

CEC carboxylated ethylene copolymer

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	carboxylated ethylene copolymer (ionomer), poly(ethylene-co-acrylic acid)	Laney, K A, B.Sc. Thesis, Princeton Uni., 2010.
Acronym	-	CEC	
CAS number	-	187410-30-6; 9078-96-0	
HISTORY			
Person to discover	-	Armitage, J B of DuPont	
Date	-	1961	
SYNTHESIS			
Monomer(s) structure	-	$\text{CH}_2=\text{CH}_2$; $\text{CH}_2=\text{C}(\text{CH}_3)\text{COOH}$	
Monomer(s) CAS number(s)	-	74-85-1; 79-41-4	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	28.05; 86.06	
Methacrylic acid content	%	usually <15 mol% (range 5-70 wt%)	
Method of synthesis	-	copolymers are produced by high-temperature/high pressure free radical polymerization similar to the one used in production of LDPE. Carboxyl groups are completely or partially neutralized to form ionomers (mostly Na or Zn). Neutralization extent increase causes adequate increase in viscosity of material	
Polydispersity, M_w/M_n	-	10	
Degree of branching		2/100 carbons (short chain), 1/1000 carbons (long chain)	
STRUCTURE			
Crystallinity	%	30	
COMMERCIAL POLYMERS			
Some manufacturers	-	DuPont	
Trade names	-	Surlyn	
PHYSICAL PROPERTIES			
Density at 20°C	g cm ⁻³	0.94-0.97; 1.01 (crystalline)	
Melting point	°C	70-100	
Freeze point	°C	36-75	
Refractive index, 20°C	-	1.49	
Haze	%	3-7	
Thermal expansion coefficient, 23-80°C	°C ⁻¹	6E-5	
Heat of fusion	kJ mol ⁻¹	2.32	
Melt flow index	g 10 min ⁻¹	0.7-20	
Dielectric constant at 100 Hz/1 MHz	-	3.8/	

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MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	15.8-37.2	
Elongation at break	%	285-770	
Hardness	Shore D	36-68	
Water absorption, equilibrium in water at 23°C	%	11-19	
PROCESSING			
Typical processing methods	-	extrusion	
Applications	-	film, laminate, adhesive accelerator	
BLENDS			
Suitable polymers	-	EOP, HDPE, LDPE, LLDPE	Besser, K D; Gereke, J; Haubler, L; Leitner, B; Rapphel, I, US Patent, 2011/0077356, Dow, Mar. 31, 2001.

