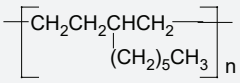
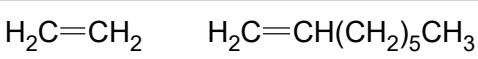
ULDPE ultralow density polyethylene

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	ultralow density polyethylene, ethene-1-octene copolymer	
Acronym	-	ULDPE	
CAS number	-	26221-73-8	
Formula			
SYNTHESIS			
Monomer(s) structure	-		
Monomer(s) CAS number(s)	-	74-85-1; 111-66-0	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	28.05; 112.24	
Monomer(s) expected purity(ies)	%	99.0; 99.0	
Octene content	%	3.3-14.6	Haward, R N, Polymer, 40, 5821-32, 1999.
STRUCTURE			
Crystallinity	%	42.9	Woo, L; Westphal, S; Ling, T K, Thermochim. Acta, 226, 85-98, 1993.
COMMERCIAL POLYMERS			
Some manufacturers	-	DOW	
Trade names	-	Attane	
PHYSICAL PROPERTIES			
Density at 20°C	g cm^{-3}	0.865-0.912	
Color	-	white	
Transmittance	%	85-99	
Haze	%	0.6-8	
Gloss, 60°, Gardner (ASTM D523)	%	67-92	
Odor		odorless	
Melting temperature, DSC	°C	123-124	
Heat of fusion	J g^{-1}	125.6	
Vicat temperature VST/A/50	°C	71-93	
Seal initiation temperature	°C	84-97	
Permeability to carbon dioxide, 25°C	cm^3 mm m^{-2} atm^{-1} 24 h^{-1}	1,200-2,000	
Permeability to oxygen, 25°C	cm^3 mm m^{-2} atm^{-1} 24 h^{-1}	280-450	
Permeability to water vapor, 25°C	g mm m^{-2} atm^{-1} 24 h^{-1}	0.53-0.85	

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MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	29-53	
Tensile modulus	MPa	150	
Tensile stress at yield	MPa	4.9-9.8	
Elongation	%	450-660 (MD); 650-760 (TD)	
Dart drop impact	g	450 to >850 (0.02 mm thick film); 610-1,500 (0.051 mm)	
Film puncture resistance	J cm^{-3}	19-24 (0.02 mm thick film); 18-26 (0.051 mm)	
Elmendorf tear strength	g	260-330 (MD) and 450-530 (TD) (0.02 mm thick film); 550-1,000 (MD) and 870-1,200 (TD) (0.051 mm)	
Toughness	J cm^{-3}	1,050-1,280	
Melt index, 190°C/2.16 kg	g/10 min	0.5-4.0	
FLAMMABILITY			
Volatile products of combustion	-	CO,CO_2	
TOXICITY			
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
Oral rat, LD_{50}	mg kg^{-1}	>5,000	
Skin rabbit, LD_{50}	mg kg^{-1}	>2,000	
PROCESSING			
Typical processing methods	-	blown film, cast film	
Processing temperature	°C	226-232	
Applications	-	food packaging	
Outstanding properties	-	abuse resistance, cling, optical properties, pinhole resistance, processability	
BLENDS			
Suitable polymers	-	PP, SIS	