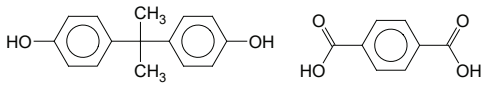


PAR polyarylate

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	polyarylate	
IUPAC name	-	poly[oxycarbonylphenylenecarbonyloxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene]	
CAS name	-	poly[oxycarbonylphenylenecarbonyloxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene]	
Acronym	-	PAR	
CAS number	-	39281-59-9	
HISTORY			
Person to discover	-	Korshak, V V; Vinogradova, A V; Salazkin, S N; Bereza, S V	Korshak, V V; Vinogradova, A V; Salazkin, S N; Bereza, S V, US Patent 3,480,597, Nov. 25, 1969.
Date	-	1969	
Details	-	method of producing polyarylates	
SYNTHESIS			
Monomer(s) structure	-		
Monomer(s) CAS number(s)	-	80-05-7; 100-21-0	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	228.29; 166.13	
Monomer ratio	-	1:0.5:0.5 (Ardel, U-polymer)	
Method of synthesis	-	polyarylate is the polyester derived from bisphenol-A and a mixture of isophthalic and terephthalic acids by acidolysis, phenolysis, alcoholysis and esterolysis	Han, X; Padia, A B; Hall, H K, J. Polym. Sci. A, 37, 2891-97, 1999.
Temperature of polymerization	°C	260	
Time of polymerization	h	108	
Yield	%	100	
Mass average molecular weight, M_w	dalton, g/mol, amu	81,000-148,000	
COMMERCIAL POLYMERS			
Some manufacturers	-	Westlake; Unitika; Kuraray	
Trade names	-	Ardel; U-polymer; Vectran (fiber)	
PHYSICAL PROPERTIES			
Density at 20°C	g cm ⁻³	1.2-1.21	
Refractive index, 20°C	-	1.64	
Transmittance	%	87	
Haze	%	2.3	
Melting temperature, DSC	°C	228-252	
Thermal expansion coefficient, 23-80°C	10 ⁻⁴ °C ⁻¹	0.61	
Thermal conductivity, melt	W m ⁻¹ K ⁻¹	0.18	

PAR polyarylate

PARAMETER	UNIT	VALUE	REFERENCES
Glass transition temperature	°C	155-196	Serin, M; Sakar, D; Cankurtaran, O; Karaman Yilmaz, F, J. Optoelectronics Adv. Mater., 6, 1, 283-88, 2004.
Specific heat capacity	J K ⁻¹ kg ⁻¹	1200	
Long term service temperature	°C	150	
Heat deflection temperature at 0.45 MPa	°C	175-180	
Heat deflection temperature at 1.8 MPa	°C	160-174	
Hildebrand solubility parameter	MPa ^{0.5}	10.8-11.6	Serin, M; Sakar, D; Cankurtaran, O; Karaman, F, J. Optoelectronics Adv. Mater., 7, 3, 1533-38, 2005.
Dielectric constant at 100 Hz/1 MHz	-	1.9-3.3/3.0	
Relative permittivity at 100 Hz	-	2.6-3.3	
Dissipation factor at 1000 Hz	E-4	40-100	
Volume resistivity	ohm-m	2E12-2E15	
Surface resistivity	ohm	2E12	
Electric strength K20/P50, d=0.60.8 mm	kV mm ⁻¹	31-106	Noniewicz, K; Brzozowski, Z K; Zadrozna, I, J. Appl. Polym. Sci., 60, 1071-82, 1996.
Arc resistance	s	127	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	48-75	
Tensile modulus	MPa	2,070-2,100	
Tensile stress at yield	MPa	69	
Elongation	%	25-65	
Tensile yield strain	%	8.4	
Flexural strength	MPa	76-83	
Flexural modulus	MPa	2,100-2,140	
Compressive strength	MPa	81-84	
Izod impact strength, notched, 23°C	J m ⁻¹	260-288	
Rockwell hardness	-	R105-125	
Shrinkage	%	0.8-1.0	
Water absorption, 24h at 23°C	%	0.26	
CHEMICAL RESISTANCE			
Alcohols	-	good	
Aliphatic hydrocarbons	-	good	
Aromatic hydrocarbons	-	good	
Halogenated hydrocarbons	-	poor	
Other	-	poor	
⊖ solvent, ⊖-temp.=25	-	dioxane:cyclohexane=68:32	
Good solvent	-	tetrachloroethane	
Non-solvent	-	THF, n-heptane	

PAR polyarylate

PARAMETER	UNIT	VALUE	REFERENCES
FLAMMABILITY			
Limiting oxygen index	% O ₂	34-36	
Heat release	kJ g ⁻¹	4-19	Zhang, H; Westmoreland, P R; Farrus, R J; Coughlin, E B; Plichta, A; Brzozowski, Z K, Polymer, 43, 5463-72, 2002.
Char at 500°C	%	27-41	Zhang, H; Westmoreland, P R; Farrus, R J; Coughlin, E B; Plichta, A; Brzozowski, Z K, Polymer, 43, 5463-72, 2002.
UL 94 rating	-	V-0	
WEATHER STABILITY			
Spectral sensitivity	nm	320-340	
Activation wavelengths	nm	343, 355, 370	
Important initiators and accelerators	-	30 weeks of WOM exposure without changes	Cooney, J D, Polym. Eng. Sci., 22, 8, 492-98, 1982.
Products of degradation	-	photo-Fries rearrangement producing UV absorber which protects against further degradation	
Stabilizers	-	uses own produced UV absorber	
PROCESSING			
Preprocess drying: temperature/ time/residual moisture	°C/h/%	120-140/6-8/	
Processing temperature	°C	310-360	
Processing pressure	MPa	0.981 (back)	
Applications	-	appliance parts, automotive, photolithographic emulsions, semiconductor components, snap-lock connectors, solar energy components	
Outstanding properties	-	UV stability, transparency, good electrical properties	