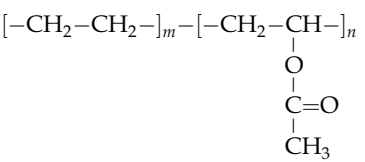
Ethylene-vinyl acetate copolymer

PING XU

ACRONYMS, TRADE NAMES EVA; A-C® (Allied Signal); Elvax® (DuPont); Levapren® (Bayer); Microthene®, Spectratech®, Ultrathene® (Quantum Chemical); Modic®, Novatec® (Mitsubishi Kasei); PDX® (LNP)

CLASS Chemical copolymers

STRUCTURE



MAJOR APPLICATIONS Film extrusion, packaging, wire and cable insulation, adhesives, coatings, and compounding.

PROPERTIES OF SPECIAL INTEREST Flexibility and toughness, good adhesion, and stress crack resistance.

PROPERTY	UNITS	CONDITIONS*	VALUE	REFERENCE
Linear thermal expansion coefficient	K^{-1}	ASTM D696, no composition given	$16–25 \times 10^{-5}$	(1)
Density	$g\,cm^{-3}$	ASTM D792, 9–28% vinyl acetate	0.93–0.95	(2)
Solubility parameter	$(MPa)^{1/2}$	Halogenated aliphatic and aromatic liquids, 20°C		(3)
		30% vinyl acetate	19.0	
		40% vinyl acetate	19.2	
		67% vinyl acetate	19.0	
		Halogenated aliphatic and aromatic liquids, 30°C		
		30% vinyl acetate	18.8	
		40% vinyl acetate	18.9	
		67% vinyl acetate	18.9	
Interaction parameter χ	—	29% vinyl acetate, 150°C, inverse GC, infinite solution		(4, 5)
		Acetaldehyde	0.16	
		Acetic acid	1.12	
		Benzene	−0.02	
		1-Butanol	0.65	
		2-Butanol	0.51	
		Cyclohexane	0.07	

PROPERTY	UNITS	CONDITIONS*	VALUE	REFERENCE
Interaction parameter χ	—	Dioxane	0.45	
		Ethanol	1.28	
		Hexane	0.25	
		Methanol	1.69	
		Octane	0.23	
		2-Propanol	0.93	
		Tetrahydrofuran	0.25	
		m-Xylene	−0.02	
Glass transition temperature	K	30% vinyl acetate, $M_n = 27{,}000\,g\,mol^{-1}$, $M_w = 110{,}000\,g\,mol^{-1}$	231	(3)
		40% vinyl acetate, $M_n = 25{,}000\,g\,mol^{-1}$, $M_w = 130{,}000\,g\,mol^{-1}$	235	
Melting point	K	30% vinyl acetate, $M_n = 27{,}000\,g\,mol^{-1}$, $M_w = 110{,}000\,g\,mol^{-1}$	345	(3)
		40% vinyl acetate, $M_n = 25{,}000\,g\,mol^{-1}$, $M_w = 130{,}000\,g\,mol^{-1}$	318	
Brittleness temperature	K	ASTM D746		(2)
		9% vinyl acetate, melt index = 2.2 g/10 min	<197	
		9% vinyl acetate, melt index = 9.8 g/10 min	<197	
		15% vinyl acetate, melt index = 8.2 g/10 min	<197	
		15% vinyl acetate, melt index = 30 g/10 min	<197	
		18% vinyl acetate, melt index = 1.5 g/10 min	<197	
		18% vinyl acetate, melt index = 30 g/10 min	<197	
		19% vinyl acetate, melt index = 0.45 g/10 min	<197	
		19% vinyl acetate, melt index = 30 g/10 min	<197	
		28% vinyl acetate, melt index = 3.1 g/10 min	<197	
Vicat softening temperature	K	ASTM D1525, ring and ball method		(2)
		9% vinyl acetate, melt index = 2.2 g/10 min	356	
		9% vinyl acetate, melt index = 9.8 g/10 min	348	
		15% vinyl acetate, melt index = 8.2 g/10 min	339	
		15% vinyl acetate, melt index = 30 g/10 min	334	
		18% vinyl acetate, melt index = 1.5 g/10 min	334	
		18% vinyl acetate, melt index = 30 g/10 min	327	
		19% vinyl acetate, melt index = 0.45 g/10 min	335	
		19% vinyl acetate, melt index = 30 g/10 min	331	
		28% vinyl acetate, melt index = 3.1 g/10 min	322	
Tensile strength at break	MPa	ASTM D638		(2)
		9% vinyl acetate, melt index = 2.2 g/10 min	13.9	
		9% vinyl acetate, melt index = 9.8 g/10 min	11.7	
		15% vinyl acetate, melt index = 8.2 g/10 min	12.8	
		15% vinyl acetate, melt index = 30 g/10 min	10.4	
		18% vinyl acetate, melt index = 1.5 g/10 min	13.5	