

TOYOBO CO, .LTD

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Product information

HARDLEN_{TM} CY-2321P

HARDLEN_{TM} CY-2321P has high compatibility with other resin and high solubility. This product has same property with CY-2121P. Futhermore, it has great stability under low temperature. The paint formulation including HARDLEN_{TM} CY-2321P has great performance for PP and TPO substrate.

(1) Characteristics

1. Good compatibility with other resin
2. Good adhesion strength for PP and TPO substrate without pre-treatment
3. Good performance to water and gasoline resistance
4. Good stability under low temperature (-5 °C)

(2) Properties

Type	CY-2321P
Chlorine content (wt%)	21
Total MA content (wt%) ^{a)}	1.3
Molecular weight ^{b)}	50k
Viscosity (mPa·s) ^{c)}	20
Color(Gardner)	3
Product form	Pellet

a)IR, b)GPC, c) NV:20% Toluene solution

These data are not specification.

(3) Solubility

These pellet can be dissolved easily in aromatic solvents. But solubility of non-aromatic solvent is not good. It is effective to blend ester or ketone with cycloalkane type solvent.

Solvents		CY-2321P	CY-2121P
Aromatic hydrocarbon	Xylene	C	C
	Toluene	C	C
Non aromatic hydrocarbon	Cyclohexane (CH)	SC	SC
	Methylcyclohexane (MCH)	SC	SC
Ester or ketone	Ethyl acetate (EA)	NG	NG
	n-Butyl acetate (BA)	SC	SC
	Methyl n-amyl ketone (MAK)	CL	CL
Mixture	CH or MCH / EA = 50 / 50	C	C
	CH or MCH / BA = 50 / 50	C	C

C : Clear, SC : Slightly clouded, CL : Clouded, NG : Insoluble

(4) Low temperature stability (N.V. 20%)

Low temperature stability of CY-2321P solution is good.

Notes: CY-2321P is maleic anhydride (MAH) modified PO, so they are sensitive to moisture. Therefore, it is preferable to use the pellet and dissolve in non-moisture atmosphere. Ring opening of maleic anhydride makes viscosity higher due to hydrogen bonding. Addition of polar solvent (MEK etc.) 5% is effective to prevent hydrogen bond.

Solvents	Temp.	CY-2321P	CY-2121P
Xylene	5	C	C
	-5	C	C
Toluene	5	C	C
	-5	C	C
CH/EA= 50/50	5	SC	SC
	-5	CL	CL
CH/BA= 50/50	5	SC	SC
	-5	CL	CL

C : Clear, SC : Slightly clouded, CL : Clouded, NG : Insoluble

(5) Compatibility (N.V. 20%)

The compatibility of CY-2321P and CY-2121P with co-resin

	Ratio (CPO/Others)	ALUKIDIR ^{a)} EZ-3653-60	ALUKIDIR ^{a)} EZ-3801-60	ALUKIDIR ^{b)} P-539	Acrylic ^{c)} ZU-582	Acrylic ^{c)} A-166	Acrylic ^{c)} WDL-787
CY-2321P	50/50	C	C	C	C		
	25/75	C	C	C	C		
	10/90	C	C	C	C		
CY-2121P	50/50	C	C	C	C		
	25/75	C	C	C	C		
	10/90	C	C	C	C		

C: compatible, I: Incompatible

a) Alkyd resin of short oil fatty acid type, produced by DIC b) Alkyd resin of short oil fatty acid and Phenol modified type, produced by DIC c) Acryl resin, produced by DIC

(6) Paint performance including CY-2321P

We evaluated performance of paint formulation including CY-2321P. CY-2321P formulation gives water resistance and gasoline resistance.

No.		1	2
NV		36.2	36.2
PWC		40	40
Mill base	Alkyd resin (NV:60%, Xylene)(%)	21.5	21.5
	TiO ₂ (*1)(%)	11.1	11.1
	Carbon black (*2)	0.6	0.6
	Barium sulfate (*3)(%)	1.8	1.8
	Talc (%)	0.8	0.8
	Xylene (%)	8.3	8.3
Let down	CY-2321P(NV:20%, Xylene)(%)	44.8	
	CY-2121P(NV:20%, Xylene)(%)		44.8
	Cyclohexane	9.2	9.2
	MEK	1.9	1.9
Total		100	100

*1: Main modifier : Al, Si, Oil absorption : 21 cm³/100 g, Made from chlorine process

*2: Nitrogen absorption surface area : 115 m² , Oil absorption : 110 cm³/100 g , pH value : 7.5

*3: Surface treatment : SiO₂-Al₂O₃, pH value : 8

No.		1	2
CPO		CY-2321P	CY-2121P
Adhesion test*	Cross-hach test	0/100	0/100
	Water resistance (40C, 10 days)	0/100	0/100
	Gasoline resistance(Max:120min)	120min	120min
	E-10 resistance (Max:120 min, Gasoline 90%, Ethanol 10%)	45min	45min
Paint stability (Ford cup #4)	Low temperature fluidity (-5C, 10 days)	17→18 sec	17→17 sec
	High temperature fluidity (50C, 10 days)	17→18 sec	17→18 sec

* Primer thickness : 10 μm. Top coat : 2k polyurethane, thickness 30-40μm
 Cross-hatch test 2mm*2mm 100 mass. XX/100 means how many peeled off

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