resins have been widely used as the industrial material for electrical household appliances, parts of motor vehicles, etc. on account of their light weight and low price in addition to their excellent properties with respect to, for example, chemical resistance, heat resistance, and excellent electrical characteristics.

Though polypropylene resins have these excellent characteristics, the use of polypropylene resins still remains limited to a part. One of the reasons hindering the polypropylene resins from a wider range of applications is due to their nonpolarity and crystalline which make the coating and the adhesion difficult.

There has been a strong desire, therefore, for the development of a coating composition that excels in adhesiveness to the polypropylene resins.

This problem has been solved by SUPERCHLON 822S. SUPERCHLON 822S has an excellent adhesion to polypropylene and gives an excellent adhesion to top coat based on polyurethanes, acrylics, melamines, epoxies, and alkyds.

In Japan, a large number of bumpers of motor vehicles are coated with adhesion primers based on SUPERCHLON 822S, and these primers have excellent performance.

SUPERCHLON 822S is widely used as the adhesives which are well suited to create structural bonds between polypropylene and other substrates such as aluminium foil, cellophane, polyester, and other plastics.

General properties

Appearance	Pale-yellow granule.
Odor	Resin odor.
Toxicity	None (passes the test specified in the Health and Welfare Ministry of JAPAN Notification No. 434).
Free chlorine	None.
Dry film	Colorless, transparent and flexible thermoplastic resin.
Flammability	Poor flammable.
Softening point	60 ~ 70°C (mercury method, modified JIS K-2407 test.)
Solubility	Generally soluble in aromatic hydrocarbons and chlorinated hydrocarbons; soluble in alicyclic hydrocarbons such as cyclohexane, methylcyclohexane and ethylcyclohexane; n-hexane, esters and alchohols can be used as a diluent.

Specification

Chlorine	24.5± 1%
Viscosity (20WT% toluene／IPA = 97／3% soln. at 25°C)	20 ~ 80 mPa·s

Packing

Internal Packing:	One wall polyethylene bag
External Packing:	Cardboard Box
Net Weight:	20 kgs

Compatibility of SUPERCHLON® 822 S with other resins

In the case of using some top coat, the primer tends to have more excellent adhesion to the top coat by mixing SUPERCHLON 822S with other resins. SUPERCHLON 822S has been improved the compatibility with other resins, compared with the conventional lowly chlorinated polyolefins. The compatibility of SUPERCHLON 822S with other resins is shown below.

Please, be careful not to decrease adhesion to polypropeylene substrate by the addition of a large amount of other resins. The ratios of other resins to SUPERCHLON 822S are preferably less than 30 wts.

●Compatibility with other resins

Solid Ratio (SUPERCHLON 822S: other resins = 7: 3

Other resins (Trade mark)	Compatibility *1		Resin	Maker
	soln *2	film		
Paraloid A-11	○	○	Thermoplastic acrylics	Rohm & Haas
Paraloid B-44	△	△	Thermoplastic acrylics	Rohm & Haas
Paraloid B-66	×	×	Thermoplastic acrylics	Rohm & Haas
Paraloid B-72	×	×	Thermoplastic acrylics	Rohm & Haas
Dianal LA-1215	×	×	Thermoplastic acrylics	Mitsubishi Rayon
Cotax GX-059	○	○	Thermoplastic acrylics	Toray Fine Chemical
Laroflex MP-35	◎	◎	Vinyl chloride resin	B A S F
Laroflex MP-45	◎	◎	Vinyl chloride resin	B A S F
EVAFLEX-40	○	○	E V A	Mitsui Polychem
Phthalkyd 355-50	◎	○	Alkyd resin	Hitachi Chem.
Phthalkyd 375	◎	◎	Alkyd resin	Hitachi Chem.
Phthalkyd V-902	◎	○	Acrylic Modified resin	Hitachi Chem.
Phthalkyd V-903	△	○	Acrylic Modified resin	Hitachi Chem.
Nisseki neopolymer 120	◎	○	Petroleum resin	Nihon Petrochem.
Nisseki neopolymer 140	◎	○	Petroleum resin	Nihon Petrochem.
Beckacite J811	◎	○	Maleic rsin	Dainippon Ink & Chemicals
Beckacite 1120	○	○	Maleic resin	Dainippon Ink & Chemicals
Coumaron NT2 2/1	◎	○	Coumaron-inden resin	Nittetsu Chem.
Pencell KK	◎	○	Rosin ester resin	Arakawa Chem.
Tamanol 350	△	△	Phenolic resin	Arakawa Chem.
Lignol R-140	◎	○	Xylene resin	Lignyte
Nikanol HP-70	◎	△	Xylene resin	Mitsubishi Gaschem.

NOTE *1··· ◎ Compatible ○ Almost compatible △ Partialy compatible × Incompatible

*2··· 20WT% Toluene soln.

Heat seal strength of SUPERCHLON® 822 S to several films

SUPERCHLON 822S was applied to treated polypropylene films ("Torayphane" by Toray Co., Ltd.). Then these films was set at room temperature. (setting)
After heat sealing these films with several object films, the peel strength was measured under the following conditions.

Experimental conditions

- Heat seal conditions…100°C, 1kg／cm², 1 sec.
- Peeling test conditions…15mm width, 180°, 50mm／min.
- Glue spread…3g／m² (dry)

● Results

Object films	Peel strengh (g／inch)
Aluminium foil	580
Aluminium foil (Embossed)	700
Cellophane	580
Polyester	500
Treated polypropylene	560
Untreated polypropylene	500
polyethylene	40

An example of primer coatings for polypropylene substrates

(1) Primer Formulation

Components	weight (g)
SUPERCHLON 822S	100
TiO_2 (rutile)	25
Carbon black	0.5
Thixotropic Agnet *1	0.5 ~ 1.5
Stabilizer *2	5
IPA	12
Toluene	388

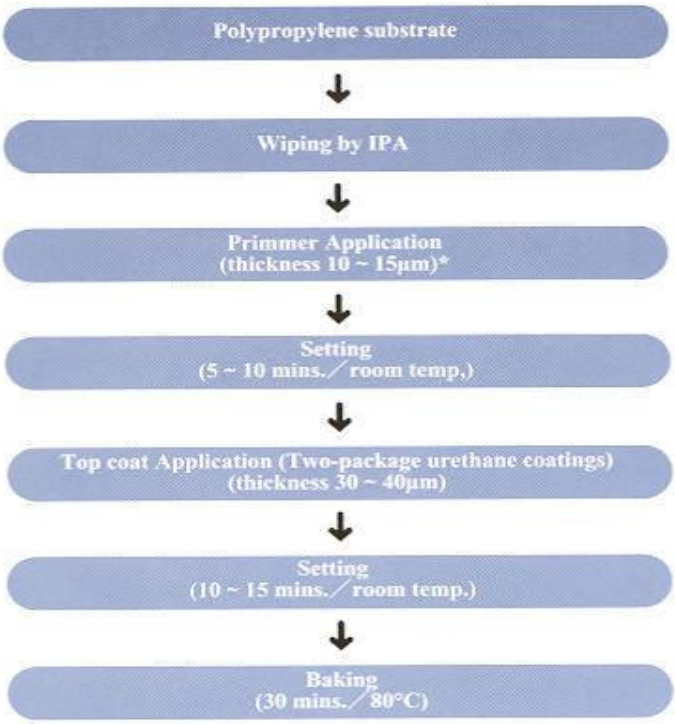
NOTE: *1 The thixotropic agents which are used in general purpose paints or chlorinated rubber type paints are effective. Polyamide type thixotropic agents are particularly effective. But, please, be careful not to use a large amount of polyamide type thixotropic agents, which vary the properties of SUPERCHLON 822S.

*2 Bisphenol type epoxy resins, for example, "EPIKOTE #828" by SHELL CHEMICAL CO., LTD., are well suited to the stabilizer.

(2) Preparation & Painting

The above components of primer formulation were dispersed together for 1 hour by use of sand mill. Then, the mixture was diluted to a suitable viscosity with toluene or xylene (13 ~ 14 secs. by Ford Cup No. 4) and spray-coated on a polypropylene substrate, whose surface had been treated by IPA vapor. This coating thickness requires 10 ~ 15μm. Primer's properties increase with increasing coating thickness.

(3) Application system



NOTE:
Increasing viscosity & Gelation at low temperature

Though the primer coating based on SUPERCHLON 822S tends to increase viscosity or gel at low temperature, by warming it to 50 ~ 60°C this viscosity will revert to a initial condition. The coating which was diluted to a suitable viscosity with toluene or xylene (13 ~ 14 secs. by Ford Cup No. 4) will be little found increasing viscosity and gelation at low temperature.

*10 ~ 15μm with pigment
Approx. 5μm without pigment

(4) Experimental Results

The experimental results in System 1 and System 2 are shown below.

- System 1... After spray coating the primer based on SUPERCHLON 822S to the test plates of polypropylene bumper, two-package urethane coating was sprayed. (PRIMER)
- System 2... Two-package urethane coating was sprayed directly to the test plates of polypropylene bumper. (NONE PRIMER)

	System 1 (PRIMER)	System 2 (NONE PRIMER)
Adhesion	Excellent	Peeled off
Gasoline resistance (Dipping)	No change after 4 hrs.	Top coating was peeled off after 10 mins.
Moisture resistance	No change	Blistering
Bending resistance	No change	No change
Impact resistance	No change	No change

(5) Testing Procedures

•Adhesion
On the surface of the coaitng, 100 sections of a checkered pattern were cut into through the whole coating layer thickness at intervals of 1mm.
A cellophane adhesive tape was tightly applied to the checkered pattern and then was peeled off at an angle of 180°.

•Gasoline resistance
The coatings were scratched to draw X markes deep through the whole coating layer thickness.
The conditions of the coatings were examined after lapsed time.

•Moisture resistance
The coated test plates were left at 50°C and under an atmosphere of relative humidity exceeding 98% over 240 hours.
The conditions of the coatings were examined after the lapse of the test period.

•Bending resistance
The coated test plates were bent 180° by means of a 1／2 inch diameter mandrel. Then, the coditions of the coatings were examined.

•Impact resistance
A Dupont type impact tester was used. A hitting core of 1／2 inch with a load of 500g was used.
It was dropped from above at a distance of 50cm for hitting on the surface.